

# The Climate University

The University of Bremen's  
Capabilities and Involvement

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## What Constitutes a Climate University – in Brief

A climate university seeks to **UNDERSTAND CLIMATE CHANGE** and analyze its causes and consequences in all their facets. This is something that the scientists and scholars at the University of Bremen do through their work. The university has been raising its profile through the issues of climate and environmental sustainability for years. “Marine, Polar and Climate Research” is one of its areas of focus and has achieved international renown. The university’s climate research takes place **in interdisciplinary networks**, be that in an Excellence Cluster, in its centers that cover a broad range of disciplines, or in Collaborative Research Centers, investigating things from the carbon cycle to the melting of the Arctic sea ice. The cutting-edge non-university institutions in the state of Bremen are **excellent partners**. Together with them, the university appoints outstanding academic staff and coordinates research agendas. The university is involved in large consortia to share data for climate research and biodiversity. High-profile international partnerships, guidance for decision makers, excellent positions in rankings, significant awards, and internationally recognized publications as well as considerable external funding are all evidence of the **respect for and international influence** of climate research at the University of Bremen.

A climate university looks for ways for how we can **RESPOND TO CLIMATE CHANGE**, mitigate it, and adapt to the consequences of it. At the University of Bremen, these questions are not just for natural sciences. They are also asked of social sciences, humanities, the liberal arts, and engineering sciences. There are multiple research units contributing to effectiveness at the **interface between environment and society**. Their projects include a connection of **local perspectives and global challenges**, such as deforestation in the Sahara, material cycles in Germany, and threatened livelihoods in the Arctic.

A climate university seeks to **SHAPE TRANSFORMATION** in society and in firm concert with business and industry. It is in close proximity to these challenges in every respect. With automotive, aerospace, logistics, and steelmaking, the state of Bremen is home to significant industries with a critical influence on the climate. Bremen can be a **demonstrator for transformation** in business, industry, and society toward climate neutrality. The University of Bremen and other scientific facilities in the state perform **application-focused, industry-based research**, contributing to innovation.

A climate university takes responsibility for **THE NEXT GENERATION**. It also offers this generation the opportunity to become involved itself. That is why the University of Bremen works in a number of formats with and for schools to stimulate **interest and excitement** among their students. At the University of Bremen, local and international students can **study the climate** as a subject in numerous programs of study, in courses, in a European dialog, and with digital learning resources. Notably, it is also the early-career researchers who **shape the future through research**. They gain outstanding, interdisciplinary, and, most importantly, international postgraduate training at the University of Bremen.

A climate university practices what its research findings demand. It puts itself **ON THE JOURNEY TO A CLIMATE-NEUTRAL CAMPUS**. The University of Bremen has committed to **systematic climate protection** for this reason. This climate protection will be certified, realized **with tangible actions for climate neutrality**, and shaped on an ongoing basis through a **joint process** at the university.

The **UNIVERSITY OF BREMEN** will continuously expand its climate-research capabilities and engage in international and new, national partnerships as a climate university. This documentation demonstrates how **capable** the University of Bremen is in researching climate change. It also shows the resolve with which it is **committed** to climate neutrality.

## UNDERSTANDING CLIMATE CHANGE

For more than two decades, Bremen's high-profile, interdisciplinary area of "Marine, Polar and Climate Research" has concentrated key questions in the one place: How has the climate changed during the Earth's millions of years of history? To what extent are human activities responsible for it today? What role does the sea have in the Earth's systems? Scientists work on these questions in leading global networks and collaborate closely with cutting-edge research institutes in the state of Bremen.

### Climate Research in an Interdisciplinary Network

MARUM – Center for Marine Environmental Sciences and the Institute of Environmental Physics oversee excellent research in the natural sciences to gain an understanding of climate change. This area of focus receives targeted support from the state government through its research strategy. It involves a large number of different subjects.

