

# Providing impulses. Doing sustainable research.

DESY Sustainability Report  
2019–2021



SUSTAINABLE  
**DESY.**





## ● DESY in numbers

**1959**

### foundation

Deutsches Elektronen-  
Synchrotron DESY in Hamburg

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**2**

### sites

- Hamburg
  - Zeuthen
- 

**4**

### research areas

- Photon science
  - Accelerators
  - Particle physics
  - Astroparticle physics
- 

**2800**

### employees

from more than 60 nations

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**3000**

### guest scientists

from 42 nations

ca. **232** million €

DESY annual budget 2020

## Dear readers,

DESY carries out fundamental research in pursuit of its mission: “Decoding Matter”. We address the key questions in our understanding of the quantum universe and, in particular, the major and immediate challenges facing society today, contributing to their solutions through our research. This also allows us to improve our understanding of the environment, to make it more sustainable and to counteract climate change. The findings obtained at DESY’s large-scale research facilities, in close cooperation with research groups from all fields of study, lead to numerous technical developments, such as solar cells and batteries from energy research, environmentally friendly, more durable materials from materials science, or innovative active ingredients from medical research.

We are aware that our research using large facilities at DESY consumes large amounts of energy and other resources, and this is why we have set ourselves the goal of successively reducing the carbon footprint of our accelerator facilities’ operations. Using green electricity from 2023 onwards is of course essential. Here at DESY, we view sustainability not just as an obligation (to ourselves), but also as a mission on behalf of society and an opportunity in the international world of science. Our commitment to sustainability is rooted in our mission, in our guiding principles and also in our statutes.

*“Sustainability is an irrevocable part of our strategy for the future, which we are already implementing today.”*

DESY created an interdivisional staff unit for sustainability in 2019, assigning it extensive responsibilities. I am therefore very pleased that we are now publishing the first DESY Sustainability Report, offering new perspectives on our world of research. We have rethought a number of projects and made adjustments to facilitate sustainable research. This is thanks to many motivated DESY employees who are actively and creatively



involved in this development. Within the period under review, from 2019 to 2021, some initial interim goals were achieved: We have switched to green electricity and adapted our travel policy; this alone saves more than 40 000 tonnes of CO<sub>2</sub>. We have drawn up a plan to make our heat consumption, our third largest source of carbon dioxide, climate-neutral. This large-scale project to recover waste heat is now ready to be implemented. In 2021, DESY hosted the Helmholtz Sustainability Summit, at which we published the Helmholtz Association’s Sustainability Guidelines.

Sustainability is about more than that, though – also here at DESY: It includes topics such as technology transfer, diversity and compliance. You can read more about all these issues in this report. Join us on our way to becoming an environmentally friendly, resource-efficient and multifaceted research campus!

Yours sincerely,

Helmut Dosch  
Chairman of the DESY Board of Directors

# Five fields of action

In view of their responsibility to society and their public funding, research centres operate within a special framework – also in terms of sustainability. This is why DESY is basing this report on the Guidelines for Sustainability Management in Non-University Research Organisations (LeNa), which were published by the German Federal Ministry of Education and Research (BMBF) in 2016 and are specifically geared to the circumstances of centres like DESY. In line with LeNa, we too have divided the strategically adopted broad definition of sustainability into five areas. In addition to the ecological aspects, these also include the economic and social aspects.

## Buildings and infrastructure

DESY has large technical accelerator and research facilities, which are to be operated sustainably and efficiently. From planning, construction and modernisation through operation and management to dismantling and disposal.

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# Recovering waste heat

Looking back at her days in DESY's School Lab, it was perhaps obvious that Eva Leister would eventually end up at DESY and breathe new energy into the campus. She wrote her master's thesis at DESY. Her findings were then implemented on the research campus. Today, she is DESY's energy manager.

It almost seems as though Eva Leister's life was unswervingly predestined. Sitting in front of you, she is reserved and yet impressively clear and confident. "In 9<sup>th</sup> grade, I did an internship on an infant ward. I thought paediatric nursing was the thing for me." And as she says this, you might really think it was. But it wasn't. Back then, her physics teacher already knew that. "We visited the DESY School Lab with him." That was her first encounter with the research centre. She chose maths and physics as her main subjects, and her next internship was at a company that built photovoltaic systems. "That's when I was first confronted with the issue of climate change, and from then on my thoughts revolved around regenerative energy sources." As the daughter of a quality inspector in the health sector and a mechanical engineer, she went to Universität Hamburg after completing secondary school in 2007, where she studied physics. "That was the pragmatic path. Physics is just logical!"

Once again, she was drawn to the DESY campus, for internships within the context of her university studies. Love at second sight? "No. I wanted to do something tangible, not just remain in the research bubble." Eva Leister went to Kassel and chose to do her master's degree in "Renewable Energies and Energy Efficiency". So far, so good. Then came the

desire to be a bit closer to her long-distance relationship, and therefore Hamburg, and to write her thesis up in the north. There it was again, her pragmatism: "I wondered who were the major energy consumers in Hamburg. And I hit upon DESY."

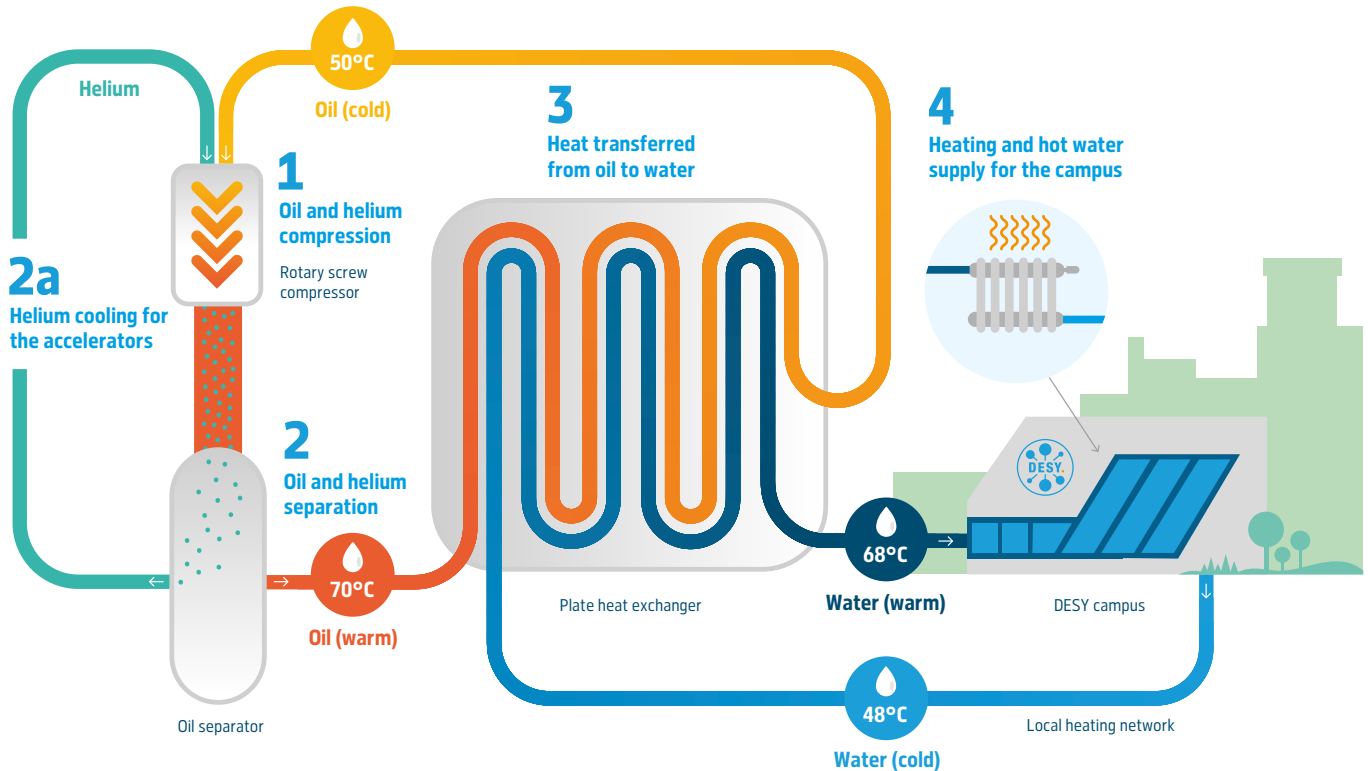
The young woman from an idyllic small town with big-city visions came here – and stayed. That was in 2013. At the time, DESY did not have its own inter-divisional staff unit for sustainability. "But two of the departments and I jointly came up with the idea of investigating the potential for using waste heat as the topic for my master's thesis." DESY was highly interested. "To be honest, it was only once I started working on it that I realised that we have extremely large amounts of waste heat available to us. I then focused on the cryogenics plant in DESY's cryo hall, where helium is cooled down for the operation of the accelerators." She got going, and DESY left her to it. "I was given a lot of freedom to work things out myself and move things forward, without concrete specifications." A strong motivation. The cryogenic plant became her "baby". "Ye-e-s, you could say that," the 34-year-old admits with a chuckle, while her actual daughter slumbers within sight.

A brief aside: The idea of using the waste heat from liquefying helium in the cryogenic plant is not a new one. When the building was constructed at the end of the 1980s/beginning of the 1990s, a heat recovery system was already installed, initial analyses were carried out, and connections were provided for →



*“I wondered who were  
the major energy  
consumers in Hamburg.  
And I hit upon DESY.”*

*Eva Leister, DESY's energy manager*



### How waste heat recovery works:

Many modern particle accelerators require cryogenic cooling. The accelerator modules for FLASH or the European XFEL, for example, can only bring electrons up to speed at a frosty -271 degrees Celsius (2a). To reach that temperature, a mixture of helium and oil is squeezed together inside compressors (1). This releases heat, which remains in the oil once the helium has been separated off (2). Oil and water then flow along next to each other in a heat exchanger, separated by a thin wall (3). In the process, heat is transferred to the water and can then be used to heat the campus (4).

