

ABOUT

TRUST

THE MAGAZINE OF THE TÜV SÜD GROUP 02 — 2022



Add value.
Inspire trust.

...s on
...a hub.
...the important
...pace Telescope
...ades—and why it
...n be retired.

Focus: **TRANSPARENCY**

A look behind the scenes has fascinated humanity for millennia, but a clear view of things doesn't always help us. We explore where transparency can help make companies more sustainable, how it reveals the mysteries of wastewater and when too much transparency does more harm than good.

ABOUT

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DEAR READERS,

Heat waves, droughts across multiple continents, energy supplies in crisis: the global events of the past months have reminded us all yet again that sustainability and climate protection are more important now than ever before.

Our cover story focuses on the European Union and how it is trying to encourage companies to operate more sustainably. One of the key issues here is transparency: it should be possible to compare procedures, to avoid greenwashing and, as far as possible, to ensure that only measures that really benefit the climate, the environment and our society are initiated.

We at TÜV SÜD are setting a good example. Our Sustainability Report, published in July, was put together according to the standards of the Global Reporting Initiative for the first time. We're also aligning our services to become the most sustainable company in our industry. Renewable energies, sustainable construction, low-emissions mobility and the circular economy: we know what's driving markets and offer solutions in multiple areas for our customers' sustainability. We as a company are forging our own path towards greater climate protection and have set ambitious carbon-dioxide reduction targets for 2025. In this issue and on our website, you can find a wealth of information about our dedication and involvement—set out for you as transparently as possible.

I hope you find inspiration and enjoy the read!



**PROF. DR.-ING.
AXEL STEPKEN**

Chairman of the Board of Management, TÜV SÜD AG



02 2022

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PHOTOS: TÜV SÜD (Stepken); Philotheus Nisch, Getty Images/Tarchyshnik (cover); Tabea Mathern (food); Philotheus Nisch (water); NASA (Hubble Space Telescope)



Still life. All of these foods are actually vegan.

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You can find even more articles on the ABOUT TRUST content hub. For instance, find out about the important role that the Hubble Space Telescope has played for decades—and why it will soon be retired.

PUBLICATION DETAILS

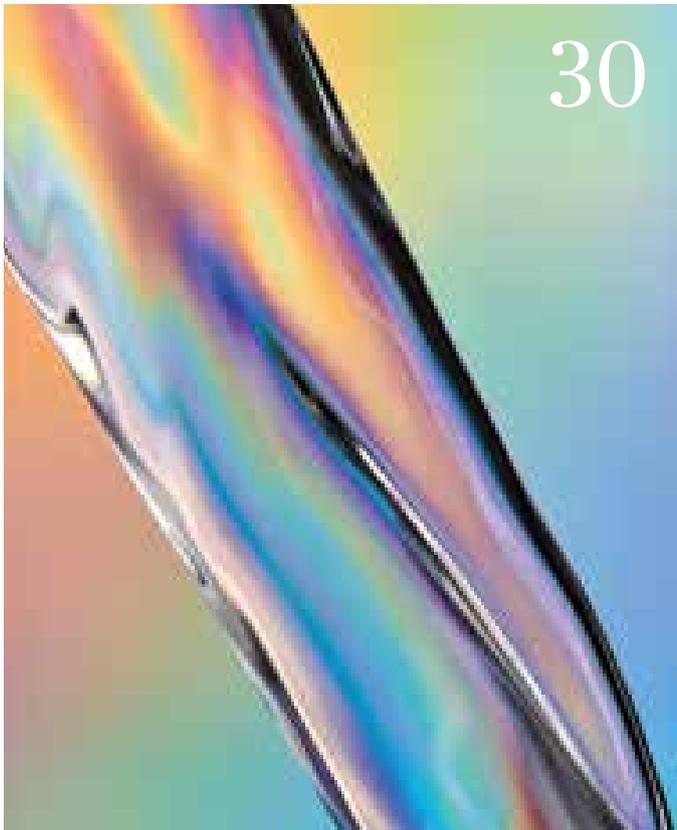
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Go with the flow. Wastewater can reveal a lot about people.

Focus

TRANSPARENCY



LOCAL HUMAN-RIGHTS NETWORK



The Supply Chain Act will come into force in Germany in 2023. One of its goals is that companies must eliminate negative impacts of their activities on human rights as far as possible. This will prove quite challenging for many companies, particularly those with global footprints. TÜV SÜD and the Linklaters law firm have founded the Munich Human Rights Compliance Network to support companies and to allow them to share experiences. At the kickoff event in early July 2022, around 25 representatives of the largest companies met in the Bavarian capital. The participants' conclusion: those who reap the benefits of global supply chains also bear responsibility for the consequences. Adequate wages, particularly in developing countries, safe working conditions and the prohibition of child labor must become core issues in all business activities. The Munich Network has now created a platform to further promote these issues.

NEW TRANSPARENCY RULES

The European Commission has passed comprehensive rules for consumer protection—known as the New Deal for Consumers—that have been in force in all member states since the end of May. One of the most important reforms: companies that make customer reviews accessible must be transparent about whether they ensure that the review authors actually use the product in question. It must also be clear whether all reviews are actually displayed, both the positive and the negative ones. Furthermore, if search engine rankings can be boosted by paying a fee, this must be made clear in the future. Companies must now comply with these new regulations or they could face sanctions. Another New Deal rule is that when companies offer items at a discount, they now must always indicate the previous sales price.



CONCENTRATED AERIAL CABLEWAY EXPERTISE

Austria has around 1,000 aerial cableways and 8,000 surface lifts—and around two-thirds of them are regularly inspected by TÜV SÜD. Now these specialists have a new headquarters; the International Competence Center for Security and Aerial Cableways in Wiesing, Tyrol, offers state-of-the-art testing facilities, for instance for cables or for surface tears, and is also pioneering in its own way. Sustainability was very important from the get-go: around 70 percent of the building's energy needs are self-generated with photovoltaics. In total, TÜV SÜD has more than thirty experts for aerial cableways deployed around the world.



NEW LABS FOR MORE SUSTAINABILITY

The TÜV SÜD network of testing facilities that are focused on innovation and sustainability continues to grow and grow. This summer, an additional two laboratory centers were added: in Chonburi, Thailand, the ninth TÜV SÜD Lab for Batteries and Automotive Components started operations and became part of TÜV SÜD's global testing network. At this new location, located on the Gulf of Thailand, the performance and service life of e vehicle batteries can be tested, not to mention tests for environmental compatibility, sustainability and durability. In Fareham, England, the Octagon Hub started operations in late July 2022. The focus here is on testing electrical and electronic equipment, their emissions and electromagnetic compatibility. Particularly in this field, the issue of the circular economy is becoming increasingly important.

87

PERCENT

was the top score of the best brands on the Fashion Transparency Index 2022. This index is published annually by the NGO Fashion Revolution to measure how openly fashion brands communicate their sustainability. This year, the index focused on issues including the amount of water used in production, the use of microfibers and how many employees in the supply chain receive a living wage. Fashion Revolution sent its questionnaire to all fashion companies with annual sales of 400 million US dollars or more. Of the 250 firms the NGO contacted this year, it reports that 62 percent participated in its survey, more than ever before.