- **An Excellence Cluster is exploring the ocean floor's role in the climate system.** An Excellence Cluster called "The Ocean Floor – Earth's Uncharted Interface" is quantifying the exchange processes at this significant boundary layer. It is a space where geological, physical, chemical, and biological processes interact with each other. In doing so, they influence the climate system, the global carbon cycle, and the biological productivity of the world's oceans. We still do not know enough about these processes to incorporate the ocean floor into environmental material balance approaches at a global level.
- **A Collaborative Research Center is improving climate predictions.** Climate models have energy-related inconsistencies in them and these can lead to distorted climate projections. The interregional "Energy Transfer" Collaborative Research Center develops physically, mathematically, and numerically consistent models for both the atmosphere as well as the ocean.
- **A Collaborative Research Center is investigating the melting of the Arctic sea ice.** The rise in temperatures prompted by global climate change is much stronger at the polar ice caps than it is at other places on Earth. The interregional "Arctic Amplification" Collaborative Research Center is examining the feedback processes that lead to things such as the Arctic sea ice melting much more quickly than feared.

- **An institute is researching ocean acidification.** The Bremen Marine Ecology Centre for Research and Education (BreMarE) looks at controversial issues associated with climate change, such as the biological consequences of ocean acidification and the growing oxygen-minimum zones in oceans. BreMarE conducts research projects in the tropics as well as in temperate climates, the Arctic and Antarctic seas, coastal regions, and the deep sea.
- **Environmental Physics is analyzing greenhouse-gas emissions.** The University of Bremen's Institute of Environmental Physics – IUP (Institut für Umweltphysik) is a leading research institute doing work about the atmosphere, the ocean, the cryosphere, bodies of water, and the ground. It is particularly renowned for its remote-sensing methods in atmospheric research, which quantify the contribution that human activities and emissions make to climate change. Key geophysical parameters are surveyed using minisatellites, satellite swarms, and new types of sensors, including ones developed in conjunction with industry partners. Environmental sensor technology is being further developed together with Microsystems Technology, Biophysics, and Solid State Physics.

### Climate Research with Excellent Partners

The excellent institutions in the “U Bremen Research Alliance” are close climate-research partners within the Bremen region. The university and eleven nonuniversity research institutes funded by the federal and state governments began this close collaboration in 2016. Having these institutes located in the university's surroundings was a key goal of the state's science strategy.

- **Joint, strategic research planning.** The Alfred Wegener Institute, Helmholtz Centre for Polar and Maritime Research (AWI); the Max Planck Institute for Marine Microbiology, and the Leibniz Centre for Tropical Marine Research – ZMT (Zentrum für Marine Tropenforschung) have the most important role in investigating climate change, together with the university. They cooperate within the Ocean Floor Excellence Cluster and regularly collaborate on all major projects. They strategically coordinate professional appointments with each other, most recently in 2021 for the Heisenberg professorship approved by the German Research Foundation – DFG (Deutsche Forschungsgemeinschaft). This new position will investigate the role of polysaccharides in the carbon cycle. Bremen also has a leading role in the German Marine Research Alliance – DAM (Deutsche Allianz Meeresforschung).

- **The international hot spot for earth and environmental data.** Data for the international scientific community is concentrated at the global data center PANGAEA – Data Publisher for Earth & Environmental Science, which is jointly operated by the AWI and MARUM. PANGAEA possesses roughly 400,000 data records from hundreds of projects across the world.
- **The place for all data for biodiversity research.** Bremen is represented in the National Research Data Infrastructure – NFDI (Nationale Forschungsdateninfrastruktur) with multiple consortia. In particular, the consortium for biodiversity data – which is important for climate and environmental policy – is coordinated at the University of Bremen.
- **Joint technological development with AI componentry.** MARUM at the University of Bremen continuously develops ultraspecialized technologies for researching the climate and environment. Working jointly with space scientists and in partnership with the Alfred Wegener Institute in Bremerhaven, the German Aerospace Center – DLR (Deutsches Zentrum für Luft- und Raumfahrt) in Bremen, the German Research Center for Artificial Intelligence – DFKI (Deutsches Forschungszentrum für Künstliche Intelligenz), and other universities and industry partners, it uses AI-based methods to develop fully autonomous systems that can take samples independently at inaccessible locations, whether on the Arctic sea ice or Mars.

### Highly Respected Climate Research with International Influence

The scientists at the University of Bremen who conduct climate research constantly receive individual awards and have together developed considerable international renown. Thirty percent of all publications from the University of Bremen between 2010 and 2019 concern the United Nations' Sustainable Development Goals.