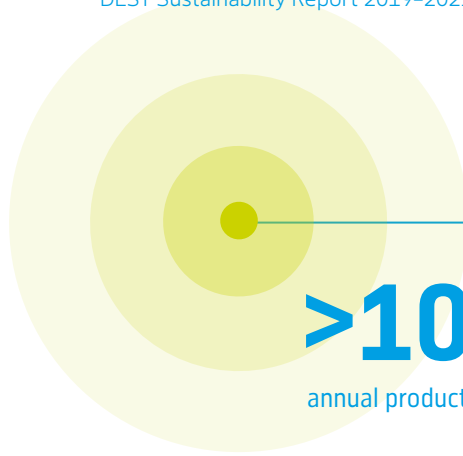
to facilitate a later conversion. The idea was not, however, actually pursued. Until Eva Leister came along, kicking at an open door and suggesting that the heat from the second compression stage should be used as well. “My analyses gave us concrete figures, which allowed us to submit the project to the Directorate.” DESY was very willing to technically implement the facts she had established in her master’s thesis.

Eva Leister’s feasibility study for waste heat recovery was published in 2015, and the new heat recovery plant went into operation in 2017. “To begin with, things couldn’t move ahead fast enough for me.” In 2019, the project even made it to the finals of the Energy Efficiency Award, which is presented by the German Energy Agency dena. “At the time, I was very pleased about that. On the other hand, I felt that using this waste heat was in fact a really obvious thing to do.” The plant is now up and running. “And doing better than my calculations indicated: At the time, I was expecting 7.5 gigawatt hours per year. Now we are getting more than 10 out of it.”

Thanks to logic, foresight and her drive to achieve sustainable change, she conveniently launched a further DESY sustainability project even before the feasibility study had been completed: the energy monitoring system. “I actually wanted to identify the weak points of the individual buildings, so as to change something. However, we didn’t have any energy ratings. That’s how I came to push for the monitoring system.” Down-to-earth and direct as she is, she points straight to the problem: “We lack concrete information. Roughly speaking, we could save around three percent of our energy consumption through monitoring. But that is linked to a metering infrastructure, and the data also needs to be analysed and projects need to be consistently implemented.” In other words, “on a huge research campus like this with a huge energy consumption, this is simply a huge project.”

She says this without emotion. Emotional outbursts are not Eva Leister’s thing. She speaks with inner conviction and an almost stoic matter-of-factness about load management and low-temperature waste





# >10 GWh

annual production

# 200 000 €

annual savings in energy costs

heat utilisation, about energy laws, increasing administrative work and working tirelessly to convince others. She also invests a great deal of personal energy.

*“I have the tendency to perfectionism, and I have made the experience that, when you show real results, people grasp issues better and become more open to them.”*

The fact that she is a young woman in a male-dominated technical field plays a role too, of course: “There is only one other woman my age in the Hamburg energy network. Sometimes you really get the feeling that people underestimate you. Just some young thing. On the other hand, they also say that being a woman is a bonus. It’s difficult.” A short story to illustrate the point: “I once arranged an appointment with a sales rep to discuss meters, and I included a colleague who was only meant to install the meter. The sales rep kept looking at him and addressing him the entire time. Until he said, ‘Please consult Ms Leister, sitting next to me. She’s your contact.’” The fact is that Eva Leister is very much the right person in the right place – and what she does is so important: “I get the impression that women have a different approach to resources. The people I meet who want to change something in energy management tend to be women. I find that very striking.”

Eva Leister is already far ahead. One step closer to the future. Also in terms of her family planning. And in a sense, DESY is a member of the family. Her husband has been working in the accelerator division at DESY since 2010. They have two young children. Her son is already talking about wind turbines and electric circuits, even before starting school, while her daughter is soaking up sustainability at her mother’s breast. “I want to do something to ensure I am handing over a good world to my children. For me, energy efficiency and acting sustainably are imperative to saving the Earth.” Some final thoughts before breastfeeding.

If she could do as she pleased, she would love to install photovoltaic systems on the many roofs around the DESY campus. “But it’s difficult, complicated and very bureaucratic. There are legal pitfalls. And in some cases, the structural engineering would need to be upgraded.” However, if she could do as she pleased, little things would have to change too – such as “providing hot water in every washroom. That’s unnecessary for washing your hands.” Again, her pragmatism shines through. “You’ve got to get this into people’s heads! Their awareness, their basic attitude towards energy-efficient projects needs to change – also when it comes to new buildings.” Eva Leister is impressively clear and confident: “I could stay here until I retire – there’s plenty to be done.”

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**A down-to-earth product of DESY: Eva Leister wrote her master’s thesis on waste heat utilisation at DESY in 2013. Today, the mother of two is DESY’s energy manager. “I get the impression that women have a different approach to resources.”**

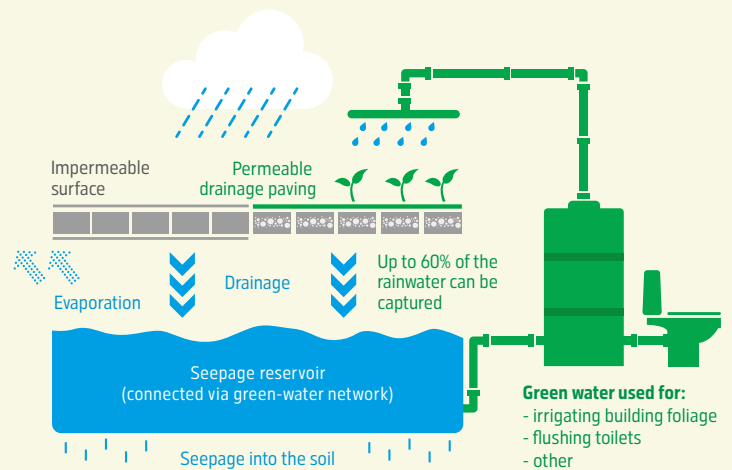
News in brief

# Buildings and infrastructure

## Greening buildings

The research site in Hamburg Bahrenfeld is blossoming. In the spring of 2021, DESY and Hamburg’s environmental authorities launched one of the biggest projects of its kind in the City of Hamburg: greening Hall 36. The motivation to grow plants on its roof and façade actually stems from a flaw that needed to be remedied. DESY was discharging too much rainwater into the public sewers. The positive side effects of this greening project include a healthier

microclimate, better sound insulation and a new habitat for birds and insects. A total of 4570 square metres, almost half a hectare, have been planted in the “Green DESY” project with around 25 000 plants – from woodbine to wistaria. The City of Hamburg is contributing 410 000 euros in funding, and Technische Universität Berlin is providing scientific support. The research project goes by the title “Energy-efficient Cooling of Buildings”.



## Acting in concert

Committed to economising: DESY’s special large-scale research facilities make it a massive consumer of electrical power, which is why it is an active member of the energy efficiency network, founded by Hamburg’s industry in 2016. The network draws up savings targets and serves as a forum for the goal-driven, unbureaucratic exchange of ideas on ways of implementing climate protection measures. Between 2019 and 2021, DESY has saved 131 tonnes of CO<sub>2</sub> through targeted efficiency measures.

**131 t**

CO<sub>2</sub> savings through targeted efficiency measures 2019–2021

## Upcycling technologies

Ambitious and highly sustainable: The last of 24 recycled magnets was installed underground at the DESY site in October 2020 for the new ALPS II experiment, which is searching for the mysterious dark matter. ALPS II uses the tunnel and infrastructure of the former HERA accelerator, which was decommissioned in 2007. Achieving as much as possible with a limited budget – to do this, the researchers had to be inventive and efficient. The new experiment uses 24 decommissioned superconducting magnets from the HERA ring, which had to be carefully straightened to a high level of precision. This type of intelligent upcycling reduces the impact on the budget and on the environment, saving energy and materials. The HERA dipoles are 9.8 metres long, with an outer diameter of 60 centimetres, and weigh some nine tonnes. Among other things, their complex innards contain superconducting niobium–titanium cables. Impressive and sustainable: Upcycling is a project that spans multiple generations! The engineers and technicians involved in bending the dipoles into shape even included some who had helped build HERA in the 1980s.

## Analysing energy consumption

From lighting systems to accelerators: Since 2019, DESY has been installing an energy monitoring system on its campus in Hamburg to help visualise the flow of energy. Hundreds of meters are being modified and connected to the metering system. The information is then automatically recorded in a database and analysed with the help of monitoring software. Aside from electrical power, this also includes heating, cooling and water consumption. The bottom line: shedding light on the flow of energy, identifying potential savings and optimising energy consumption. DESY has set up a special conversion team for this purpose and is investing more than 500 000 euros in its monitoring measures.



**6000 t**

heavy concrete as new building material

## Repurposing shielding blocks

Initially, the heavy concrete blocks in the HERA halls served as protection against radiation; now they will become the foundations of future new campus buildings. For years, 500 of these discarded shielding blocks stood around the DESY campus in Hamburg, unused. Reusing them seemed impossible. Until 2020, when the 6000 tonnes of heavy concrete were shredded with breathtaking ease. The concrete rubble has become a new building material and is already being used for campus renovations.

## Recycling energy

Space heating using waste heat: The waste heat generated by DESY's technical facilities could be part of the solution to reducing carbon emissions from heating, DESY's third largest source of CO<sub>2</sub>. One of the sources of waste heat is the water used to cool the accelerator magnets. A project by the Hamburg University of Applied Sciences has revealed just how much heat could potentially be recovered during the cooling process – at the moment, the waste heat is still released into the atmosphere. It turns out that the amount of waste heat available for use (129 GWh per year) exceeds DESY's current consumption by a factor of ten. The next idea is that if the total amount available could actually be used – for example to supply heat to the future Science City Hamburg Bahrenfeld – the resulting annual CO<sub>2</sub> savings could potentially be around 40 000 tonnes. The next step is to plan the actual implementation.