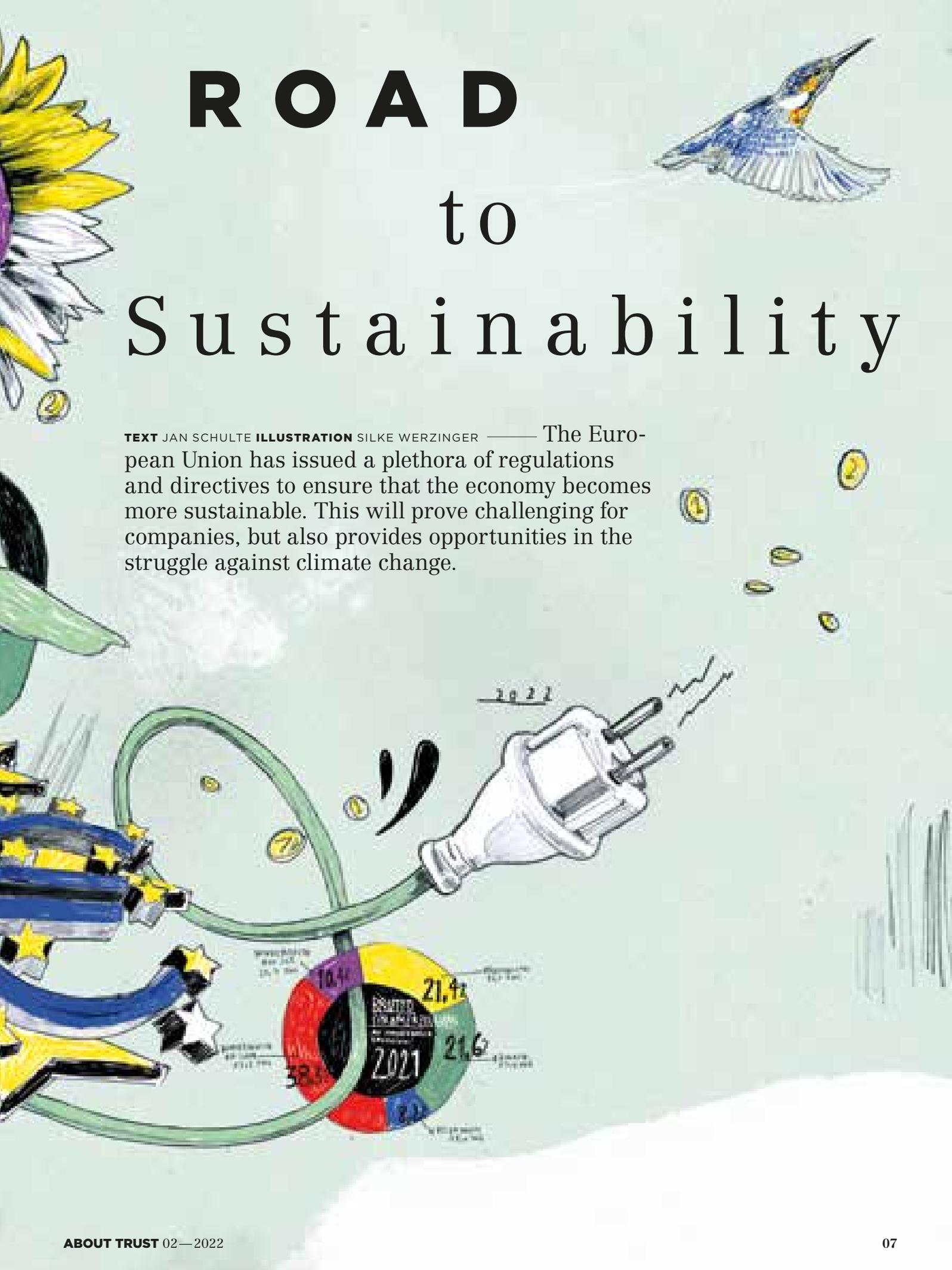


The Long



ROAD to Sustainability

TEXT JAN SCHULTE **ILLUSTRATION** SILKE WERZINGER — The European Union has issued a plethora of regulations and directives to ensure that the economy becomes more sustainable. This will prove challenging for companies, but also provides opportunities in the struggle against climate change.



If climate change could be fought with words, then the decisive step toward victory would have been taken on December 12, 2015. “Today, we can look into the eyes of our children and grandchildren, and we can finally ... tell them that we have joined hands to bequeath a more habitable world to them and to future generations,” said then-UN Secretary-General Ban Ki-moon. When future historians would look back on that day, Ban said, they would find that the fight against climate change had taken a “dramatic turn.”

Ban Ki-moon made this pronouncement on the day that the global community agreed to the Paris Climate Accords. The agreement at that time was that global temperature increases should remain well under 2 degrees Celsius, or 1.5 degrees at best. Yet it was already clear at the time that words wouldn't be enough, particularly because it was left up to each country to decide what measures would be taken to achieve the goal.

The European Union set an ambitious target after the Paris conference: according to its Green Deal, it wants to become climate neutral by the year 2050 with net-zero greenhouse-gas emissions, meaning that it will fully compensate for any emissions that are still being produced. To achieve this, the entire economy within the EU will have to be transformed—and this will be expensive: the measures necessary will cost up to one trillion euros just until 2029. To ensure that the private and public funds flowing into this transformation are spent in a targeted manner, the EU has issued a slew of regulations and directives with the goal of increasing the transparency of the economy with regard to sustainability.

“With a bit of imagination, the EU Commission could say that non-sustainable companies shouldn't get any funds at all.”

CHRISTIAN KLEIN, PROFESSOR
OF SUSTAINABLE FINANCE



It's a daunting task—and a huge opportunity for all companies. Christian Jöst is familiar with both sides of the issue. Since summer 2022, he's been a member of the new Sustainable Finance Advisory Council of the German Federal Government, where he primarily represents the interests of small and medium-sized enterprises (SMEs) in the country. His own company, Jöst abrasives GmbH, produces

abrasives and abrasive systems in Odenwald, in southwestern Germany. Particularly since last year he's noticed growing interest among his customers in issues of sustainability and supply chains. “I spent more than thirty working days in 2021 filling out other companies' questionnaires to provide information about our efforts in this area,” he says.

Along with specialist wholesalers and large distributors, his clients also include some major industrial companies that are already subject to some of the new EU regulations. “We supply globally,” Jöst says with pride in his voice. “Wherever surfaces need to be processed, our products are used.” Meanwhile, his larger customers want to know how much carbon dioxide his production process emits, how well his supply chain is monitored and, for instance, whether he can rule out the use of child labor or forced labor at his company and in his supply chains—as required by the new German Supply Chain Act.

Jöst believes that this sort of transparency is correct and important, but feels it could function more efficiently. “We need a European-wide index where all companies can register; then I wouldn't have to continually fill out new questionnaires,” he suggests. The good news for Jöst is that the EU Commission is working on it. The European Single Access Point will provide precisely what he describes. The bad news: it will take some time before the database is ready.

FIRST THINGS FIRST: THE EU TAXONOMY

First off, the question as to what is actually sustainable—and what is not—must be answered, of course. This is precisely the task of the so-called EU Taxonomy, the centerpiece of the various EU regulations. The taxonomy is a classification system

that creates a list of ecologically sustainable economic activities. It's a tool that countries outside the EU also use as a guide. The classification is also supposed to provide security for investors, help avoid greenwashing and support companies in their transformation. "We first need guidance as to what is sustainable and what isn't; that's what makes the EU Taxonomy so important," says Alexandra Themistocli, who is responsible for the issue of sustainability at the Swedish financial institution Skandinaviska Enskilda Banken (SEB) in Germany.

AN INCREASINGLY SOPHISTICATED EU CLASSIFICATION SYSTEM

The EU Taxonomy has six environmental goals. For the first two, climate protection and adaptation to climate change, the technical assessment criteria have already been defined—and regulation enthusiasts will have a field day. Across 349 pages, the assessment criteria describe in detail whether an individual economic activity is sustainable. The good news is that no company must struggle through every last page of the taxonomy. For SMEs, there's now even an online self-test from the Frankfurt School. In just a few clicks, companies can find out if they're affected by the taxonomy—and in what areas.

"The taxonomy is the EU's biggest transparency tool," says Prof. Dr. Christian Klein, who holds the Chair for Sustainable Finance at the University of Kassel and has been a trailblazer from the very start. "Twenty years ago, when I started focusing on the topic, I got a lot of funny looks," he says. His colleagues thought his research had something to do with donations. "Nowadays that has changed: sustainable finance is

moving into the mainstream, and not just in academia." He believes that performing well according to the EU Taxonomy will be decisive for how companies are financed in the future. As of now, the regulation does not yet forbid investments in non-sustainable industries; in the future, however, such companies will only be able to get money at less favorable terms. For instance, they may be excluded from receiving government subsidies.

"With a bit of imagination, the EU Commission could also use the taxonomy for hard-core regulations. For instance, at some point they could say that non-sustainable companies shouldn't get any funds at all," Klein says. It could also regulate which industries should receive investments in the future: in July 2021, electricity generation from nuclear energy and natural gas was classified as sustainable under certain circumstances—partly due to pressure from France and a few mid-Eastern-European countries and despite strong protests from other EU member states and numerous EU parliamentarians.

The taxonomy will also become much more comprehensive in the future. After all, the technical details for an additional four environmental goals in the EU Taxonomy are still being formulated. The Commission will use these four additional chapters to define what is included in the sustainable use of water resources, how the transformation to a circular economy can be designed, and what contributes to the prevention of pollution, the protection of ecosystems and the preservation of biodiversity. It sounds like a huge undertaking, which it is, but according to Themistocli, there's no alternative. "You have to look at environmental protection and climate protection together," she says. Biodiversity is closely intertwined with climate protection. Global warming is causing coral reefs to die and biodiversity to decline. "We need to push this issue on all fronts," she adds.

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ALEXANDRA THEMISTOCLI,
HEAD OF SUSTAINABILITY AT
SKANDINAVISKA ENSKILDA BANKEN



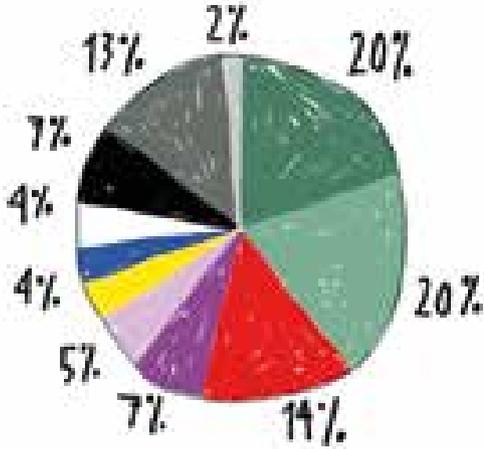
IT ALL DEPENDS ON COMPANIES

Building on the taxonomy, there's another regulation that will be crucial for companies: the Corporate Sustainability Reporting Directive (CSRD). Starting in 2024,



FRONT-RUNNERS GERMANY & FRANCE

Germany and France are the largest issuers of green bonds in Europe. Green bonds serve as tools to finance green projects for companies and countries alike.



TOP COUNTRIES AND REGIONS FOR GREEN BONDS

- France
- Germany
- Netherlands
- Sweden
- Spain
- Norway
- Great Britain
- Italy
- Europe overall
- Other
- Luxembourg

Source: Green Bond Monitor of the German Federal Bank

LEADERSHIP FUNDS

Thanks to numerous EU regulations and increasing transparency, funds focusing on sustainability are becoming more popular among private investors. In 2021, sustainable mutual funds boasted an asset size of 246 billion euros in Germany alone.



SUSTAINABLE INVESTMENT IN GERMANY IN 2021 (IN BILLIONS OF EUROS)

- Mutual funds
- Mandates and special funds
- Proprietary investments
- Customer deposits
- Total volume

Source: FNG Market Report

this will gradually apply to companies with more than 250 employees, total assets of more than 20 million euros, or sales of more than 40 million euros, thus to virtually all capital-market oriented companies.

“If the previous rules were a wave, then companies will now be facing a tsunami,” says Johann Schnabel, partner at the accounting and professional services conglomerate KPMG. In Germany, the rules will directly affect around 15,000 companies, including many SMEs.