- **The University of Bremen advises international decision makers.** The University of Bremen is one of the founding members of the “International Universities Climate Alliance” (IUCA), which was established in 2020. The university is currently the only alliance member from Germany. Research findings are communicated more effectively through the IUCA, which enables a better response to the challenges of climate change. The climate alliance is a unique network that supports heads of government, political decision makers, and business in the struggle against climate change. As an IUCA member, the university is entitled to make nominations for the Earthshot Prize, which comes with considerable prize money, and has nominated the MOSAiC Arctic expedition for it. The University of Bremen's academic staff also contribute to the Assessment Reports for the Intergovernmental Panel on Climate Change (IPCC) as coordinating lead authors.

- **The University of Bremen makes international research collaboration a reality.** Major international programs such as the International Ocean Discovery Program – whose core repository is located in Bremen – create the framework for long-term cooperation. Thanks to its significant involvement in these programs, the University of Bremen is an internationally recognized partner for environmental research. This can be seen at MARUM, for instance, where over 75 percent of publications are written with international partners.
- **Bremen is one of the world’s highest-profile locations for earth and environmental sciences.** In the latest “Nature Index” ranking, the University of Bremen was given a very high position for earth and environmental sciences. The Nature Index is based on articles published in well-recognized journals. Alongside national research organizations (such as Helmholtz, Max Planck, and Leibniz), there is only one other university apart from the University of Bremen that was among the top five in Germany.
- **The university’s climate researchers receive prestigious awards.** There are four professors in environmental and climate research at the University of Bremen who have received the Leibniz Prize, the most significant research award given out by the DFG. They include Antje Boetius and Kai-Uwe Hinrichs for microorganisms and their influence on global climate developments, Nicole Dubilier for microbial symbioses, and – most recently – Veronika Eyring. Some of these professors also work at non-university institutes, such as Professor Eyring who heads the Erdsystemmodell-Evaluierung und -Analyse (“Earth System Model Evaluation and Analysis”) department at DLR Oberpfaffenhofen. In addition, marine biologist Antje Boetius (AWI and University of Bremen) received the twenty-sixth German Environmental Award from the German Federal Environmental Foundation – DBU (Deutsche Bundesstiftung Umwelt) in 2018. With €500,000 in prize money, it offers the highest reward of any independent environmental award in Europe. Researchers at the University of Bremen have obtained ultracompetitive European Research Council (ERC) grants for climate and environmental research on seven occasions, including one starting grant, two consolidator grants, and four advanced grants.
- **The university attracts a large amount of external funding through competitive grants.** The University of Bremen has taken top place for geosciences in the DFG’s funding ranking for many years now, which is evidence of its outstanding position in climate research.



## RESPONDING TO CLIMATE CHANGE

**Scientists and scholars in social sciences, humanities, the liberal arts, engineering sciences, and natural sciences are investigating how we can adapt to unavoidable climate change, how we can mitigate it, and how we can preserve the natural foundations of life. They do this work on an ongoing basis in relevant units at the university and in constant projects that connect local and global perspectives.**

### Effectiveness at the Interfaces of Environment and Society

- **Analysis for societal transformation with a focus on sustainability.** The artec Sustainability Research Center is the only university research center in Germany to have a clear focus on socioecological research based on the Sustainable Development Goals (Agenda 2030). Scientists and scholars from the faculties of Social Sciences, Production Engineering, Cultural Studies, Pedagogy and Educational Sciences, and Human and Health Sciences seek to cooperate with groups and stakeholders for this work, including outside of academia.
- **Interdisciplinary research for sustainable technical processes.** Scientists at the Center for Environmental Research and Sustainable Technology – UFT (Umweltforschung und nachhaltige Technologien) are examining the complex interactions between chemical substances and living environments. They develop sustainable processes for things such as sewage treatment and energy-system design. Researchers in ecology, biology, and chemistry are working together on reducing the risks for people and the environment and conserving natural resources.
- **Culture and social practices in the production of environmental knowledge.** “NatureCultures” and “Maritime Anthropology” are two young areas at the University of Bremen that are committed to researching science and technology. Urgent questions – from climate change to fighting global epidemics and doing business in an environmentally responsible way – are pursued from the perspectives of cultural studies and social science in the fields of environment, energy, resources, and medicine. The research about human-to-sea relationships ranges from coastal societies to the local and transnational contexts of offshore wind energy, while also studying port infrastructures or plastic waste at sea.
- **Transnational climate-protection law.** The Research Centre for European Environmental Law – FEU (Forschungsstelle für Europäisches Umweltrecht) was established in 1994. Its work involves environmental, technological, and commercial law and it advises entities such as the German Environment Agency and Germany’s Federal Ministry for the Environment. Transnational climate-protection law in particular is one of its areas of focus.