**129 GWh**

usable waste heat from water used to cool the accelerator magnets, per year



**ca. 15 GWh**

current annual consumption at DESY



**40 000 t**

maximum potential annual CO<sub>2</sub> savings

## Building sustainably

# DESY's first building with the BNB seal of approval

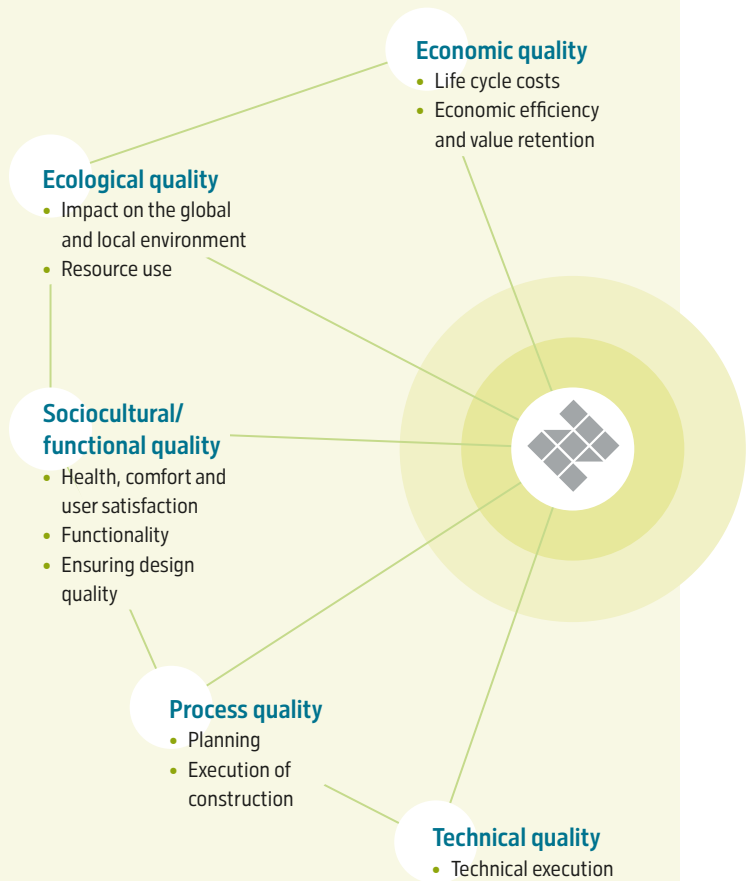
Constructing a new research building to be sufficiently sustainable – taking into account ecological, economic and sociocultural aspects – to actually meet the certification criteria of the Sustainable Building Rating System (BNB) drawn up by the German Federal Ministry of Building, is a science unto itself. That is in fact what is happening at the DESY site in Zeuthen, Brandenburg: The Science Data Management Centre (SDMC) that is being built there as a data centre for the international gamma-ray observatory CTAO will be certified with the BNB Silver rating. This will be DESY's first building to be certified under the BNB.

The timeline was as follows: In 2016, DESY Zeuthen, one of the largest scientific centres in Brandenburg, was awarded the contract to build the data centre. In 2019, the decision was made to seek BNB certification for the new building. In autumn 2020, the German Federal Ministry of Education and Research (BMBF) gave its approval. Construction began at the end of 2021. The foundation stone was eventually laid in March 2022.

In its Foundation Council, DESY and the federal government had both backed a BNB-certified building despite the additional challenges this posed for the planning process – a voluntary choice, not a requirement. Because, as Kathrin Schulz from DESY's interdivisional staff unit for sustainability explains, "the rating system covers all the aspects of a building throughout its entire life cycle. From construction through its useful life, right up to its possible dismantling. We are talking about over 150 individual criteria in total." This is why the priorities for the new data centre were established long before construction work began. "The focus of the data centre lies in ecological and sociocultural qualities," says Schulz. Getting down to the specifics, she continues: "Energy-efficient planning and the use of pollutant-free building materials are important to DESY. The 'sociocultural' aspect covers issues such as health, comfort and user satisfaction."

Once the building has been completed, Zeuthen will be home to one of the most up-to-date and sustainable scientific data centres in Europe and the new workplace for some 60 employees. The higher costs compared with a conventional building are expected to be amortised

### General criteria of the Sustainable Building Rating System (BNB)



over the life cycle of the data centre, through lower operating and maintenance costs. Its users are due to move in in 2023.

Incidentally, another environmentally friendly aspect of this story is that a 27-metre-tall copper beech, standing right on the border of the construction site, did not become an unnecessary victim of the excavators. During the construction work, the roots of this massive old tree – its trunk has a circumference of 3.65 metres – are being protected by two-metre-high sheet piling against vibrations and injuries, benefiting both the tree and humans. In the future, the copper beech will be a climate-friendly source of shade, which has already been factored into the new data centre.



## On the sunny side of research

**S**tephan Roth is one of those people at DESY who are already creating a better and more sustainable future. Together with his team and researchers from the Royal Institute of Technology (KTH) in Stockholm, DESY's lead scientist Roth is working on solar cells made from sustainable materials. But how sustainable is the research into sustainable energy production itself? What role does recycling play here? And what is meant by circular economy? Balancing problem awareness, steps towards a solution and big ideas – a conversation with Stephan Roth. →

“Our responsibility has become greater. So has the external pressure to deliver results.”

Stephan Roth, lead scientist at DESY

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**Stephan Roth, what motivates you to carry out research into sustainable materials?**

For 100 years now, we have been producing excellent polymers using crude oil. I would like to replace at least some of these with renewable materials. That is my main motivation. I'm also fascinated by tapping into the sun as a source of energy and using it to generate energy with solar cells, which ought to be as sustainable as possible. That's my field of research.

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**How sustainable can and must the research process itself be?**

The primary goal of sustainability is, of course, to optimise processes so as to consume fewer resources. However, to me it also means making our research accessible to everyone – in the sense of open access. One thing I do have to say, clearly and frankly, though: I've been working on sustainable materials for almost ten years now – and I'm still at the very beginning of my research into them. We try to make projects sustainable in general.

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**What does that mean?**

For example, we are now for the first time calculating the carbon footprint of a new project. Specifically, of a product that uses cellulose fibres and that my Swedish colleague Daniel Söderberg, from KTH in Stockholm, and my own team are currently working on. I believe the current carbon emissions will turn out to be greater than the reductions we can achieve using our materials. The process engineering will take into account the fact that we can optimise the project at this point.

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**Is that new?**

We are doing this for the first time. Of course, you can hardly expect research to be optimised for carbon emissions right from the start. But I expect our carbon footprint to become negative over time.

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**Let's talk specifically about your research at DESY: How do you define the sustainability criteria here?**

We are attaching a polymer solar cell to a sustainable sun blind made of cellulose; we call it Sunny Cellulose.

We are doing this using our new metal-biomaterial composite electrode. That's to say, it's based on cellulose, which is actually a contradiction. Let me explain that briefly: Cellulose is an insulator. So why should the nanowire electrode conduct electricity better when you add cellulose? The answer is that it leads to a better contact between the nanowires. But to return to your question: The silver nanowires that we incorporate are recyclable. In the first version, we are still using standard solvents to produce the polymer layers. At the same time, however, we are also looking into less harmful solvents. We cannot get around the polymers themselves, which are made from fossil raw materials. Regarding energy consumption: We want to reduce it during the manufacturing process by using a spray-on technique. This works with one bar of pressure, under moderate working conditions. Incidentally, the spray-on technique can be scaled very quickly by simple means. This means we can make our objects bigger easily and flexibly.

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**To clarify that: The cellulose solar film cannot simply be disposed of on a compost heap?**

No. Once the efficiency of the solar cell deteriorates and it needs to be replaced – there are examples of solar cells that are still generating electricity after 10 years – we would like to remove the film, if possible with water using a high-pressure cleaner, break it down into its individual components and separate them again. That means separating the nanowires from the cellulose and the other polymers – ideally using simple filters.

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**Sounds difficult.**

It is difficult! But we absolutely want and need to solve this problem! That's why we've specially created a position for a PhD student, who over the next three years will focus solely on making the entire solar cell recyclable. That's our dream! By the way, I am noticing a really strong interest in sustainable research here – it isn't just urgent, but really interesting too.

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**Will a successful doctoral thesis solve the recycling problem?**

One thing is clear: Recycling does not work indefinitely. To take one example from the literature, after being recycled five times, a polymer is so degraded that ten percent of it needs to be replaced. A cellulose fibre doesn't last forever either – but it does last a long time! So if we can manage to reassemble these nanoscale building blocks over and over again, as we are hoping to, then we will have our own circular economy. That's what we are now trying to do for the first time in the PhD research project.

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**Speaking of circular economies: Will the solar cell project ever be able to operate along those lines?**

That's a difficult question, and it also raises the issue of how long this kind of cycle is... I am hoping that we can break down the solar cell into as many individual components as possible and then use those to build a new one. I can't say yet whether that will be technically feasible.

## Sustainable research – the world’s strongest biomaterial



Cellulose nanofibres, the basic building blocks of wood and other plants, serve as the starting point for the ultrastrong degradable material. These nanofibres are suspended in water...



... and squeezed through a narrow channel, just one millimetre wide, in a steel block. In the channel, the nanofibres are pressed together and accelerated...



... so they self-assemble to form a thread that is stronger than spider silk. These threads can then incorporate silver nanowires, for example, which make them electrically conductive.

### Another criticism raised is that trees are being chopped down for your research...

... trees taken from a managed forest in which more new trees are planted than felled. So the overall balance is positive. We also want to try working with recycled materials, but we are still looking into how to actually use and process them.

### Is the trend here towards recycling too?

My approach is this: I want to use as much of a felled tree as possible, and for as long as possible: the wood for building houses, for example, and the cellulose for paper. You can also make artificial leather from lignin. This biopolymer is also found in sunscreen. It can be used in clothing to provide UV protection (something we are working on with a start-up). That leaves hemicellulose, for which no use has been found until now. The next step will be to find a way of processing this plant-based biomass.

### This cries out for additional PhD positions.

A lot is going to happen in the future!