Above all, the CSRD stipulates that companies must provide extensive information about the impact of their activities on the environment—and also how the environment affects them in turn. “There is currently talk of more than 200 specific key indicators that they will use to determine all of this,” Schnabel says. It will be the biggest innovation in corporate reporting in decades, he adds. “The problem is that they will have to translate non-financial issues into a logic of valuation—and it all has to stand up to scrutiny.”

Schnabel warns that this will be a major challenge for businesses, as companies will be facing a lot of things all at once. “These include corona, raw materials shortages, increasing energy prices, war in Ukraine,” he says, listing a few of the current issues. Nevertheless, they also shouldn’t lose sight of climate change. As Schnabel puts it, “Climate protection should be the most important issue for us all.”

SMES WILL GET A GRACE PERIOD

“Many of our companies don’t yet see themselves able to take a position on sustainable finance—or are affected by the CSRD,” says Matthias Bianchi from the German Association for Small and Medium-Sized



MATTER OF OPINION?

Whether nuclear energy or natural gas-fired power plants should be considered sustainable is highly controversial in Europe.





Larger companies will have to examine their entire supply chain and also obtain the necessary data from their suppliers for this reporting. Jöst also emphasizes this, yet he views it as a huge opportunity.

Enterprises (DMB). Even his association hasn't yet agreed on an official position. What is already clear for SMEs is that although there will be extensive lists of exceptions, deadline extensions and simplifications, they will still have to deal with sustainability reporting nonetheless. Larger companies will have to examine their entire supply chain and also obtain the necessary data from their suppliers for this reporting. Jöst also emphasizes this, yet he views it as a huge opportunity. He says many family-owned SMEs are already concerned about sustainability in any case. "They are usually closely connected to their locations and employees, so they automatically want to make sure that their immediate environment is intact."

Along with the UN authorities, there was recently someone who even better captured the urgency of the moment in words: "We are the first generation to feel the effect of climate change and the last generation who can do something about it." Former US President Obama spoke these words just four months before the big climate summit in Paris and announced tougher measures for his country. It's a statement that is being increasingly confirmed of late, in light of recent heatwaves and disastrous floods, and requires effective actions be taken.

SUSTAINABILITY AT TÜV SÜD

When is a company sustainable? For more than 150 years TÜV SÜD's focus has been on durability, efficiency and safety, not to mention technology. However, TÜV SÜD isn't resting on its laurels and is taking an active approach to climate protection and corporate responsibility. The Group has therefore set ambitious carbon-dioxide reduction targets for 2025, which are described in the Sustainability Report. Because the EU's future sustainability reporting standards are likely to be based on existing standards, TÜV SÜD reports in accordance with the Global Reporting Initiative.

INTERNALLY As part of an integrated plan, the company is greening its business operations. Take procurement as an example: around 90 percent of the total volume is sourced from local or regional suppliers—with short delivery routes. Durability, low energy consumption, ease of repair and reusability are laid down in a Supplier Code of Conduct, which applies not only to its suppliers but also to TÜV SÜD itself. The corporate vehicle fleet is gradually being converted to electric motors, and green electricity is already the company's dominant source of power in Germany, accounting for almost 90 percent of the total.

EXTERNALLY TÜV SÜD actively supports other companies in introducing and implementing sustainability-oriented business practices, for instance by examining and certifying appropriate management systems according to recognized standards or via energy audits. In Singapore, TÜV SÜD is currently developing a framework to help manufacturing companies on their path to more sustainability: the Green Compass focuses on a company and its value creation as well as on its products.

VERIFICATION Starting in 2024, companies will have to begin complying with the regulations of the Corporate Sustainability Reporting Directive (CSRD). This sustainability information must be verified by independent and accredited third parties to ensure that the reporting actually complies with these mandatory reporting standards. "We're particularly pleased to see the independent verification aspect of this," says TÜV SÜD Member of the Board of Management Prof. Dr. Matthias J. Rapp. "There is a rapidly increasing need for effective action in many respects. Aside from this, the danger of greenwashing is also increasing, thereby increasing the need for credible and robust verification."



“Too much
TRANSPARENCY

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Information
**HARDER
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TEXT NILS WISCHMEYER ——— Most of the world would love to be transparent—at least, that’s what people demand. Sascha Friesike explains why this often goes awry and why it’s much more a question of the right degree of transparency.

Mr. Friesike, companies and politicians are saying the same thing: We need more transparency. Where is this impulse coming from?

FRIESIKE There are two reasons for it. Number one, the concept of transparency has an incredibly positive connotation. Everyone associates it with something good and nobody would criticize calls for more transparency. That’s why you can ask for more transparency in practically any situation, regardless of how useful it actually is. Number two, today we have technology that makes it relatively simple to make something transparent. Data can be sent or linked, so we can easily make it accessible to others.

That sounds great.

FRIESIKE Yes and no. Transparency isn’t an end in itself. It’s a bit like a window. No one collects windows, nobody says we must increase the number of windows. Windows are always a means to an end. We want to look through them to the outside, we want to let in some air, and especially we want light to come in. Transparency is similarly nothing more than a means to an end. If we just create transparency for its own sake, it can even negatively affect the goal we are trying to achieve. So we need to use transparency consciously for particular purposes..

What could one of those purposes be?

FRIESIKE In principle, there are two traditional reasons for more transparency. Firstly, for accountability. In this case, I want more transparency as evidence that someone is doing the right thing. That’s

what called for in politics, for instance, when politicians should show that they’re doing a good job. To check this, we quickly return to the demand for more transparency. Then there’s also the visibility factor. Here, for example, transparency is supposed to reveal information so that we can make better, more informed decisions. Amusingly, in neither case does science assume that more transparency automatically leads to the goal. The relationships are more complex.

Getting back to visibility for a moment, why wouldn’t more transparency lead to more visibility?

FRIESIKE There is what’s known as the transparency paradox. This describes how transparency and visibility don’t always go hand in hand. That is, more transparency doesn’t necessarily lead to more visibility. If we plot the terms on a graph, we see more of an up-and-down movement. Visibility increases with increasing transparency up to a certain point, and then begins to fall. Because at some point, you’ve reached the spot where there is too much data, too much information. It may be transparent, but we can no longer keep track of it. And that means that the content is now becoming less visible, not more.

That sounds very abstract. Could you give an example of this?

FRIESIKE I regularly go shopping with my four-year-old daughter. In the supermarket, she then suddenly wants a brightly colored drink and I need to make an ad-hoc decision about which one is the healthiest for such a young child. Of course, the ingredients are all listed in the fine print, so there’s a high degree of transparency. Except that this doesn’t really help me because I don’t spontaneously understand that glucose syrup is simply sugar and how much 10 grams



⊕ per 100 milliliters extrapolated to a whole bottle actually is. Not to mention that I would still have to compare all the bottles to one another. The key facts I need get lost in the noise of too much information. The solution might be some sort of “traffic signal” labeling for children’s foods that clearly indicates: green is healthy, orange is so-so, and red shouldn’t really be bought at all. In such a case, an aggregate of information could lead to a better decision. So it’s always about the right level of transparency, which we can often only create through a summary, simplification or visualization. I always have to ask myself: What is my goal? Why do I want to make something transparent? If the honest goal is for me to make better purchasing decisions as a consumer, then I have to find the right degree of transparency.

So how do you find the right level?

FRIESIKE There’s no easy across-the-board answer. From my experience, it starts with asking the right questions, like in our example asking consumers: Do you have a flood of information here or is something missing? Consumers can usually assess that. In addition, you need to think about the context when designing a collection of information: How much time does someone in a supermarket have to make a decision and what prior knowledge can I assume is available? This is where it’s important for people to think about if they want to make a product or process more transparent. After all, it’s almost never about making something transparent for someone who is knowledgeable, but for people who only understand part of the whole.

In the digital world, the desire for transparency is even more common. Is it more helpful there?

FRIESIKE Often too much transparency is demanded there, as well. In the analog world—take packaging as an example—the space for transparency is limited. At some point, there’s just no more room to write anything. Things are different in the digital world. Just take a look at the privacy policies of your social networks. Everything that you need to know is in there, it’s all very transparent. But it’s book-length.

Nobody reads it and yet everyone clicks on “I have read and understood everything.” The visibility here is even much lower, because you would probably need days to understand it all. Something has been created here under the guise of transparency that ends up being basically invisible.

You previously mentioned accountability. How does that relate to transparency?

FRIESIKE Transparency can also be something that someone demands in order to check up on others. For instance, you’re an employer who would like to know whether someone in the office is doing what they are supposed to do. But you can’t always be looking over your employees’ shoulders. So you aggregate data and then something very human happens: your employees start to think about it. For instance, if the system tracks and measures mouse movements on the PC, someone will come up with the idea to move their mouse even if they aren’t working at that moment. The desire for more transparency may thus lead to employees putting their energy into outsmarting the system rather than into the work that was supposed to have been made more transparent.

Taking another look at offices, the trend toward open offices and co-working spaces seems unstoppable right now. They, too, are supposed to lead to more transparent communication. Is it working?

“If the goal is for the consumer to make better purchasing decisions, then I have to find the right degree of transparency.”

— **Personalia**
Prof. Dr. Sascha Friesike is deputy managing director of the Weizenbaum Institute for Networked Society and Professor of Digital Innovation Design at the Berlin University of the Arts, where he heads the Leadership in Digital Innovation degree program. His most recent book is titled *Sluggish Transformation: The Misconceptions that Block the Digital Transformation* (*Träge Transformation. Welche Denkfehler den digitalen Wandel blockieren*—available only in German) and was published by the Reclam publishing house.