## Connecting Local Perspectives and Global Challenges

- **Regional ecology and global climate change.** An area of focus for environmental research at the University of Bremen is sub-Saharan Africa. A recent project applied AI methods from the field of deep learning to high-resolution image material, doing so in an innovative way. Researchers used them to chart every tree within a space of 1.3 million square kilometers in West Africa. Consequently, deforestation processes can be tracked and climate protection supported. The study by the Technology Center Informatics and Information Technology – TZI (Technologie-Zentrum Informatik und Informationstechnik) at the University of Bremen was published in “Nature.” It was also highlighted as one of ten particularly remarkable academic findings during 2020. The data has been visualized by NASA and soon it might become possible to chart tree populations globally.
- **Biodiversity and livelihoods of indigenous populations.** Climate-based changes such as rising sea levels and ocean acidification place strain on Arctic ecosystems. On top of that, there are also issues from fisheries, tourism, and shopping. The University of Bremen is coordinating a project that was launched in 2020 and involves experts in natural and social sciences at fourteen institutions in eight countries. It incorporates the indigenous population of the Arctic and other local stakeholders in order to examine the changes in biodiversity and the human inhabitants’ livelihoods in the Arctic’s coastal regions.
- **Optimized material cycles.** Scientist Thorsten Kluß and his team at the University of Bremen have won the German Sustainability Award in its research category. When food items are produced and processed, there are often valuable substances that go to waste. Software named “loopsai” is intended to position companies within material cycles automatically and suggest organizations that can use others’ food waste as their own raw material. Using the smart open-source software “loopsai – artificial intelligence integrated naturally,” the team want to make the concept accessible online.
- **Bee research through “Citizen Science.”** As part of the “Bee Observer” project, scientists work together with local residents to conduct their research. The Cognitive Neuroinformatics working group make sensor technology available to beekeepers so that they can monitor their bee colonies. In return, the colonies provide data that the university can use to gain insights into why the bees are dying out.

## SHAPING TRANSFORMATION

The mix of industries in the state of Bremen is characterized by business sectors where the chance of a climate-neutral future is key: automotive, aerospace, logistics, and steelmaking. Bremen is meeting this challenge. The Bremen state legislature has started a public inquiry into “Climate Protection Strategies for the Federal State of Bremen” to define tangible actions to achieve climate-policy targets in the state of Bremen. Its results are due in October 2021. Academia, business, and industry are represented in the inquiry commission, as is the “Fridays for Future” movement in Bremen and Bremerhaven. The state of Bremen can be a laboratory and demonstrator for the societal and economic transformation needed. It must bring together research, application, and innovation. The issue-based and industry-linked research at the University of Bremen contributes to this just as much as other higher-education institutions and research facilities in the state of Bremen do through their activities.

- **Wind energy.** The Bremen state government and many companies within the state were early in committing themselves to expanding wind energy, particularly offshore wind energy. In this context, the University of Bremen’s scientists in fields ranging from electrical engineering to marine engineering geology are researching power electronics, sensors for early turbine-damage detection, the development of power grids and smart grids, logistics, offshore-turbine foundations, and the challenges that offshore-turbine foundations pose for nature conservation.
- **Hydrogen.** With an initiative named the “Hanseatic League for Hydrogen,” Bremen is making significant efforts to expand hydrogen as a source of energy. Projects to wean Bremen’s steelmakers off fossil fuels and transform the city of Bremen’s industrial port have been designed as showcase projects for Europe. They involve a terrific expansion of pure and applied research on the subject of “green hydrogen” at the university and at non-university institutions, like with the test field for electrolyzers at Fraunhofer IWES.
- **Energy systems.** The Bremen Research Centre for Energy Systems – BEST (Bremer Forschungszentrum für Energiesysteme) is an association of professors in the university’s technology, mathematics, natural science, economics, sociology, and law disciplines. All members view the energy revolution as a transformation of a social and technical system. BEST works closely with industry, other higher-education institutions, and research institutes in the state of Bremen to establish a link between sustainability, reliable supply, and energy-system competitiveness.