### Do you feel under greater societal pressure in view of the climate and energy crisis?

Our responsibility has become greater. So has the external pressure to deliver results. We need to move on to applica-

tions more quickly. That’s why we are working closely with industry – an incentive for my research. But research itself needs to be thought of in more sustainable terms as well. Let me give you an example: digital twins! Researchers at KTH Stockholm have been developing these together with my own team at DESY. They allow us to simulate experiments based on our vast experience and to make predictions about where we should look with X-rays, so that we don’t always have to keep going to DESY’s X-ray source PETRA III. That saves resources in very practical terms. Particle physics has been doing this for a long time – but it’s new in materials science.

### With whom do you discuss sustainability issues across different areas of research?

I am a physicist by training, I work very closely with chemists, and I automatically come into contact with areas such as engineering and computer science as well as industry. With economists and politicians, too. The discussion often and quickly turns to sustainability criteria, also at meetings on an international level. I consider this extremely important – also because of our duty to society.

### How would you define good research?

It starts with freedom of research, which is guaranteed by the German constitution. It also requires that results

actually work, are reproducible and cheaper, and – in the case of applied research – can be used in everyday life. And on top of that, results must be communicated transparently and the contributions of those involved need to be acknowledged fairly.

### Are you worried that the criteria for fundamental research might change?

We are strongly committed to ensuring that we can continue to carry out fundamental research as before. I see myself as being at the interface between pure and applied research. That’s to say, I do research into cellulose because it’s exciting, because I want to know whether we can make things out of it. Maybe we can! Fundamental research is important – and so is adequate funding for it! To me, it’s important that we cannot do a cost-benefit analysis when we begin carrying out fundamental research. After all, who knows whether a new product will not end up saving more than it cost to develop?

**DESY scientist Stephan Roth studied physics and recommends that everyone should do research at the interface between physics and chemistry. Incidentally, his wife would love to install a Sunny Cellulose solar cell on her own roof.**

## News in brief

# Research

## Matter for discussion

In October 2019, DESY launched its proactive discussion campaign with a high-level panel. The chosen topic at the time was: "Freedom of Science under Threat". The physicist and presenter Ranga Yogeshwar summed up the problem as follows, in autumn 2019: "Fake news and populism, fear of espionage and assassination, political compartmentalisation – the current political developments are having a devastating impact on the global science network." Ulrike Beisiegel, Chair of DESY's Commission for Ethics in Research said:

*"It's important to find places where discourse can occur, so as to reach the critics of science too."*

DESY's Director Helmut Dosch self-critically called for a greater commitment and responsibility on the part of researchers: "Our job is to make scientific findings comprehensible." Since that conference, scientific research has been unpredictably harshly and frequently in the spotlight, and the Covid crisis and the war in Ukraine have demonstrated the practical relevance of these statements. Three years later, they sound more pertinent and more urgent than ever. After the long break forced upon us by the pandemic, DESY's discussion campaign is continuing. The next topic will be "Sanctions in Science".



The participants of the panel discussion (from left): Volker Rieke (BMBF), presenter Ranga Yogeshwar, Helmut Dosch (DESY), Helle Porsdam (Univ. Copenhagen), Niels Annen (Federal Foreign Office), Abideh Jafari (DESY), Herwig Schopper, Armando Bermudez Martinez (DESY), Charlotte Lindberg Warakulle (CERN), Götz Neuneck (IFSH) and Ute Beisiegel (Univ. Göttingen)

## Matter for negotiation

Since 2020, DESY has had a Commission for Ethics in Research (DKEF). DESY's scientists are dealing with the future – and their thoughts usually venture beyond the realms of the imaginable. They often pursue new fields of research at the frontiers of the unknown, sometimes also in areas of tension between academic freedom and other values and legal interests. This raises ethical issues on which the DKEF advises researchers – and, in critical cases, also the Directorate – laying down standards for responsible action. Having weighed up the different considerations, the ethics commission then makes a recommendation on how to proceed. The DKEF is an interdisciplinary commission and currently consists of ten (external and internal) members.

## Hazardous materials

With freedom of science comes great responsibility. Particularly in the sensitive area of dual use – i.e. research results that have both civilian and military applications – there is considerable danger of misuse and thus a strong awareness for conscientious and confidence-building action. In November 2019, DESY organised an international meeting of experts to discuss the dual use of free-electron laser science and technologies with regard to potential military applications. Participants from all over the world compared their experiences and assessments and discussed common strategies for responsible research. The key insight was that, in order to minimise dual-use risks and not jeopardise scientific freedom, there is a need for open, trusting communication, awareness and competence for dual-use issues as well as agreement on common guidelines within the international scientific community. This holds true even if the political climate makes scientific cooperation world-wide more difficult and, right now, sometimes impossible.



## Raw materials

Power storage systems generally need to become more efficient and more sustainable. A team led by DESY physicist Simone Techert is working on a battery made from renewable materials that is even non-toxic and compostable. It uses small protein fragments known as peptides as its starting material. "These can be obtained from cereals, among other things," explains Techert. The trick is that these cereal peptides are electrically active and can be used to generate electricity.

*"We have already built the first operational prototypes."*

Even though research into cereal batteries is still in its infancy, the peptide battery already promises to have some exciting applications, including in medicine. Being made of a type of gel, it is soft and pliable, so that it could be used in pacemakers, for example.



Simone Techert,  
lead scientist at DESY



The participants of the discussion (on site and via video, from left): presenter Frank Böttcher, Hamburg's First Mayor Peter Tschentscher, UFZ researcher Katja Bühler, energy economist Claudia Kemfert, host and DESY Director Helmut Dosch, Greenpeace Managing Director Martin Kaiser and DESY scientist Simone Techert

## Materials of the future

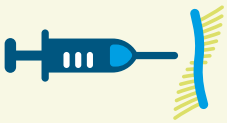
The Helmholtz Sustainability Talk held in April 2021 on the DESY campus in Hamburg had a special focus: the energy transition with hydrogen. Along with Hamburg's First Mayor Peter Tschentscher, representatives from the fields of science, business and NGOs discussed the use of hydrogen in the context of a sustainable, resource-efficient energy industry. DESY's lead scientist Simone Techert explained how her research at DESY's high-brilliance X-ray sources contributes to developing new, marketable hydrogen technologies. Techert is working closely with the Centre for Molecular Water Science (CMWS), which will run its own laboratory at DESY in the future. The consensus at the Sustainability Talk was that fundamental research has a special significance in the search for solutions to the problems facing society, such as climate change.

## Waste materials

When industrial users carry out extremely sensitive and high-quality analyses at DESY's X-ray source PETRA III under scientific supervision, this can result in sustainable benefits to society as a whole. For example, a Finnish company used PETRA III to investigate the ash that is produced in waste incineration plants. The problem is that the residues contain zinc compounds, some of which are highly toxic. The company was able to characterise the various different materials in the incinerator ash with great precision. Their results have expanded the library on zinc compounds – and are equally relevant to science. The goal is to use the knowledge gained to optimise the combustion process and the utilisation of materials. Ultimately, disposing of incinerator residues in landfills ought to be avoided altogether. Our environment would emerge as the winner.

## Covid research

From drug development to big-data modelling: Since the beginning of the corona-virus pandemic, science teams from a wide range of fields have been studying and analysing the virus at DESY's large-scale facilities, such as the high-brilliance X-ray source PETRA III. This has huge relevance for society in terms of health and infection research. Here is an overview of the Covid-related projects carried out by DESY and its on-site partners:



### Vaccines

In 2020, the biotechnology company BioNTech, which developed one of the first Covid-19 vaccines, carried out research at DESY to determine how the mRNA agent could be transported around the body more effectively. It worked together with the University of Mainz and the European Molecular Biology Laboratory (EMBL), which operates its own beamlines at DESY.



### Medicines of the future

DESY scientist Alke Meents and his team screened some 6000 substances to determine how suitable each was in principle as an active agent against Covid-19. In the course of this X-ray screening at PETRA III, they identified a number of candidates, which might be turned into future drugs that block an enzyme important for virus replication. Another research group has tracked down a synthetic antibody that might be used to neutralise the virus.



### Dosage

Researchers and experts at the Royal Institute of Technology (KTH) in Stockholm and DESY are looking for innovative methods of dosing medicines very precisely, including potential Covid-19 drugs, with a view to reducing side effects.



### New imaging techniques

An interdisciplinary research team from Göttingen and Hanover has come up with a new imaging technique that can be used to visualise damaged lung tissue in Covid-19 patients with high resolution and in three dimensions. The research took place at PETRA III in 2020. In 2021, the X-ray source also revealed changes in the myocardial tissue caused by Covid-19.



### Data analyses

Right at the beginning of the pandemic, DESY's IT departments made computing power and know-how available for data analyses and elaborate computer simulations. By September 2020, they had already clocked up 13 997 439 hours of CPU time. That corresponds to around six percent of DESY's total computing capacity.



### Spread

DESY theorists used big-data models to predict the spread of SARS-CoV-2. One of their findings is an algorithm that might help to reduce the burden on clinics by introducing targeted local measures.



### Rapid testing

Several research teams, including one from Universität Hamburg and DESY, worked on rapid tests to detect the virus more quickly, easily and cheaply.

# The sideline strategists

One of the most important committees at DESY is the Scientific Committee (“Wissenschaftlicher Ausschuss”, WA). It was set up by the Directorate in 1969 and officially launched three years later. Today, around 100 WA members advise the Directorate on fundamental issues of long-term strategic and scientific importance. They provide recommendations and decision-making support, raise objections and offer encouragement. The WA is an in-house authority, a gauge of scientific mood – and its influence is increasing. →



Since March 2020, Ingrid-Maria Gregor has headed the Scientific Committee (WA). Her commitment and dedication have played an important part in the success of the WA. The particle physicist by training regularly attends the meetings of the Directorate. "We have an extremely good relationship with the Directorate," says Gregor right at the beginning of our conversation. "This is important, to ensure that our voices as colleagues are heard." Time and again, WA involvement has resulted in procedures and decisions being reconsidered or revised by the Directorate. "The established practice is to ask us – but we speak up even when we are not asked. It's a genuine discourse!"