FRIESIKE It's true, the urge toward more transparency is a big driver of our office architecture today: lots of glass, lots of open spaces. In fact, the goal is always the same: people should become more open and communication flows more transparent. Unfortunately, this also often tends to go wrong. There's a much-cited study that shows that one-on-one communication in such offices doesn't increase, but, on the contrary, dramatically decreases—a decrease of

70 percent in the study! The reason is that the constant chatter annoys others, and people often don't want to discuss things in the larger group. In the end, that sort of office can become a panopticon, where everyone feels under constant surveillance and no longer dares to talk, turning to email instead. The solution here is to find a healthy balance. Ultimately, what's needed is a mixed form of open office and closed rooms that allows as much transparency as really makes sense in the specific context.





PHOTO: Tabea Mathern





HIGH LEVEL

Dr. Andreas Daxenberger is a certified food chemist and food safety auditor at TÜV SÜD. He advocates cooking with fresh food whenever possible.



— *Inside View*

“**VEGAN** doesn’t automatically mean natural.”

Vegan food is booming—and we at TÜV SÜD are increasingly dealing with foodstuffs that don’t contain any animal ingredients. But no matter if it’s animal-based, vegetarian or vegan: food should be safe. Customers must be able to depend on the fact that it’s been produced in clean facilities and that the information in the list of ingredients is correct. That’s my area of expertise and why I travel throughout southern Germany for my work.

Almost all manufacturers produce according to the International Food Standard (FSSC 22000) these days. I carry out on-site inspections to ensure adherence. These audits are sometimes announced in advance, but more and more frequently occur without warning. We check whether the machines are clean, inspect the warehouse and take production samples to ensure that the ingredient listing required by law is correct. For this,

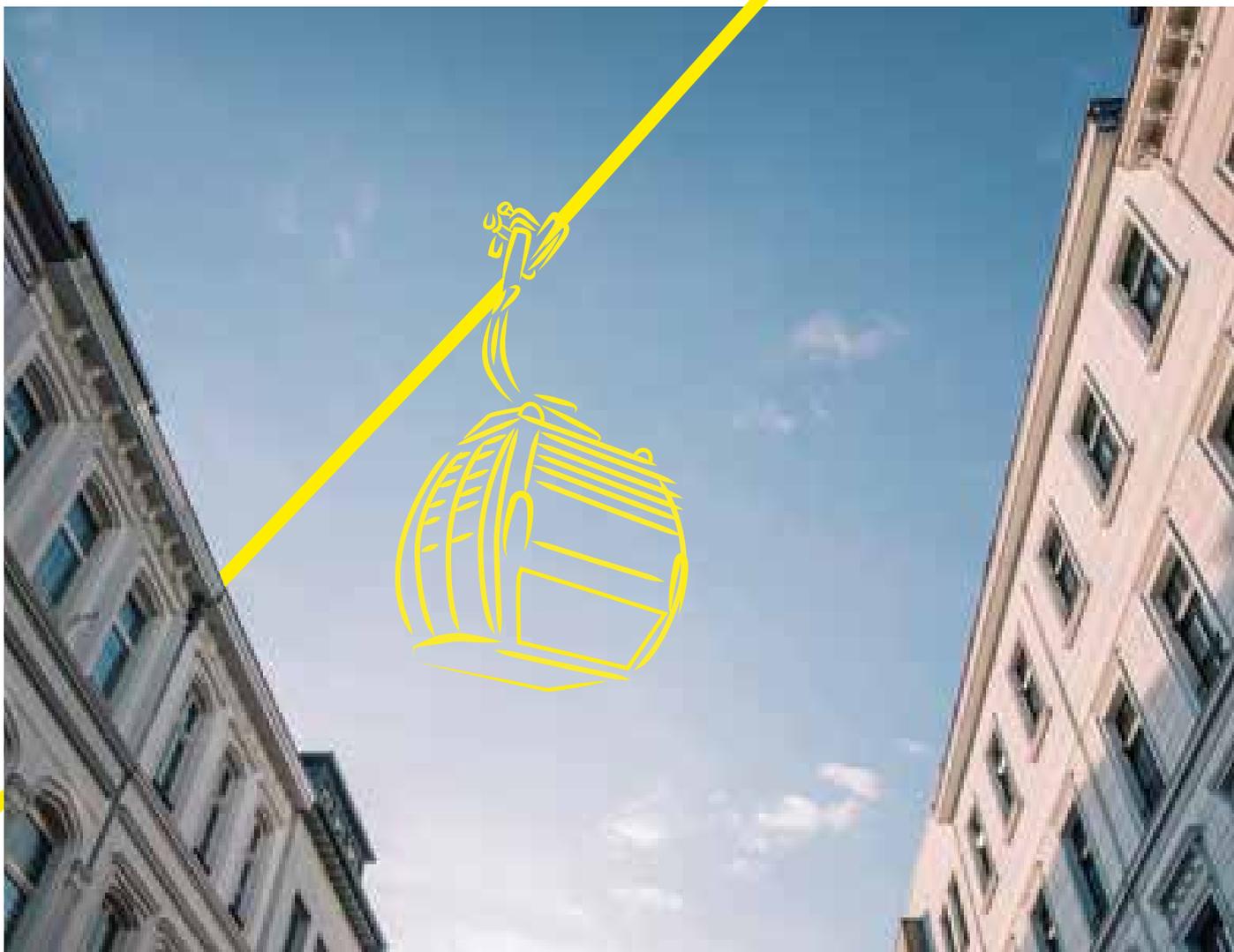
the manufacturer is required to let us in on the company’s secrets and disclose the recipes. We also check origin information and labels such as “additive-free”—or “vegan.” During inspections for vegan foodstuffs, it must be ensured that no animal-based ingredients are used throughout the entire manufacturing process.

However, it should be clear to everyone: vegan doesn’t automatically mean natural. Of course there are many natural vegan foods, for instance a fresh salad or a lentil curry you’ve made yourself at home. But the overall trend is moving toward highly processed foods. Although social media is full of food photos, fewer and fewer people are actually cooking fresh meals from scratch. And almost every ready-made product is complicated to produce and often requires the use of additives. In fact, any vegan product attempting to imitate meat or fish requires a highly complex production process to change the protein structure of the ingredients as needed.

I’m often asked what I still eat. The answer: because I know what the products contain, I eat almost everything. The standards at these food companies are very high, and the work is generally very reliable and they work in clean facilities. But I always look first at the list of ingredients, and I try to cook for myself, with fresh products, whenever I have the time.

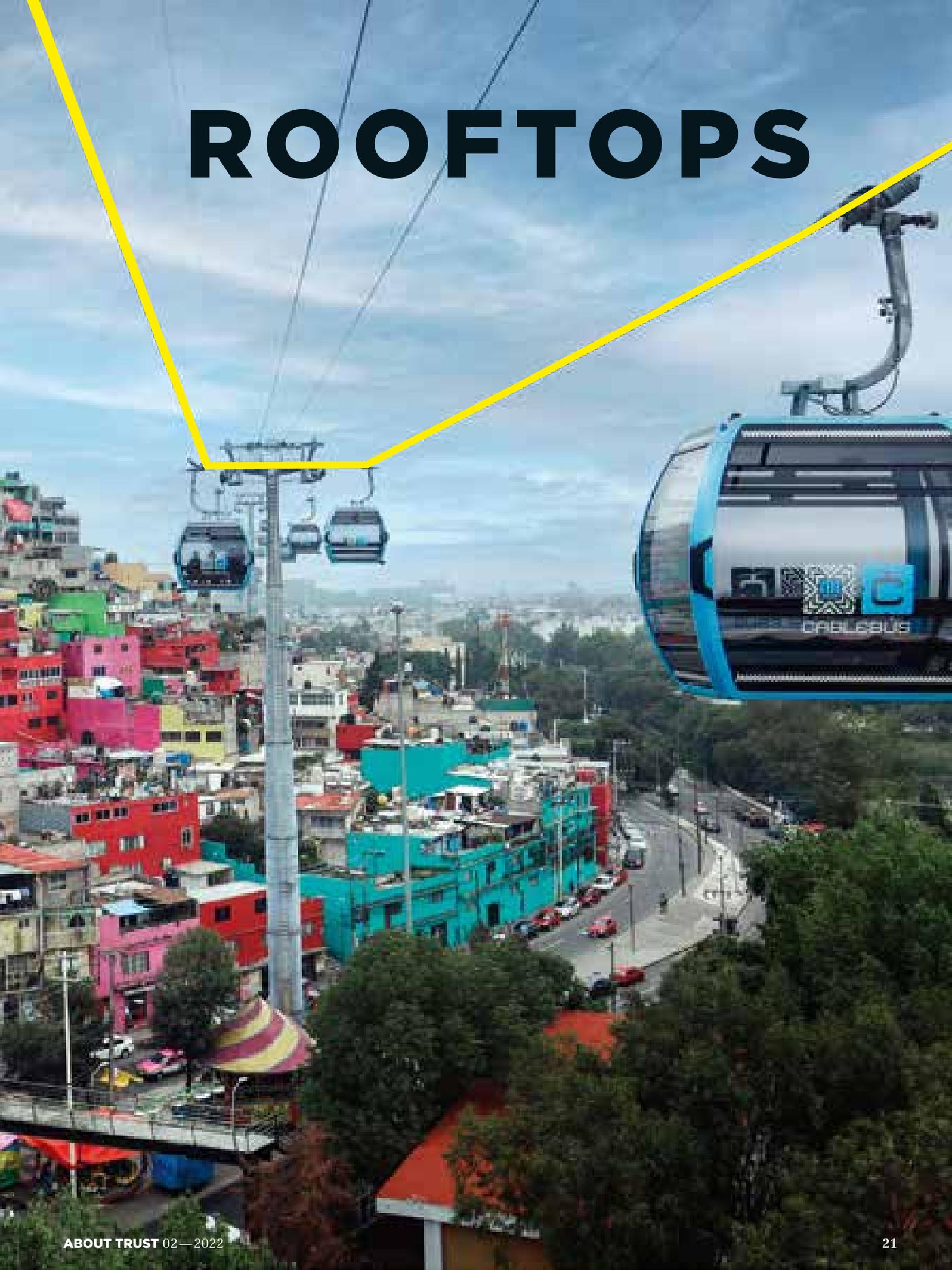
— **DR. ANDREAS DAXENBERGER** AUDITOR
AND BUSINESS DEVELOPMENT FOOD AT TÜV SÜD

Over the City's



TEXT ANNA FRIEDRICH AND SANDRA WEISS ——— An aerial cableway across the city? While countries in Latin America are leading the way, Europeans view such cableways with more skepticism. Yet the technology offers enormous possibilities for climate protection, mobility and society as a whole. A look at Bonn, where German politicians want to give it a try—and Mexico City, where people have already fallen in love with the aerial cableway.