- **Logistics and production.** Bremen has Germany's largest freight village and its port is the country's second largest and Europe's fourth largest. Logistics research at the University of Bremen is concentrated in the LogDynamics research cluster and is closely connected to industrial practice. By combining approaches from business administration, information technology, and production engineering, LogDynamics contributes to solutions for logistical issues. It also provides a path for small and medium-sized enterprises to access science and academia. Energy efficiency in logistics and production is an important topic, as the current "ecoKI" project at Bremer Institut Produktion und Logistik – BIBA ("Bremen Institute for Production and Logistics GmbH") shows. It involves supporting SMEs with the implementation of AI technologies for energy efficiency.
- **Transport.** Bremen is a major location for automotive manufacturing in Germany. Simultaneously, the city of Bremen is a fitting space for innovative transport concepts such as widespread car-sharing services. As part of a current project at the Zentrum für Technomathematik, scientists simulate urban traffic with a digital twin to make predictions about traffic flows and carbon emissions. To do this, they use a data-based hybrid model with parameters that are optimized using big-data and machine-learning methods. In another project about autonomous vehicles, work is being done to automate recurring journeys in familiar areas.
- **Aerospace.** Bremen is a key location for the European aerospace sector. Companies such as Airbus and OHB collaborate with the university for research and development. The university, together with non-university institutions, hosts research into materials for lightweight construction. The purpose of them is to reduce the energy needed and carbon emitted by airplanes. The university's MAPEX Center for Materials and Processes studies materials that consume resources and energy efficiently, along with manufacturing methods for other industrial processes. In supporting manned missions to other planets, it has consciously taken on a difficult task. It is impossible to transport everything needed to such planets, so nutrients and materials have to be able to be produced on inhospitable terrain using as few resources as possible. The methods used for this will also contribute to climate neutrality on Earth.

## THE NEXT GENERATION

For a university, viewing climate protection holistically always means fulfilling its mission to educate. The University of Bremen offers spaces for personal exploration, development, and research for its own students and early-career researchers, as well as students still at school. In addition, the University of Bremen will be developing into a European university of sustainability as the decade progresses. Together with other higher-education institutions in a European university network labeled Young Universities for the Future of Europe (YUFE), it has made sustainability one of four focus areas. Students from European countries will concentrate on the topic at the Bremen campus and students from Bremen will learn about the subjects of climate, environment, and sustainability at other European locations. The university will benefit from the experience that its European partners, such as Jacobs University and Bremen University of Applied Sciences, have had in becoming more international.

### Stimulating Interest and Excitement

The next generation plays a crucial role in achieving a climate-friendly future. Today's school students are involved, they are shaping the society of tomorrow, and they are future decision makers and researchers. The University of Bremen wants to prepare them for this and arouse their excitement right now.

- **The University of Bremen provides awareness about individual possibilities.** As part of a MARUM school project called “Klima – ich wandle mich!” (“Climate – I’m Changing!”), students and teachers at four partner schools are receiving guidance for a two-year period for science-based learning about climate change. It is a complex and tense subject straddling sustainable climate protection and the prevailing circumstances in society and politics, and together the participants develop options for action in their day-to-day lives.
- **The university introduces school students to climate research.** The university works with schools to organize laboratories for students. In them, the students research current issues in environmental and climate protection. The university’s Environmental Management department and the Bremen state branch of Friends of the Earth Germany – BUND (Bund für Umwelt und Naturschutz e.V.) organized a youth climate conference in 2018. Other events include the 2019 Physics Day about the creation of greenhouse gases, OPEN CAMPUS 2019 with laboratory workshops about “The Oceans and the Climate” for school students, the Ocean Day held by the Max Planck Institute for Marine Microbiology and the university, and a workshop on climate change, renewable energies, and the Earth’s history in the “Interdisciplinary Science Education” subject.