As a concrete example, "take the new rules on good scientific practice. The WA collaborated on the text." Another example is "working remotely. Because it's easy to forget the researchers' perspective." An extremely important issue is "the revision of DESY's strategy processes: During the pandemic, several virtual meetings were held on this matter with the Directorate, and those were prepared and moderated by WA members. They were open, effective

discussion sessions." A positive side effect is that "the Directorate now views us more than ever as an important sounding board." Another result: "The scientists know that the WA gives them a forum in which they can raise issues." And what's extremely important: "We need to shape the WA even more actively, we want to become more visible."

One of the most pressing issues for Ingrid-Maria Gregor is career development at DESY. That's where she wants to bolster her own work in the long term: "The WA has the strategic development of DESY in mind. That includes career opportunities for young scientists, for whom we need to provide long-term perspectives at DESY. Of course, they care about the overall direction we are taking, what we – and they – will be doing in 25 years' time." She herself came to DESY as a young postdoc 20 years ago – and has stayed here ever since.

One final question: When is the work of the Scientific Committee successful? "When the Directorate and other researchers actively approach us," says Gregor. And they do. "We are being heard, consulted and taken seriously."



**Tim Laarmann**

Vice-Chairman of the WA since 2020

"What do young scientists need? This is one of the sustainability issues we address in the WA, because young scientists today are finding creative approaches to solving the problems of tomorrow, thus decisively shaping our future."

**Elke Plönjes-Palm**

has been on the WA since 2013

"The WA promotes a cross-cutting exchange between researchers from all of DESY's divisions and the Directorate. That way, we are advancing discussions on scientific topics across the entire centre, but also on issues such as diversity and inclusion; that's important for a good (research) culture at DESY."

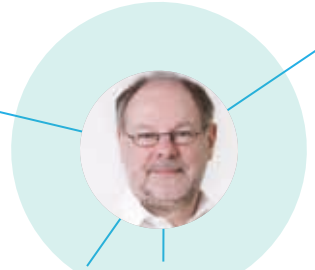




**Nicoleta Baboi**

was elected to the WA for a second term, having joined in 2018

“My focus on the WA is largely on establishing transparent, varied career paths for scientists.”



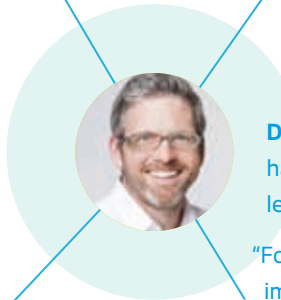
**Siegfried Schreiber**

was elected to the WA in 2010

“It is particularly important to me to discuss and help shape DESY’s scientific direction in the WA. I have often been involved in important appointments of lead scientists. The WA only has advisory powers – but I am pleased that the WA members are now also being directly involved in the strategy process.”

## The Scientific Committee (WA) at DESY

- Representatives of the scientific staff at DESY
- Task: to advise the DESY Directorate on issues of fundamental scientific importance
- Members: currently around 100
- Composition: Scientific and technical staff as well as lead scientists from each DESY division and from external research groups at DESY, each elected for a two-year term
- Meetings: three to four times a year. In addition, internal working groups and task forces work on issues such as strategy discussion, campus development, diversity and inclusion, professional development etc.



**David Berge**

has been on the WA as a lead scientist since 2017

“For me personally, the WA is the most important body at DESY. This is a forum where we discuss everything that is important to the researchers and exchange ideas with the Directorate. We take our advisory role very seriously, and we are helping to shape DESY.”



**Jan Garrevoet**

was elected to the WA in 2021

“The WA empowers employees to influence a wide range of relevant issues with a view to shaping a pleasant and interesting work environment. It’s particularly important to me that I can give input on issues like career paths and working-hour models for those employees involved in the PETRA III user operation.”



**Frauke Poblitzki**

has been on the WA since 2021

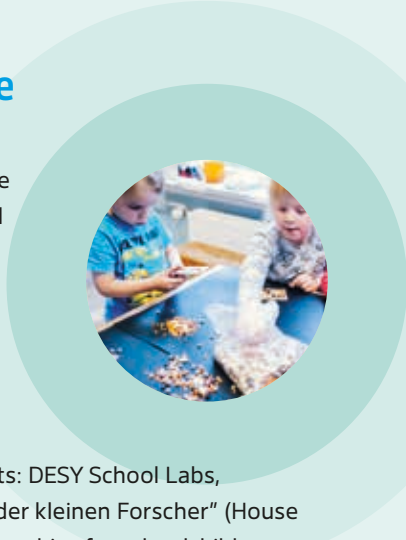
“I am an engineer, and the WA allows me to influence the shape of the infrastructure and scientific technology at DESY – as well as the boundary conditions under which they are being developed. Sustainability needs to be present in the design, as well as in the minds and structures, in order to preserve knowledge and skills and to encourage creativity in solving current problems.”

News in brief

# Governance

## Sharing knowledge

The more complicated the research, the greater the desire to make it comprehensible and accessible. That is why DESY has a comprehensive offer of knowledge transfer to society in Hamburg and Zeuthen. Here are some examples:



- » For children and adolescents: DESY School Labs, STEM days for girls, "Haus der kleinen Forscher" (House of Young Researchers), internships for schoolchildren. 2019: hosted the worldwide Beamline for Schools competition. 2021: hosted the 10<sup>th</sup> International Cosmic Days in the field of astroparticle physics
- » For the general public: DESY campus tours, "Wissenswertes" (Knowledge Values – public evening lectures), the event series "DESY Science Café" and "Wissen vom Fass" (Knowledge on Tap), virtual DESY tours, open days
- » For the professional public: Over 1000 publications a year, workshops and conferences

Some of the programmes for science enthusiasts and DESY fans had to be scaled back temporarily during the pandemic – or else they were held online.

**10 000**

annual visitors to the campus

**6000**

children and adolescents attending the School Labs

## Taking part

How does society view science? This was the key question that led to the "Science & Society" initiative from the ranks of the DESY workforce. The initiative organised discussions, seminars and activities revolving around societal issues such as Fridays for Future, Black Lives Matter and Science 4 Peace. In terms of key issues such as diversity, ethics and the responsible use of resources, the initiative is guided by the goals laid down in DESY's mission.

## Looking ahead

Fundamental research in the service of society goes beyond pure cutting-edge research. That is why DESY is actively strengthening Innovation and Technology Transfer (ITT) in order to create closer links between science and the economy and to promote the transfer of ideas, knowledge and technologies more effectively. This has been successful in ITT – with these offers:

- » Services for industry: supporting customers, from using beamtime through testing materials to building prototypes
- » Knowledge and technology transfer: identifying inventions and potential for development at DESY, protecting intellectual property, supervising cooperative ventures
- » Supporting company start-ups: case-specific advice at the DESY Start-up Office
- » Help getting started: creating an innovation-friendly environment

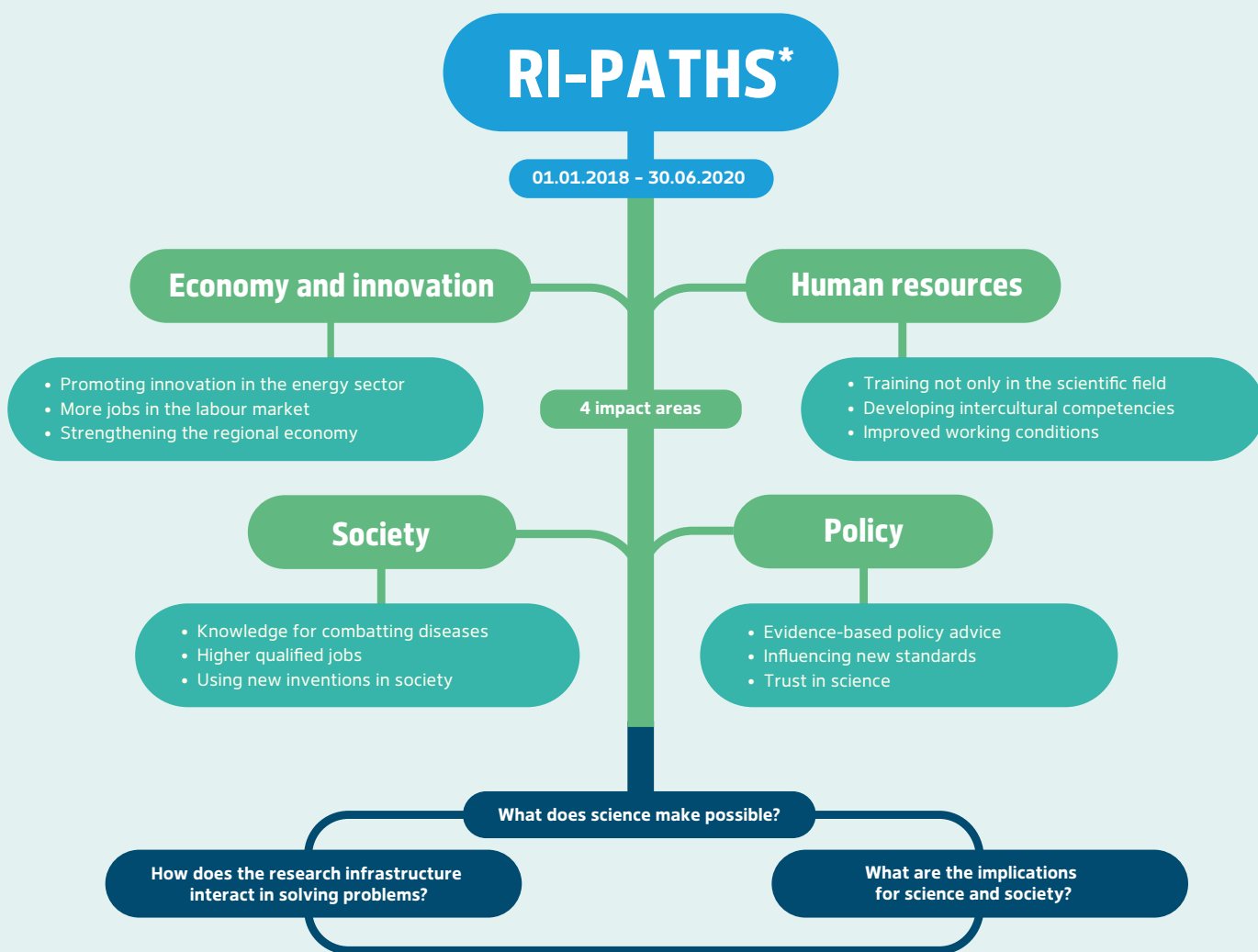
Ultimately, all these measures are about making brilliant ideas practical and marketable for society as quickly as possible.