ROOFTOPS



Johannes Frech is standing at the “Hariboschiff” playground in Bonn in the Rheinaue Park on the bank of the Rhine River. It’s windy on this Thursday afternoon in mid-July, and the sky above the green meadows here is filled with dark clouds. Yet Frech, in his cycling gear, is ready for any sort of weather. For thirty years, he’s been a member of the German Cyclist’s Association (*Allgemeiner Deutscher Fahrrad-Club*, or ADFC) and for twelve years was the spokesperson for the Traffic Planning Group of the ADFC Bonn/Rhein-Sieg District Association. But at some point, he got tired of arguing with the city of Bonn about “incorrectly placed traffic bollards,” which is why he’s now focusing on the next big thing: Bonn’s new aerial cableway.

If everything goes smoothly, it’s supposed to start operations in 2028—and will change everything, if Frech is to be believed. From the playground, you can already imagine how one day the cableway will soar from the Rheinaue up to the top of the Venusberg (Mount Venus), where the University Bonn Hospital is located. The street up the mountain is a notorious traffic bottleneck, a nuisance that the aerial cableway could help alleviate.

Yet Frech is certain that the cableway in Bonn could solve not only this problem, but a number of others in one fell swoop. Aerial cableways are regarded internationally as the transportation means of the future. This has already been proven in parts of Latin America, where they bring modernity and mobility to poorer neighborhoods on the outskirts of cities and integrate these districts into overall urban planning. In contrast, transportation policies and politicians in Europe have long been reluctant to add this “+1 dimension” up in the sky. But here, too, a rethinking of the issue is underway. Germany’s federal government is currently developing guidelines to facilitate an expansion of the use of aerial cableways and the German Federal Ministry for Digital and Transport (BMDV) is planning to provide incentives to encourage thinking about transport beyond only “Level 0,” or street level. Is this going to be a mobility transformation that will change the lives of millions of people? And if so, can it succeed?

The trend toward aerial cableways has become stronger over the past decades. Increasing numbers of projects have been realized and more and more cities are jumping on



**JOHANNES FRECH,
ACTIVIST**

Frech believes that the aerial cableway in Bonn solves many of the former capital’s infrastructure problems.

**WHAT MIGHT THE AERIAL
CABLEWAY IN BONN LOOK LIKE?**

20
MINUTES

is approximately how long it currently takes to get from Ramersdorf to the top of Venusberg, where the university hospital is located.

95
CABINS

could carry people over Bonn’s rooftops during peak hours. When there is less demand, some cabins can be detached from the cableway.

4,300
METERS

is the current planned length of the Bonn cableway, which is significantly shorter than other projects in Latin America, for example.

the bandwagon—or rather the cableway. Toulouse, France, now has one, the one in Bonn is in the planning stages, in Leipzig one is being considered and in the Turkish metropolis of Ankara, the cabins are already in the air. The megacities of Latin America, where aerial cableways have long been a successful alternative to streetcars, buses and cars, are much further along. In the Colombian metropolis of Medellín, for instance, the Metrocable, built 25 years ago, is considered to be the first urban cable-propelled transit system in South America. Another aerial success story is in the Bolivian capital of La Paz, where there’s a real transportation network up in the air, with hundreds of thousands of passengers using the small gondolas every day. This success is unsurprising when you consider the enormous advantages of aerial cableways: they can quickly overcome steep changes in elevation and pass over watercourses or chasms that would otherwise require expensive bridges. In addition, they are fairly energy-efficient, have low emissions profiles, are nearly silent when running and are often cheaper than other types of transport.

Fueled by the mobility revolution, the hope for aerial cableways as a solution is finally glimmering on the horizon in European cities. In Germany as of yet there’s no flagship project, but is that about to change?

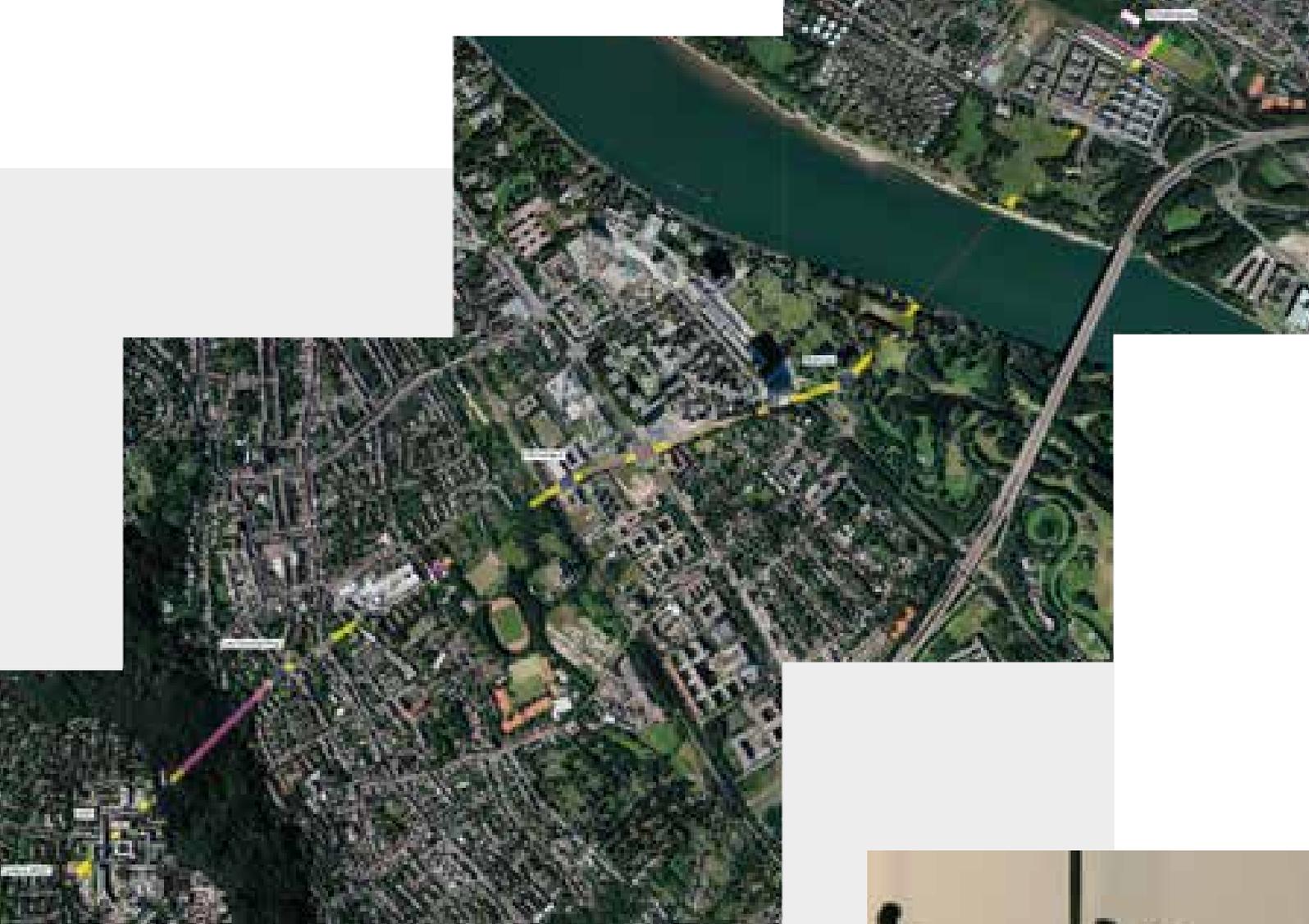
**CABLEWAY TO SOLVE
TRAFFIC ISSUES**

Frech sees no alternative to the aerial cableway. Traffic in the city is on the verge of collapse, with increasing numbers of people working and living in Bonn, or commuting there—and the traditional mobility infrastructure of streets, bridges, bicycle paths, trains and buses simply cannot keep pace with the city’s growth. Bonn is thus confronting the same problem as almost every other big city in Europe—with almost no way to cope with the increasing traffic. “Additional buses or a higher frequency of bus trips alone won’t be able to solve all the traffic problems,” says City Planning Officer Helmut Wiesner. There’s not enough space for more bus lanes or streetcar tracks. The airspace over the city could be a fallback option.

That’s why urban planners in Bonn are now seeking a solution up in this third dimension. The aerial cableway will run 4.6 kilometers and connect the hospital on Venusberg with the Tele-



PHOTOS: Marcus Simalits/lal (portrait); Ingenieurbüro Schweiger (map); Getty Images/golero (bridge); Getty Images/Dukai photographer (people)



INCREASINGLY CONGESTED

Bonn, the former capital, suffers from the same problems as many major metropolises: more commuters, more vehicles, more traffic jams. If people switch to taking the cableway, it could reduce car traffic.