- **The university invites climate debate.** The University of Bremen and Haus der Wissenschaft Bremen cooperate to host an event series named “Forum Wissenschaft und Schule” (“Academia and School Forum”). Representatives of academic institutions hold presentations and workshops on multiple occasions throughout the year. In 2019, four scientists reported on possibilities for responding to climate change using the perspective of their own research.
- **The university thinks of both the beginning and the end.** Life-cycle assessments are playing an increasingly important role. As part of the school laboratory “Freies Experimentieren der Chemiedidaktik – FreiEx” (“Free Experimentation in Chemistry Teaching”), the end points of “Virtual Water,” “Carbon Footprint,” “Land Consumption,” and “Life-Cycle Assessment” are worked through using selected examples with a focus on chemistry and technology. The features, videos, and small series of experiments are appropriate for school and higher education. The online platform is being realized with partners in Brazil and the United States.

### Studying “Climate” through Research

The University of Bremen offers its students an extensive range of courses and study options to learn about climate change and all its facets. Subject-specific programs of study are complemented by numerous easily accessible classes and events that can be studied independently of any subject. They are often available to audiences outside the university, too.

- **The University of Bremen offers access to teaching about climate change.** Courses that relate to the United Nations’ seventeen Sustainable Development Goals are marked with a corresponding icon in the course handbook, making them easier to access across subject and faculty boundaries.
- **The university attracts international students to climate sciences.** The University of Bremen attracts international students to climate-change-related subjects with international, English-language master’s degree programs. Some of them take their findings back with them to their home countries, creating lasting networks.
- **The university puts teaching about climate change on the agenda across Europe.** The University of Bremen is a member of Young Universities for the Future of Europe (YUFE), which is an EU-funded network that links young and innovative universities. Sustainability is one of its four focus areas. Accordingly, University of Bremen students have been able to take classes at other YUFE universities and have the coursework credited to their degrees – and vice versa – since the 2020/21 winter semester. The course offering for climate-related issues will expand over the next few years.

- **The University of Bremen makes it easier to access climate knowledge.** The unique courses and programs on offer at the Virtual Academy of Sustainability – VAN (Virtuelle Akademie Nachhaltigkeit) provide video-based classes for all German-language higher-education institutions. Climate protection and adaptation is dealt with in a module of its own and is also an overarching topic that connects all modules. The Federal Ministry of Education and Research – BMBF (Bundesministerium für Bildung und Forschung) funded VAN from 2016 to 2020. The VAN concept is currently being remodeled and designed for YUFE’s international context, making it available as an open educational resource (OER) for a wide audience.
- **The university talks about climate-friendly energy production.** The “Energy Systems of the Future” lecture series foregrounded questions about energy efficiency and climate-friendly to climate-neutral energy during the 2020/21 winter semester. The lectures were open to all students, researchers, and members of the public. They were characterized by an interdisciplinary approach to the discussion about future sources of energy.
- **The university offers space for experiments.** Bremergy e.V. is a team that was formed by students at the University of Bremen in late 2011. During 2020, roughly fifty Bremen students from different disciplines developed “BreMo20,” a climate-friendly electric racing car and the seventh model overall of the car concept. Along with a number of partners at the university, the team also receives funding from almost fifty companies and foundations.

### Shaping the Future through Research

Early-career researchers have an exceptional role in the challenges of climate change and climate protection. The university supports and trains young researchers in a variety of ways for the different aspects of research on climate-related issues.

- **Recognition for climate research.** The CAMPUS PREIS – Forschen für nachhaltige Zukunft (“CAMPUS AWARD – Research for a Sustainable Future”) is given out by the Kellner & Stoll Stiftung foundation each year. It honors responsible research by early-career researchers at the University of Bremen. The winner receives the award for a research project that contributes to using resources sustainably and protecting the environment, climate, and ocean. There is a strong emphasis on research angles that consider all stakeholders on an equal footing and incorporate local partners, companies, or civil society.
- **Supporting early-career researchers.** MARUM hosts a graduate school named Global Change in the Marine Realm (GLOMAR). It organizes interdisciplinary training for doctoral students in the marine sciences at the University of Bremen and for partner institutions in the U Bremen Research Alliance (UBRA). Its principles are academic excellence and interdisciplinary, international connections. The doctoral candidates themselves mainly come from abroad. Early-career researchers are given excellent preparation for interdisciplinary collaboration in the climate sciences and for equally important science communication.