## Giving meaning

An important element of DESY's sustainability strategy is a transparent and comprehensive culture of compliance. That is why DESY has developed a Compliance Management System (CMS) over recent years, ensuring compliance with legal, ethical and DESY-specific standards, which brings together a range of – existing – departments, committees and officers relevant to compliance. This is what the CMS is about:

- » Development of rules and instructions for action
- » Risk analysis and assessment
- » Training/communication of compliance requirements
- » Counselling options and grievance procedures
- » Regular review of the compliance system

DESY has a compliance officer, who is the central contact for all questions relating to the CMS. She was appointed by the DESY Directorate.



\*RI-PATHS = Research Infrastructure Impact Assessment Pathways

## Having an effect

What does science make possible? How does one measure the socioeconomic impact of research infrastructures? Questions like these cannot always be answered unambiguously, nor can they be substantiated with numbers. That’s why DESY collaborated on an EU-funded research project called Research Infrastructure Impact Assessment Pathways (RI-PATHS) between

2018 and 2020. Its aim was to show the many positive effects of research institutions, which benefit not only the scientific community but also the economy, politics and society. Impact pathways are shown here as an example. The project partners included the European centre for particle physics CERN near Geneva and Fraunhofer ISI in Karlsruhe.

## Giving emphasis

One of our most important strategic goals is Digital DESY, the comprehensive digitalisation of our research and administrative procedures. The project – which has been developed further in the DESY 2030 strategy – is being addressed along multi-disciplinary lines and currently covers the following areas:

- >> Remote working and modern business methods
- >> Autonomous accelerators, data processing, artificial intelligence and high-performance computing
- >> Monitoring, safety and sustainability in infrastructure

Some initial successes – also related to the pandemic: Automated user operation for experiments has already been implemented, as has the digitalisation of numerous administrative processes.



# The pacemaker

The DESY group MKK (“Maschine Kraft Kühlung” – Machine Power Cooling) plans, builds and operates the technical infrastructure on DESY’s Hamburg campus. It is responsible for the entire electricity, heat and cooling water supply to all buildings, accelerators and research facilities. Practically speaking, MKK is the technical heart of DESY. Since February 2021, its “pacemaker” has for the first time been a woman: Nadja von Neuhoff. Nothing happens without her. “I would agree with that,” she says.



**N**adja von Neuhoff is the boss of around 90 employees – from the trades and engineering professions: “My group is large, diverse and multifaceted in terms of its experience and its expectations.” In addition, there are the scientists with whom she works closely in operating the accelerators. “With this large number of protagonists and stakeholders, and the complex set of facilities that has grown over time, implementing fundamental issues and ideas calls for time, perseverance and never-ending motivation.”

Nadja von Neuhoff wants to “set new standards”: be proactive rather than reactive. “Partners and external companies should consider us a pioneering client. But our campus is 60 years old, so we are continually having to modernise.” MKK plays a decisive role in this process: “I want my group to be the designer of safe, economical and resource-efficient campus facility operations that allow modern research to be carried out.”

For Nadja von Neuhoff, this means two mammoth tasks: sustainable human resources management *and* the energy-efficient implementation of sustainability goals. Her answers to these two sets of issues include precise ideas as well as grand visions:

**Nadja von Neuhoff** grew up in a technical environment in South Brandenburg. Her mother was an engineer in a municipal planning department. She enjoys tinkering with things. Sustainability as well. She has a degree in supply engineering and helped to develop Germany’s largest industrial waste heat recovery system for neighbourhood supply in the Port of Hamburg. She has been at DESY since 2018, heading the MKK group since 2021.



## Sustainable HR management

## Sustainable construction and operation

### WHAT SHE WANTS (TO DO DIFFERENTLY)

I prefer leadership at eye level – transparent and agile – and want to empower my team to go about its work responsibly, efficiently and in line with modern practices. I also want it to continue learning in new areas. My employees need to show leadership in their respective areas.

This type of position allows me to shape things in sustainable ways. I am constantly and continuously trying to optimise things and processes and to implement projects. We have so much potential, and there are many things we could do better today. In terms of energy supply, for example.

### HER FOCUS

We must use the digital opportunities offered by the infrastructure in order to operate more efficiently. For this, we need an up-to-date collaborative work environment and a central facility management system. This is possible, but it requires perseverance and persistence.

We need to evaluate and adapt all our research facilities and operate them efficiently, take stock and define goals. We need to reduce our consumption and conserve resources. To do this, we need technical monitoring. This is possible, but it will take time.

### MOTIVATION

I am a very tenacious person. I love digital tools. And I like delegating responsibility. I want to set the goal and contribute my ideas, though, and I want our work to bear my signature. It's important to me that my decisions are understood.

I am an engineer, I am excited about technical infrastructure, about supply, about facilities throughout their entire life cycle. A climate-friendly energy supply has always been at the top of my agenda. I specialised in resource-efficient neighbourhood supply systems early on. I think sustainably, and I act sustainably.

### BIG CHALLENGES

Human resources planning! The market is tense. It's difficult to find good people. But let's be honest: In which sectors and professions can people make a difference? Precisely in areas such as technical infrastructure! We should be doing more promotion for this.

Planning technically modern buildings and facilities! In future projects, such as PETRA IV, we need to be even more motivated to explore how far we can go in terms of sustainability. Our goal is to build low-energy facilities without limiting research. That's part of my job too, to intervene and think along the same lines.

### DOUBTS

We don't have enough women! I simply don't understand why so few girls are choosing this type of career, especially in times of Fridays for Future – it's all about protecting resources and supply in the broadest sense.

Our way of life consumes resources! We need to come up with some clever ideas, maybe do without certain things. And we are in a phase where it cannot always be a matter of finding the cheapest solution. What we build now will consume resources for decades. A difficult issue.

### AND NOW?

Our sector needs to become more attractive. Perhaps it is simply still associated with outdated images?!

We will become more creative and persistent. That requires an effort.

### IN TEN YEARS...

... we will be offering our employees an innovative and ultramodern work environment, where they can develop and concentrate on the essentials.

... we will have already implemented numerous efficiency measures and significantly reduced our use of resources. Sustainable construction and operation will have become second nature.

News in brief

# Human resources

## Historic: First woman on the DESY Directorate

In December 2021, DESY’s supervisory body, the Foundation Council, decided to appoint Beate Heinemann as Director in charge of Particle Physics. “We are facing some exciting challenges, in science and in society,” she said. “I want to play my part in ensuring that DESY makes decisive contributions.” The physics professor is the first woman to join the Directorate since DESY was founded in 1959.



## Varied: DESY signs Diversity Charter

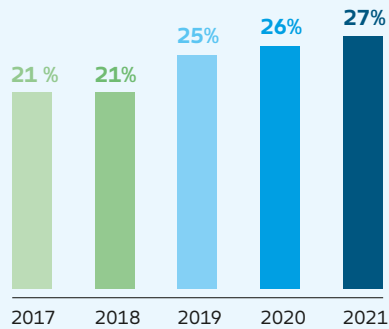
In June 2021, DESY signed the Diversity Charter, becoming part of Germany’s largest diversity network. “As employees of DESY, we stand for a cosmopolitan and tolerant attitude. People from all over the world work together at DESY to find solutions to the big questions facing humanity,” said DESY Director Helmut Dosch. “We regard diversity as being both a necessity and a strength.”



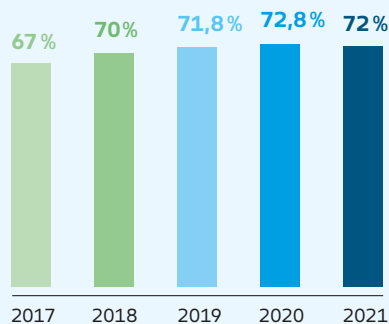
## Positive: More women in leadership positions – fewer fixed-term contracts

The trend at DESY is moving in the right direction, as these two statistics demonstrate:

The proportion of women in leadership positions is continuing to increase



The number of permanent positions has also increased in recent years



We are striving to speed up this positive development!

## New: Integrating vocational training and academic studies

DESY for the next generation: Since 2021, the research centre has been offering a new integrated training programme in cooperation with the vocational college Berufliche Hochschule Hamburg (BHH), which was founded in 2020.

The distinguishing feature of the programme is that participants start an in-company (and paid) apprenticeship together with a degree course at BHH. After 18 months, they can decide whether to continue their academic studies. The following combinations of subjects are offered: industrial management assistant with a Bachelor of Arts in business administration and IT specialist with a Bachelor of Science in computer science. The entire vocational training and academic study last four years.

This new educational path is an additional option alongside the dual education programme, in which the theoretical training takes place at the Hamburg University of Applied Sciences (HAW) or at the FH Wedel University of Applied Sciences. In Zeuthen, DESY is cooperating with the Technical University of Applied Sciences Wildau. The practical training takes place at DESY outside term-time. The degree programmes offered are mechanical engineering, electrical engineering, information technology and general computer science (Bachelor of Science). In 2021, 24 students received dual vocational training at DESY.