GREAT VIEWS

The aerial cableway in Mexico City offers convenient access to transportation for secluded neighborhoods and wonderful views of sometimes very colorful rooftops.

kom Group corporate campus, which is located in the former government district adjacent to Rheinaue Park. The concept may be familiar from winter ski areas: the gondolas hang from a cable, there are 30-meter-tall masts every few hundred meters, and the cableway will take 20 minutes from one end to the other—transporting some 15,000 people across this former capital of West Germany. At peak traffic hours in the mornings and evenings, all 95 gondolas will be in use. One gondola with 10 seats could then leave the stations every 20 to 24 seconds. At less busy times, “You can take a number of gondolas off the cables to save energy,” Wiesner says.

The aerial cableway is expected not only to relieve congested streets and rail lines, but also to help curb carbon-dioxide emissions. The cableway could replace some 12 million kilometers of car trips annually and create an urgently needed Rhine River crossing. Aside from relieving the pressure on traffic on and around Venusberg, it would also encourage commuters to leave their cars at the city’s periphery—or even to leave them at home and come directly to the city by train. Around 100,000 employees make the daily commute into Bonn—a majority of them to the UN Campus and to Venusberg. “The aerial cableway only makes sense if it’s connected to the rest of the public transit system and doesn’t end up isolated from it all,” Wiesner says. Three of the five planned stations connect directly to rail lines, including the city railway Line 13, which will connect Bonn directly to the Cologne-Bonn airport starting in 2030.

THE NIMBYS ARE OUT IN FORCE

Of course, not everyone is inspired by the idea of so much traffic up in the air over the city. In Bonn’s Civic Center there’s a dark-blue bulletin board where citizens can post orange-colored sticky notes expressing their opinions of the aerial cableway. “Would you like an aerial cableway running above your private garden?” is written on one of the paper slips. Its author ignores the fact that the cableway actually passes almost exclusively over public land. The Telekom Campus is the only private area overflowed by the cableway—and they gave their go-ahead ages ago. Other notes contain even more negative critiques from the not-in-my-back-yarders: the project is too expensive, it will spoil the

PHOTOS: Gerardo Magallón; Getty Images/NurPhoto/Kontributor (gondola); Getty Images/Future Publishing/Kontributor (cableway station)

beautiful view of Venusberg, the cost-benefit analysis was inadequate.

A citizen's initiative "Bonn stays cableway-free" is also sniping against the infrastructure project. Among their arguments: it does almost nothing to reduce traffic, harms the environment, costs too much and fails to provide any benefits for Bonn's residents. Which of the arguments is City Planning Officer Wiesner most worried about? "None of them," he says. He's confident that the cableway's advantages will prevail.

In the coming months, the city of Bonn intends to prove this point by commissioning the numerous expert opinions required for the planning process, including an environmental impact study, a geological survey of the Venusberg, wind measurements in the area and an investigation of noise pollution. In 2023, Wiesner expects to submit a construction application, and its review will take another two years. It is hoped that the results from the expert opinions will appease the critics and convince them of the advantages of the aerial cableway as much as possible.

ENGAGING WITH THE PUBLIC

This is important, because the planning approval process allows any person affected by a project to file a complaint against it. To intercept as many of these objections as possible beforehand, the city is relying on a process of civic dialogue. The bulletin board in the foyer of the Civic Center building is as much a part of this as informational events and open question-and-answer sessions. "You have to take the opponents seriously and see how valid their arguments are," Wiesner says. "If we can't provide answers to their concerns, others are likely to become skeptical as well."

Frech is still standing on the playground. In light of the critical dissenting voices, he can only shake his head. He points towards the Venusberg: "For example, wind is an ongoing issue. But it isn't a problem until there are wind speeds of more than 60 kilometers an hour, and it rarely blows that hard here."

MEXICO CITY SHOWS THE WAY

In Mexico City, Victor Jasso would probably just laugh it all off. He's sitting in one of the sparkling clean blue gondola cabins that silently float over the rooftops of one of Mexico City's



FLYING HIGH

The gondolas on the new cableway in Mexico City travel around 20 meters above the ground, with eight stations along the newest line.



OVER TOWNS AND COUNTRYSIDE

Both rural areas in Toulouse, France, and cities like La Paz, Bolivia, benefit from cableways.



poorer districts. It's considered a dangerous neighborhood, but 20 meters above the ground, any danger is far below. Jasso is a stocky man with a graying full beard and a firm handshake. He's not someone who builds castles in the sky, but rather is partly responsible for the fact that one of the world's most interesting infrastructure projects is located here.

Mexico City has one of the largest aerial cableway networks in Latin America. The cableway is an important addition to the urban transportation network in this metro area with a population of more than 21 million people. The main mode of transport is the Metro subway system, the lines of which radiate outward from the city center towards the periphery. From there, the journey usually continues in a diesel minibus. The aerial cableway now connects the end stations of two of these subway arms with each other—and it's all much quieter, faster and more environmentally friendly than the minibuses. The pioneer was Line 1 in the north of the city. There were numerous concerns and a lot of resistance at the time. Since then, the cableway has proven itself and become accepted by the populace, which is why a second line is already in operation and two more are in planning.

SOARING CONNECTIONS: CABLEWAYS AROUND THE WORLD

2,400
PASSENGERS

are carried by an aerial cableway in the Turkish metropolis of Ankara every hour, in each direction.

3

KILOMETERS

is the length of the Téléo cableway, making it the longest in France (left photo).

30.43
KILOMETERS

is the total length of the world's largest aerial cableway network, located in La Paz (right photo) and the nearby city of El Alto, in Bolivia.

EARTHQUAKES, CRIME, BEDROCK: ENORMOUS CHALLENGES ALL

Construction was certainly no easier than in Bonn—on the contrary. The area is in an earthquake zone and construction workers had to struggle with three geological formations at once: volcanic rocks, sandy soil and the much-dreaded swampy soil, whose physical properties are responsible for the fact that so many buildings in Mexico City sink a few millimeters per year. And the cableway was not constructed in an uninhabited mountain landscape, but in the middle of a densely populated poor neighborhood, where narrow streets wind through an intricate maze of houses and the crime rate is high.

It was incredibly challenging. "Erecting the towers, which are up to 40 meters tall, was a logistical nightmare," Jasso recalls. But it's worth it, formerly isolated and neglected neighborhoods have benefited from the new means of transport. Students can get to university more quickly and safely while older people need half the time to get to the next hospital. For the people living in these neighborhoods, there's a life before and a life after the cableway. And most find the one after much better.

VIRTUAL CREEPY-CRAWLIES THAT YOU CAN TOUCH

Mid-air haptic technology lets you feel what actually exists only in virtual reality. There are plenty of potential applications—some of which could take some getting used to.



Most smartphone users are familiar with the feeling: when you type in a number, you sense a vibration as soon as your fingertip touches the screen. This haptic feedback, to use the technical term, gives the smartphone user the illusion of operating a real keyboard.

This connection between the physical and digital worlds is something that some researchers and companies now want to bring to the next level. Mid-air haptic technology, as it's called, should enable users to simultaneously feel what they otherwise only see in virtual reality or on a screen. If, for instance, someone wearing VR goggles comes into contact with water during a game, it should actually feel wet.

Mid-air haptics could be the next big thing in the field of digitization. The market research company VPA Research is currently predicting that the market volume for haptics will reach a total of 28 billion US dollars in 2026. In 2020, the market was estimated to have had sales of 13.8 billion dollars.

Andreas Noll, who researches haptic technologies at the Technical University Munich, explains how this novel technology works. "When you stroke a fabric, you feel a sort of vibration on the skin that feels differently depending on the texture," he says. That's exactly what mid-air haptic technology would take advantage of, except that the vibration would be artificially generated, usually with the help of ultrasonic waves.

These waves are generated by a number of ultrasonic speakers, each with a diameter of about a centimeter. These speakers could be installed either in a laptop or in some sort of tablet and connected to a computer or to VR goggles. If a hand gets close to the device, it can be detected using laser scanners or cameras. The sound waves from the speakers create pressure points on

the skin that awaken the illusion in users that they are touching a particular surface.

One of the most well-known manufacturers working with haptic technology is Ultraleap. This British company is working together with the French National Centre for Scientific Research (CNRS) on a joint research project, financed by the EU, with the name E-TEXTURES. The goal is to commercialize the technology and make it viable for a variety of applications.

Claudio Pacchierotti, who researches haptics at CNRS and is overseeing the project, can already picture countless potential areas of application: "For example, mid-air haptic technology could be useful for treating a variety of phobias such as arachnophobia, the fear of spiders," he says. Using the ultrasonic waves and images of spiders via VR goggles, the patient should thereby get the impression of seeing and touching real spiders—as a sort of desensitization therapy. Other potential areas of use include online retail, where it would be possible via the technology for shoppers to feel the fabric of a piece of clothing rather than merely seeing an image. Especially for more expensive items, he explains, this is gentler on the garment than being handled by numerous customers in the shop.

"Mid-air haptic technology is useful whenever a person is supposed to feel an object but not actually touch it, or if we want add a new dimension to a visual or acoustic experience to make it more engaging and memorable," Pacchierotti says.

But how far along is this technology to date? At the moment, he says that researchers are able to create the illusion of rain or snow on the skin, meaning moving particles. It's also capable of creating the feelings of texture for a number of materials, although not yet all the materials we know. Despite this, Pacchierotti is confident in the future of haptics: "This won't remain a niche technology."

I N T O T H E

TEXT NILS WISCHMEYER ILLUSTRATION MICHAŁ BEDNARSKI

— To look at, an MRI scanner isn't much more than a large tube that makes loud clicking noises and somehow ends up producing images. But how does the device actually allow doctors to see inside the human body? A simplified explanation.