## Expanded: Offers during the Covid crisis

When campus life was abruptly paralysed by the lockdown, forcing employees to work from home and making personal contacts virtually impossible, DESY responded swiftly to the massive impact. In a short space of time, all the services offered by the interdivisional staff unit for HR development, such as further training, welcome days and networking meetings, were moved to virtual platforms. This extreme situation also meant dealing with new, digital issues, such as leadership in remote and hybrid work situations, facilitation of online meetings, resilience training and self-management when working from home. The crisis also made people creative: Employees met via Zoom in the new virtual DESY coffee bar, which for a long time replaced water cooler talks and chats in the canteen, providing a forum for public lectures and private conversations. Some new online services proved so successful that they have remained in place – even after the lockdown came to an end. Virtual meetings, for example. They not only save travel time and costs, but also allow larger numbers of participants to attend and a greater level of exchange between the two DESY sites in Hamburg and Zeuthen.



## Helpful: COAST for DESY's postdocs

Only 20 percent of all postdocs find employment in science; that is the sobering message from the statistics. It also means that 80 percent have to look for jobs elsewhere. DESY's postdocs receive special support in this situation. Since May 2020, COAST has been assisting them in planning their further careers. COAST stands for Career Orientation and Skills Training and is a personal incubator for career skills development. The service focuses on counselling, training and networking. COAST's own launch was a quite a challenge. Coinciding as it did with the first Covid lockdown, COAST's inauguration became DESY's first major online event. Subsequent demand was enormous – one third of postdocs made use of the offer of virtual individual consultations during the initial phase. Helmholtz Association funding for the project is assured until 2025.

**1/3** of postdocs attended virtual one-to-one consultations during the initial phase

# 1600

participants per month attending the online exercise programme "Bewegte Pause"



## Comprehensive: DESY's corporate health management

According to DESY's guidelines for safety and health, "employees offer the greatest potential for a successful future at DESY". And it goes on to say, "we promote the physical, psychological and social well-being of our employees, and their ability to devote themselves to their work in a healthy, motivated and creative manner." In terms of everyday practical life on campus, this means that DESY does far more than just provide plasters and headache pills through its medical outpatient clinic.

Among other things, its health services include:

- >> A wide range of information and counselling services on topics ranging from burn-out and addiction to caring for relatives with dementia
- >> A range of activities, such as the exercise programme "Bewegte Pause". This started live on campus before the Covid pandemic, with around 250 employees participating per month. During lockdown, the programme was offered online for people working from home. Participation rose to 1600 per month

In 2020, an employee survey on mental stress in the workplace was conducted at DESY. As a result, DESY identified new, in some cases Covid-related fields of action.

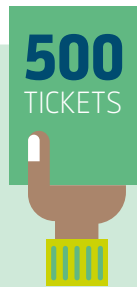
And of course, the corporate medical services and the outpatient clinic also provide vaccinations – against influenza and against Covid.

# Green light for DESY's mobility

How do our employees get to the research campus? How do they get to their various appointments? What flexible alternatives are there to owning a car, and how can we contribute to becoming more environmentally friendly while on the move? DESY is on the right track!

## Job ticket

When the budget laws dealing with subsidised "job tickets" for employees and trainees changed in 2021, DESY was prepared for the strong interest among its employees. Within the first few weeks, almost 500 job tickets were issued. And that was in times of Covid!



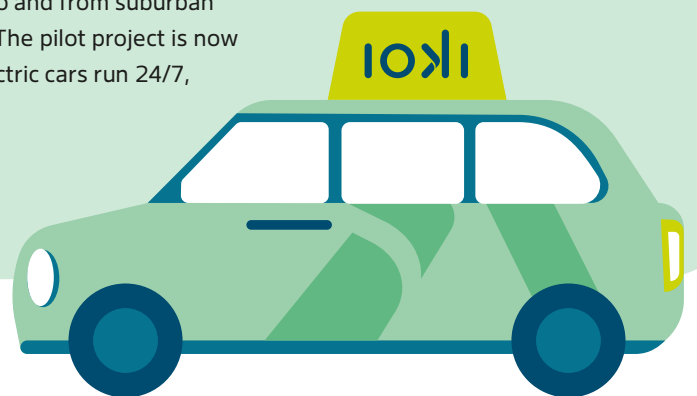
## Bus

Since 2020, the Hamburg DESY campus has been even more closely connected to the public transport network. A new express bus route connects Schenefeld (in Schleswig-Holstein) with Bahrenfeld and Hamburg's inner city. Other buses serve the DESY campus at shorter intervals or more directly via modified routes.



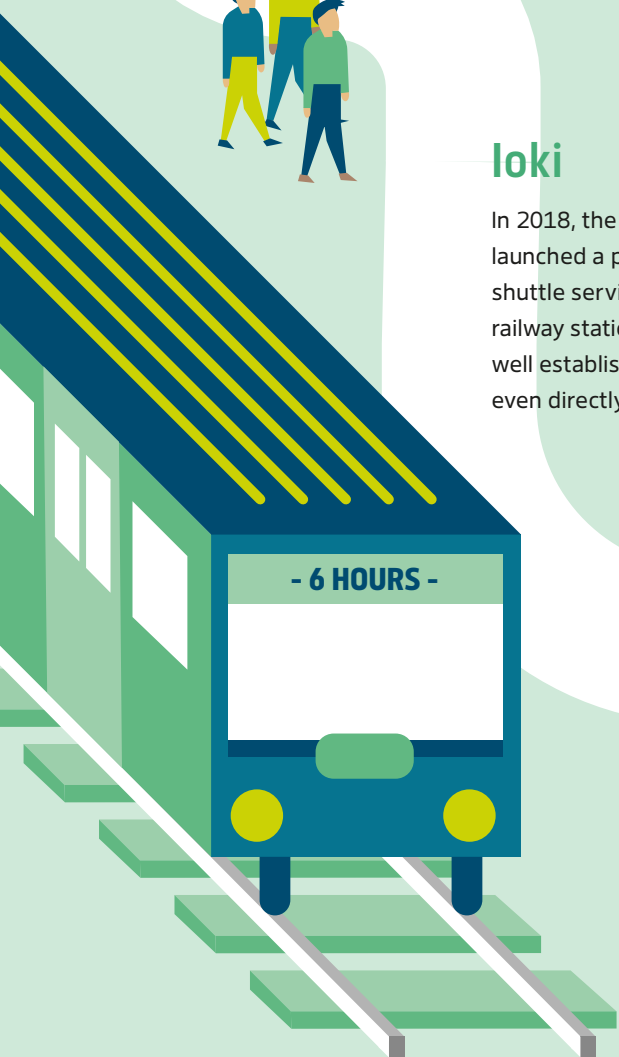
## ioki

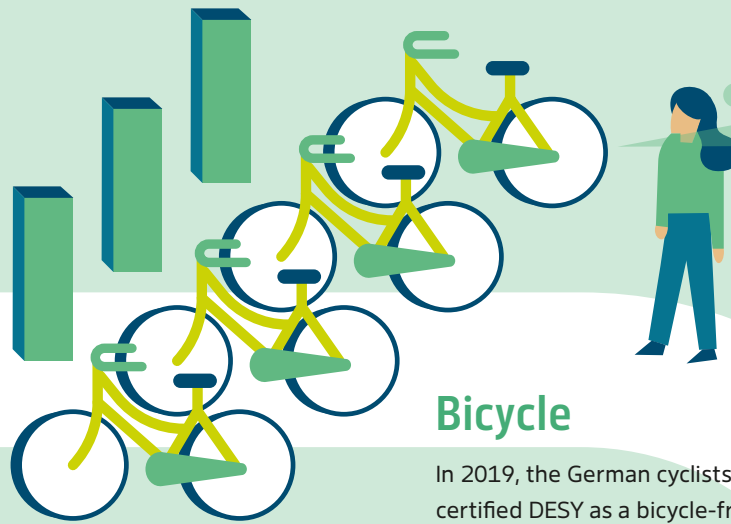
In 2018, the Hamburg-Holstein transport authorities launched a public on-demand service called ioki: a shuttle service for commuters to and from suburban railway stations and bus stops. The pilot project is now well established: Accessible electric cars run 24/7, even directly onto the campus.



## Business travel

Avoid, reduce, compensate – this is the principle behind the travel regulations adopted by the DESY Directorate in 2021. Business travel is to be reduced by 30 percent compared with 2019. For journeys of up to six hours, travellers will switch from air to rail. When flights are unavoidable, DESY will compensate for the emissions.





## Bicycle

In 2019, the German cyclists' association ADFC certified DESY as a bicycle-friendly employer. The Hamburg site was awarded gold, Zeuthen bronze. Details from the Hamburg campus: +++ Company bikes: More than 500 company bikes are available to the workforce, including cargo bikes and two with fire-fighting equipment for the European XFEL tunnel +++ Service: DESY has installed two bicycle repair points. In addition, a mobile bicycle workshop offers repair days +++ Safety: New bike stands have been set up at almost all buildings +++ StadtrAD: The campus includes two stations for the public bike-sharing system. More are planned +++ Conveniently located: Staff who come by bike can reach the campus via two cycle routes +++



## Stadtradeln

DESY employees regularly participate in this nationwide "City Cycling" campaign with great enthusiasm. In 2021, the result in Hamburg was 130 employees cycling some 21 000 km in 21 days. At the Zeuthen site, 69 employees (a quarter of the workforce) clocked up 13 000 km.



**HAMBURG**  
**21 000 km**

**ZEUTHEN**  
**13 000 km**

News in brief

# Supporting processes

## Switching to green electricity

The beauty and fascination of fundamental research also entails the truth about energy policy: The research done at DESY uses huge amounts of electricity, roughly equivalent to the annual consumption of 49 000 households. DESY is aware of this, which is why we decided back in 2020, as part of our comprehensive energy concept, to switch our contracts completely to green electricity. In concrete terms, this means that, from 2023, the research centre will only buy electricity from renewable sources. Compared with 2019, DESY will thus emit some 37 000 tonnes less CO<sub>2</sub> annually. To ensure that this is achieved economically, the purchasing, energy management, controlling and sustainability departments are all working closely together with DESY's Administrative Director Christian Harringa. "Green electricity is more expensive, but the investment will pay off," says Harringa, who was instrumental in driving the project forward. "Especially in the current energy crisis, we clearly stand by our decision." And he adds:

*"Of course, switching to green electricity is just one of several building blocks. In addition, we are also working to improve our energy efficiency."*

*Christian Harringa, DESY's Administrative Director*



**37 000 t**  
annual CO<sub>2</sub> reductions as from 2023

## End to plastic tableware

The mountains of plastic waste at DESY have shrunk considerably. Since July 2021, the DESY canteen has been offering Rebowl and Recup: Food and drinks are served in reusable bowls and cups. This has been a success. The returnable system, which allowed hygiene regulations to be met even during the pandemic, is now being used by around 1100 canteen users.



**1100**  
canteen users take advantage of the Recup service

## End of the paper mounds

There was a time when every in-house circular was printed on paper and placed in your pigeon hole. As part of the digitalisation process, DESY's administration has abolished this procedure, ending the mounds of paper and switching to email. What this means for the environment? Previously – from 2015 until 2019 – the administration sent out an average 41 000 printed circulars per year. That alone corresponds to 205 kg of 80-g paper. More precisely, switching to email meant that, every year, 613 kg less wood, 10 679 l less water and 2194 kWh less power are now consumed.



**613 kg**  
wood saved per year



**10 679 l**  
water saved per year



**2194 kWh**  
energy saved per year

## Commentary: Confession

# Giving ivy a leg-up

## Reselling machines

Just because something is no longer needed does not mean that it's useless. This is also true of the equipment used on a research campus. That is why DESY uses the federally managed platform VEBEG to resell its equipment – a kind of eBay for machines. VEBEG is based on the idea of a circular economy: recycling instead of throwing away. The DESY site in Zeuthen was a pioneer in this respect and was already selling drive motors in 2015. DESY Hamburg has been on the platform since 2019. The first machine to be offered at that time was in fact an industrial vehicle used to move goods around on the premises, a type of forklift truck. To date, the proceeds from the sales add up to about 75 000 euros in Zeuthen and about 370 000 euros in Hamburg.

## Recycling when printing

DESY has its own copy centre, which handles over half a million printouts a year. In order to be as environmentally friendly as possible, the copy centre has signed up to the Clean Planet Program operated by the supplier of the printing materials. This programme ensures that all consumables, such as toner cartridges and developers, are recycled.



**Y**ou have already heard that DESY is blossoming, and greening buildings on its Hamburg research campus. Hall 36 was the first, with 25 000 grasses, perennials and creepers being planted on and around it, with great effort and amid loud cheers. Good-bye, dull façade! Hello, lush jungle! That was in May 2021.

Okay, it will take time and patience before we are able to sit back in the shade of thickets, birds chirping on the old walls. More precisely, the hall is supposed to be completely covered in vegetation by 2026. Or so they say. At this point, our comment would be: "Wow!" and "Really?" Taking a closer look the other day, we noticed some sluggish ivy moving sideways instead of shooting upwards like the zealous wild vine next door. As self-proclaimed demigods in green, we pronounced our diagnosis: Replant it! It has no "feet" at all. We were soon enlightened by the planting officer in charge: "*Hedera helix* is a late bloomer, which takes its time. It'll get 'feet' – and start climbing too. Eventually."

In the meantime, the tender ivy plants have been coerced into climbing by providing massive struts. There's room for improvement! We are keeping an eye on them and will keep you posted on their growth.

## Far-sighted

# “We provide impulses – we don't give up”

If you have read this far, you will now know all about the status and importance of sustainability at DESY. The primary responsibility lies with DESY's interdivisional staff unit for sustainability, headed by Denise Völker. So she will have the final word.

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### **DESY's interdivisional staff unit for sustainability has existed for just over three years now. Perhaps you could take stock for us.**

My main conclusion would be that DESY is really serious about sustainability – and this is why we have already achieved so much. Personally, I am particularly proud that my small team and I have managed to rigorously address all the major sources of CO<sub>2</sub>, from green electricity through travel costs to waste heat recovery. This has made DESY considerably more climate-friendly.

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### **How does this small team change the sustainable procedures within such a large research centre?**

We are organised in the form of an interdivisional staff unit, which means that we can have an impact on all of the DESY departments. We provide impulses and strategic support, connect people and procure funding... and above all we don't give up, even when there are numerous conflicts to be overcome.

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### **How does that work in practice?**

With a great deal of pragmatism and passion, which is typical of DESY! When I started working here three years ago, coming from the NGO sector, I immediately realised that

many employees at DESY already had ideas for sustainable research and sustainable campus operations. Initially, our staff unit was a kind of sparring partner. Good ideas were discussed and refined. We analysed the potential of the unused waste heat in a very short space of time, for example, and planned its implementation together with the technical groups. The collaboration was exemplary – other areas call for greater powers of persuasion.

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### **Surely that is a euphemistic way of saying you are “tearing out your hair”... To whom would you like to give a lesson in sustainability?**

I would prefer to explain the thinking within my staff unit. We too have to make concessions or weigh up carefully whether other goals should take priority over sustainability – at least temporarily. For example, opting for green electricity means higher costs. That money is then missing elsewhere. In this example, we have weighed everything up and come down in favour of sustainability. The arguments for green electricity were overwhelming, because of our enormous power consumption and the huge positive impact.

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### **Give us a more controversial example.**

DESY is currently planning the best and most powerful X-ray microscope in the world: PETRA IV. This needs to run in a stable manner and provide plenty of time for doing research. That equation adds up to a high energy consumption. Yet PETRA IV should also consume as little energy as possible. This is a real balancing act and a potential source of conflict and error. Some factors are just non-negotiable. However, since we all want to implement PETRA IV, we keep readjusting.

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### **Let's talk about the political context of sustainability...**

... without which we could not operate at all, being a publicly funded research centre. Fortunately, some stumbling blocks were removed during the reporting period. We are closely connected with other centres through the Helmholtz Association and are able to achieve a lot together. Last but not least, our outstanding researchers ensure that sustainability is always treated as a top priority. The Prisma Forum, for example, a group of high-ranking scientists that includes DESY Director Helmut Dosch, has initiated a process with the German research ministry focusing on energy-intensive research at large-scale facilities, such as DESY. Conversely, all of this helps us



“For example, we would like to capture the energy of the electrons used to generate the X-rays so as to reuse it. That would be mega-recycling, but it’s still a long way off.”

*Denise Völker, DESY’s sustainability manager*



DESY’s sustainability team (from left): Kathrin Schulz (sustainable buildings, funding), Frank Merker (energy monitoring), Eva Leister (energy management), Denise Völker (direction) and Andrea Klumpp (PETRA IV)

to implement concrete measures and obtain the necessary funding.

**From insights to outlooks: For which projects are you exerting positive pressure?**

We want to fully implement the use of waste heat as soon as possible, so that we can honestly say: DESY is climate-friendly! That would allow me to sleep more peacefully. In addition, there is further dormant potential for increasing efficiency in the operation of our accelerators. We could install photovoltaic systems and feed the electricity straight into the accelerators. That would save us converting it from direct current to alternating current and back again. Then there are real science-fiction-like ideas, which are guaranteed to be implemented with tomorrow’s technologies. For example, we would like to capture the energy of the electrons used to generate the X-rays so as to reuse it. That would be mega-recycling, but it’s still a long way off.

**What else are you focusing on?**

For example, together with other departments we are continuing to look into new ways of working. In the meantime, the challenges we faced during the Covid-19 pandemic can be viewed as opportunities. But

we also have to look very closely at the issue of remote working: If working from home means that women start sliding down the career ladder, then we will need to find solutions together with our equal opportunities officers.

**What areas will you be putting the most energy into over the coming months?**

The design of PETRA IV, actually! During the planning phase, we will identify many challenges in the field of environmental, social and economic sustainability. We definitely want to work on solving these. That is and will remain an exciting task!

**Denise Völker learned the love of nature collecting herbs and mushrooms deep in the Thuringian Forest with her grandparents. Shortly before the end of the East German regime, her teacher gave her a certificate with the following message: “In some countries, even a sharp tongue is considered unlawful possession of a weapon.” At DESY, the political scientist, who has a PhD, has been successfully using this tongue since 2019 to bring about a sustainable transformation.**

# We want numbers!

In the reporting period of this sustainability report (2019–2021), DESY’s top priority was to reduce CO<sub>2</sub> emissions. We have made significant progress in this regard, achieving initial interim targets and consuming less energy and resources. We have also identified further major potential, the implementation of which will shape the next reporting period. You will find the main figures here:

**200 000 €**

annual cost savings through waste heat utilisation

**40 000 t**

maximum potential annual CO<sub>2</sub> savings through waste heat utilisation

**1/2 ha**

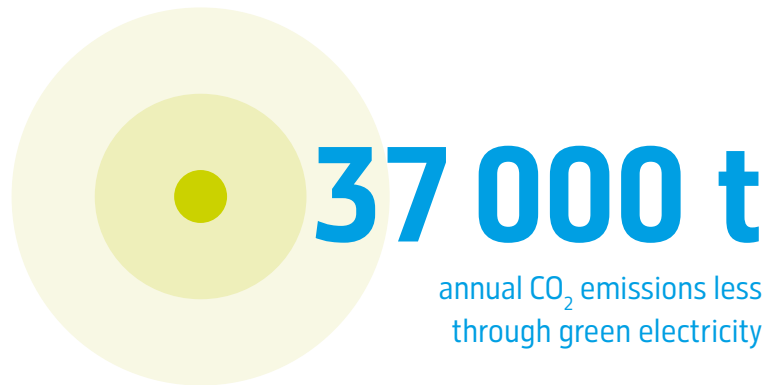
area of façade and roof greening on Hall 36

**6000 t**

recycled heavy concrete

**34 000 km**

cycled in the Stadtradeln competition at both DESY sites together



**1m €**

potential operating cost savings if both sites are supplied with existing waste heat

**613 kg**

wood saved by digital circulars

**1100**

of 2800 employees use Rebowl

**>10 GWh**

annual waste heat from the cryogenic plant

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**A research centre of the Helmholtz Association**

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