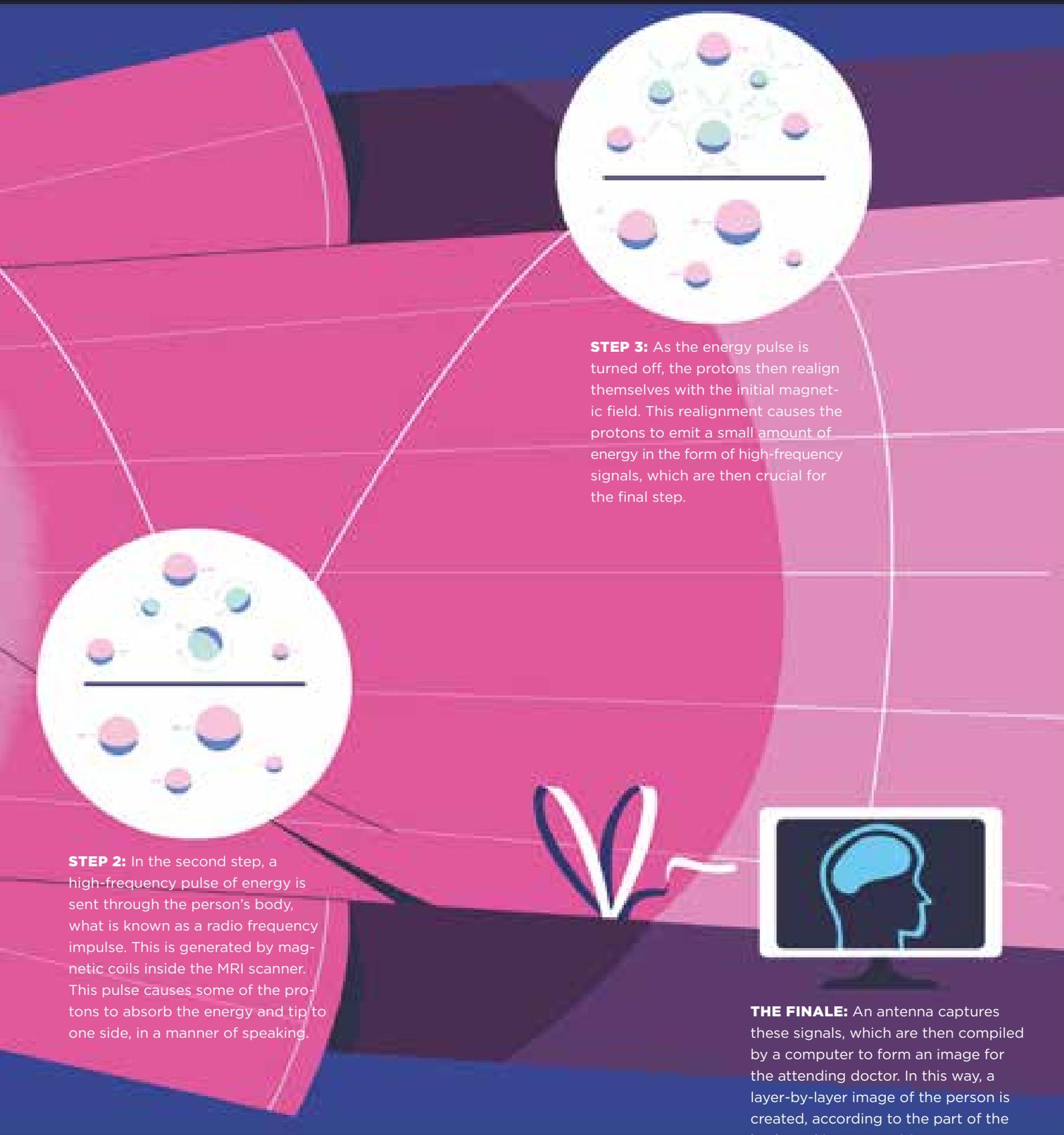
WHAT DOES "MRI" STAND FOR?

MRI is an acronym for magnetic resonance imaging, a medical imaging technique that makes it possible to create layer-by-layer images of the human body. MRI is used for examinations of what are known as soft tissues, which can include the brain, breasts or kidneys. Doctors can also look at joints or spinal disks, for instance in cases when they suspect the patient might have a herniated disk. Unlike other imaging methods, such as X rays, MRI doesn't use radiation to create images.

STARTING POINT: An adult's body consists of about 60 percent water. These water molecules contain hydrogen protons that rotate around their own axes, meaning they have a measurable "spin." As long as they aren't subject to some external magnetic source, these numerous subatomic particles move around in a completely random manner, pointing in completely different directions as they continue spinning.

STEP 1: The MRI scanner generates a strong external magnetic field. As a result, all the protons align themselves along this magnetic field, either in the same direction, or in the exact opposite direction. To put it simply, imagining the protons as passengers on a train: they are all facing either in the direction the train is going or they are facing backwards, but they aren't facing up, down, or to either side.

T u b e



STEP 2: In the second step, a high-frequency pulse of energy is sent through the person's body, what is known as a radio frequency impulse. This is generated by magnetic coils inside the MRI scanner. This pulse causes some of the protons to absorb the energy and tip to one side, in a manner of speaking.

STEP 3: As the energy pulse is turned off, the protons then realign themselves with the initial magnetic field. This realignment causes the protons to emit a small amount of energy in the form of high-frequency signals, which are then crucial for the final step.



THE FINALE: An antenna captures these signals, which are then compiled by a computer to form an image for the attending doctor. In this way, a layer-by-layer image of the person is created, according to the part of the body and its composition.



Early-
Warning
SYSTEM
Down the
DRAIN?

TEXT TANITA HECKING PHOTOS PHILOTHEUS NISCH

Down the drain and forgotten? No, because our wastewater can provide an astonishing amount of data, revealing much about our way of life. It can also help in identifying social problems at an early stage.

When João Matias looks at the data from the past two years, they confirm his predictions. Matias works at the European Monitoring Centre for Drugs and Drug Addiction, or EMCDDA—an agency of the European Union—and, from Lisbon, monitors how drug use is changing across Europe. There was quite a shift during the pandemic: while far fewer people were taking ecstasy (MDMA), Matias saw a significant increase in the use of cocaine and all the other drugs monitored by the EMCDDA. His explanation is that ecstasy, as a party drug, was less attractive during the lockdowns so people were more likely to use cocaine and amphetamines because those are also taken at home, not just in clubs. The current report from the year 2021 again shows clear differences between the days of the week. In Antwerp, for example, weekend use of cocaine was 1,700 milligrams per 1,000 people and day, while during the week it was just 1,423 milligrams. Matias was able to make similar observations for MDMA use, noting that the drug remains especially popular in cities in Belgium, Germany, the Netherlands, Sweden and Norway.

For amphetamines, methamphetamine and cannabis, in contrast, levels

remained stable across the week. Matias says that these drugs are part of everyday life for many people, especially in cities in Croatia, Spain, the Netherlands and Slovenia. That he is able to draw any of these conclusions is based on wastewater analyses. “Everything we eat, drink, smoke or inject enters our systems, where our bodies metabolize it and then excrete it,” he explains. These residues can then be detected in wastewater and allow conclusions to be drawn about the lives of populations. But how exactly does wastewater analysis work? And what potential does it offer?

SDRAWING CONCLUSIONS FROM WASTEWATER

Wastewater analysis is a developing field. In the 1990s, it was used to research the environmental impacts of domestic wastewater. Today it has many uses: for monitoring drug use in Europe, but also for keeping an eye on a population’s health and looking out for potential dangers. The analysis procedures vary depending on what’s being looked for. Together with the SCORE Network, the EMCDDA, which has been monitoring the circulation of drugs in Europe for the past eleven years, studies samples from various European cities for its annual report. In 2021, 75 municipalities in 23 European countries volunteered

to provide the samples. Researchers first look for metabolites in the wastewater. These chemical compounds are found within cells and are produced by enzymes during metabolism. Chemical analyses can reveal what drugs were consumed since each drug has a different metabolite. Cocaine can be identified via benzoylecgonine (BE), cannabis by THC-COOH (11-Nor-9-carboxy- Δ^9 -tetrahydrocannabinol). This information is then used to calculate the amount of drugs consumed by the number of people connected to the wastewater system being studied.

PRECISION AND PITFALLS

“One week per year, we collect samples in each of the participating cities, allowing us to analyze almost in real time where the hotspots are and the quantities consumed per 1,000 people on a given day and in a given city,” Matias says. For him, the precision is one of the key advantages compared to other methodologies. Unlike survey





results, the wastewater data delivers more honest answers. Sometimes drug users don't even know exactly what it is they're taking. Yet the method also has its pitfalls. Not all drugs can be detected unfailingly with wastewater analysis. "We can't deliver any data about heroin because it metabolizes into morphine in the body," he says. To date, researchers remain unable to distinguish between morphine in wastewater from heroin use as opposed to from medication. Furthermore, since the wastewater samples are collective, it is also impossible to trace whether a few people are taking a lot of drugs or many people just smaller amounts. Nor is it easy to determine the purity of the drugs, how often they are taken, or how they are ingested—except for cocaine. "We can now determine how much powder cocaine has been snorted or crack cocaine smoked because of the difference in the excreted metabolites," he says.

The researchers must also take local events into account in their analyses. If, for instance, wastewater from a music festival makes its way into a city's sewage treatment plant, that distorts the data, so they would remove it from their overall analysis. Or, for example, if drugs were dumped into the toilet during a drug raid, that would also affect the data. In this case, the EMCDDA has another analytical method at the ready: they can directly examine the substance in the wastewater and differentiate between drugs that have been consumed and those that have been flushed down the drain.

DRUGS, DISEASES AND ANTIBIOTIC RESISTANCE

Numerous other research organizations besides the EMCDDA are also using wastewater analysis, for example to study the

spread of diseases. The "SARS-CoV-2 Wastewater Monitoring in Thuringia" pilot project, run by the Bauhaus University in Weimar and the company Analytik Jena, will be providing wastewater monitoring for Covid-19 outbreaks across the federal state.

The Chair of Urban Water Systems Engineering at the Technical University Munich is researching a similar project and has been receiving funding from Germany's Federal Ministry of Education and Research since last year. Wastewater analysis could make it possible to get local outbreaks more quickly under control because the data doesn't rely on the

"We can now determine how much powder cocaine has been snorted or crack cocaine smoked."

JOÃO MATIAS, RESEARCHER INTO DRUG USE AT THE EUROPEAN MONITORING CENTRE FOR DRUGS AND DRUG ADDICTION

population's willingness to get tested. In addition, the data from wastewater provides information about the current situation more quickly than tests, and could detect both mutations and asymptomatic infections. The university is still researching the specific implementation, but over the long term they hope to apply the methodology to the detection of other viruses.

At the Karlsruhe Institute of Technology, Dr. Thomas Schwartz has been working on wastewater analysis since before the pandemic. Instead of looking for drugs or corona infections, he has been tracking antibiotic-resistant bacteria and is developing potential solutions to filter multi-resistant germs out of the wastewater. That's because even from

the sewers, these germs pose a growing threat, causing concern among experts. "Right now it is predicted that infections with antibiotic-resistant germs will be responsible for 10 million deaths annually by 2050, overtaking cancer, cardiovascular disease and diabetes as cause of death," he says. Wastewater analysis can be used to detect the concentrations of such organisms and to monitor their development.

WHAT CAN WASTEWATER ANALYSIS ACHIEVE?

As appealing as the potential of wastewater analysis may sound, for Matias it's how it's applied that matters. To ensure that these analyses aren't used for the wrong purposes, he developed ethical guidelines for the EMCDDA team back in 2015. These state that such analyses will only be conducted in cities and not in smaller municipalities so that specific individuals cannot be identified. The guidelines also state that they shouldn't be used in schools or prisons. Nevertheless, some countries do use the analyses in such ways, because the guidelines are only suggestions and are not legally binding.

For Matias and the EMCDDA, it is far more important to use wastewater analysis to highlight large-scale developments at an early stage and to point out potential dangers—whether of drug use or disease. For example, the analysis could also help to evaluate the effectiveness of policy measures such as addiction treatment programs. Samples could be collected beforehand and afterwards and then evaluated, hopefully delivering reliable results.

This is where Matias sees the strengths of the methodology and is confident: "In the future, wastewater will become an early-warning tool."



WHO'S TAKING WHAT?

Party drugs such as ecstasy became less popular during the pandemic, when people were more likely to turn to cocaine. The EMCDDA knows which drugs are the most popular in which cities.

— *Just One Word*

**Ms. Wilken,
what do you think about ...**

T R A N S P A R E N C Y ?



— **Katja Wilken**

is the overall project manager for the 2022 Census at the Federal Statistical Office of Germany. She additionally manages its department for digitization and digital services. Before joining the Federal Statistical Office, she was a human resources and management consultant and worked for seventeen years at the German Federal Employment Agency, including as director of the Employment Agency in Essen and as managing director at the headquarters in Nuremberg. Wilkens studied law at Bochum's Ruhr University.

Transparency is a necessary precondition for making evidence-based political decisions. Society rightly demands that political decisions be made on the basis of facts. Collecting these facts, making them available and thereby creating transparency is an important task for the Federal Statistical Office of Germany.

This means we have two jobs to accomplish. Firstly, we have to determine which data might be helpful for a decision in the first place. Secondly, we need to ensure that this data has been independently collected, verified and is correct. That's something we do every day, adapting our methods and continually collecting new information.

Sometimes, of course, there's the impression that some statistics are useless, for instance logging statistics, which we've been collecting for years. Legislators occasionally ask us whether we actually need this much data. But some things only prove their usefulness over time. The logging data, for example, is now extremely interesting because information about the bark beetle infestation can now be derived from it.

We already know a lot about the population of Germany, for instance from public records such as civil registers. But these aren't completely error-free, as not everyone registers their new address promptly after moving, for example. This is why the census has always played an important role in maintaining personal data. With its assistance, we improve data quality and provide legislators with up-to-date information, for example on population figures. These are used to create fair electoral districts and develop the fiscal-equalization system for the federal states.

In fact, the 2022 Census will be the last of its kind. The current census is the last time we'll be carrying out the complex procedures with questionnaires and home visits. This isn't because of data protection considerations, which have dogged the surveys for many years; it's primarily about making less work for the country's citizens.

In the future, we'll be conducting the census using only the civil registers. Then we'll take this registration data and use a comparative register, for instance data from the Federal Agency of Motor Vehicles. This allows us to identify potential errors and eliminate them. To this end, we're also increasingly relying on new technologies including artificial intelligence, which independently checks our data records, identifies errors and corrects them.

But that doesn't mean less work for us. The European Union will be requiring annual population data from its members starting in 2024. We will have to provide this information. We may no longer be collecting it on clipboards at people's doors, but we'll now need to supply it much more frequently.

ILLUSTRATION: Silke Werzinger; PHOTO: Getty Images/SEAN GLADWELL



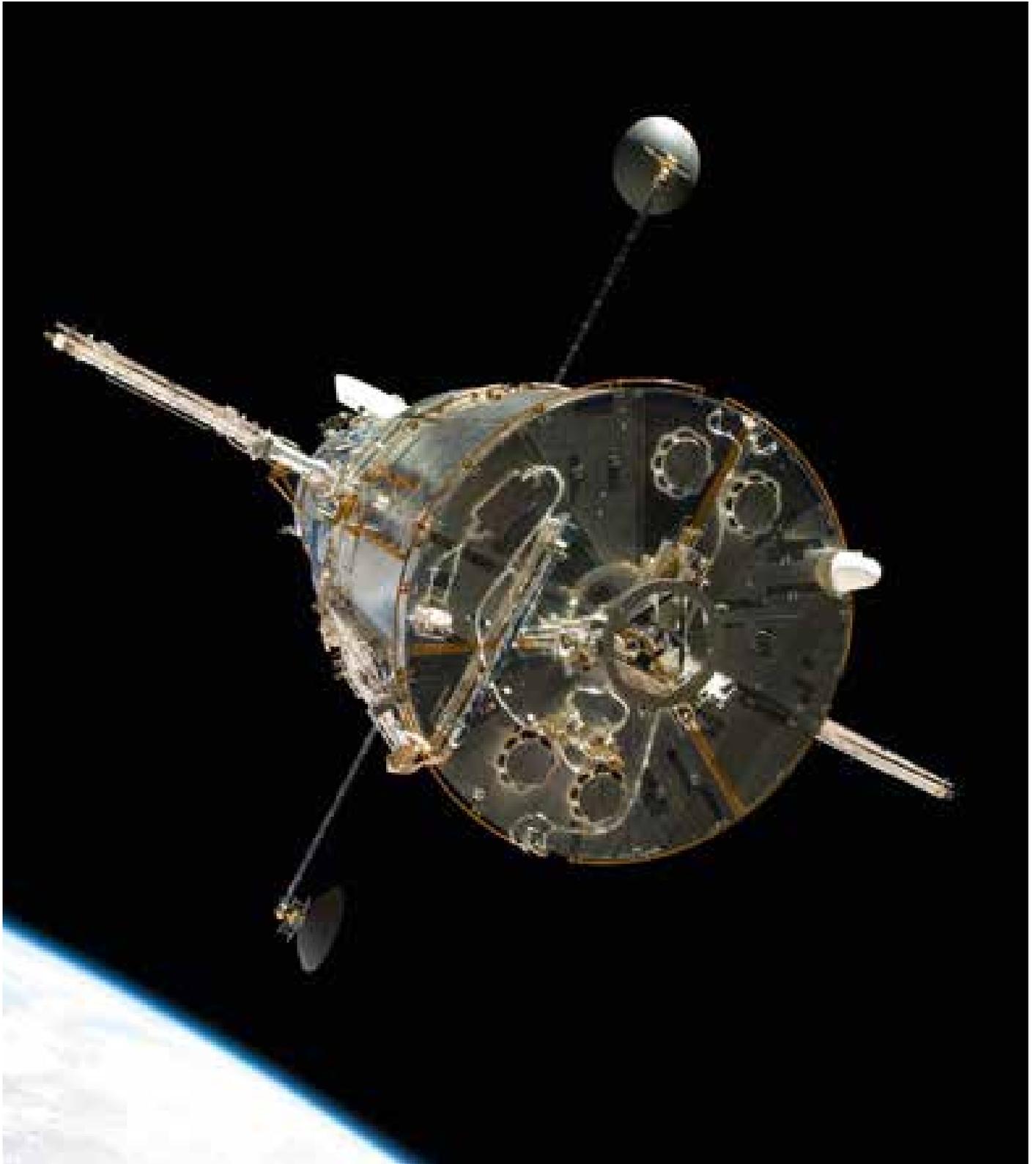
— *Picture This*

The way the light emanates from this strangely shaped creature seems almost unreal at first. But at second glance, you can recognize the form as a jellyfish, which seems to float effortlessly against the black background. As is the case for many see-through animals, its transparency is a defense

against enemies. Light—as in this photo—refracts through their bodies, confusing predators and potential prey alike. The jellyfish body is composed of two very thin layers of cells, the outer and inner skins—epidermis and gastrodermis respectively. Between the two skins is the mesoglea, a jelly-like substance, meaning the jellyfish is composed of up to 95 percent water or more. They aren't the only ani-

mals that are transparent—some fish, squid and even a frog species rely on transparency, which renders them less visible to predators than other, more colorful creatures. By the way, at the TU Vienna, a technical university, researchers are working on a process to make other species transparent as well, which they hope will allow them to gain new insights into their biology and inner workings.

Distant **GALAXIES**
up close thanks to
MIRRORS in space.



The Hubble Space Telescope has delivered amazing images of the universe, but will soon be retired. Find out more online at: ABOUTTRUST.TUVSUD.COM