## THE JOURNEY TO A CLIMATE-NEUTRAL CAMPUS

The University of Bremen is aware of its responsibility for society and sustainable global development. On its own campus, too, it strives to minimize natural-resource consumption and prevent harmful impacts on the environment and climate. Environmental management, a climate-protection plan, and the sustainability forum help contribute to this. The university maintains a dialog with stakeholders at the university and in the state of Bremen, creating climate-change awareness. It sets concrete targets that it pursues in numerous projects and initiatives.

### Systematic Climate Protection

The University of Bremen is aware of its ecological footprint and role-model status. Climate protection, as part of environmental management, has a key role for this reason.

- **The University of Bremen is progressively reducing its carbon emissions.** The university has had an environmental-management system certified under the Eco-Management and Audit Scheme (EMAS) in place since 2004. Each year it publishes an environmental statement, which regularly communicates initiatives to reduce carbon and the progress made on them.
- **The University of Bremen prioritizes energy efficiency and climate protection.** A decision was made to create an integrated energy and climate-protection concept in 2015 as part of the Federal Ministry for the Environment's Climate Protection Initiative. It includes a catalog of thirty measures that are currently being implemented. A climate-protection manager has coordinated the climate-protection concept at the university since 2019 and oversees measures initiated as part of it.

### Climate Protection as a Joint Process

Achieving a climate-neutral campus is a university-wide goal that must be fought for at all levels and in politics. The university community and state government use various formats to debate and agree on the targets and pathways to climate neutrality.

- **The university and the state government are making sustainability a broadly applicable duty.** The current target agreement between the university and the state government, for the years 2019 to 2021, devotes an entire chapter to sustainability and how it is not limited to any one department. The agreement's intention is to strengthen the focus on sustainability in order to contribute to the National Action Plan for Education for Sustainable Development. The initiatives concern things such as energy efficiency and courses about sustainability and climate change.



- **The university organizes participation in institutional climate protection.** The university's Sustainability Forum was established in 2018 with a goal of realizing the United Nations' seventeen Sustainable Development Goals at the university, including climate protection. By creating the Sustainability Forum, the university has developed a driver of internal university discourse. This discourse serves to identify areas for action in administration, research, and teaching and to realize sustainable development within the meaning of Agenda 2030.
- **The university's decision makers reflect its development into a climate university.** The issue of climate change is discussed widely throughout the university, including in recurring debates in the academic senate, the university's parliament. A student initiative has also helped bring climate change and the diverse dimensions of it to the center of university debate. The academic senate's closed-door meeting in spring 2021, for instance, will be dealing with sustainability and climate neutrality.

### Achieving Climate Neutrality with Concrete Actions

Selected actions illustrate the innovative and participation-based approach taken by the University of Bremen. At the university, climate protection means taking economically and institutionally stable actions that can support themselves and have a lasting effect.

- **The University of Bremen produces its own climate-neutral electricity.** UniBremen SOLAR eG is a collective run by members of the university community. It has produced electricity on top of the university's buildings since 2011. In 2020, 360,000 kWh of green power were provided by six photovoltaic systems with over 700 kWp. UniBremen SOLAR eG is the first association of its kind to have started at a German higher-education institution.
- **The University of Bremen is increasing the energy efficiency of its servers.** Work has been underway for years to limit the increasing energy needed to operate the university's servers. The Green IT Housing Center was set up for this purpose. It is unique among German higher-education institutions, reducing energy consumption and the costs of server operation with innovative free cooling. The university possesses server racks for all research institutes in the state of Bremen, conserving 3.6 million kWh and stopping 2,000 metric tons of carbon emissions each year.

- **The University of Bremen supports biodiversity awareness.** The grassroots project “Campus Goes Biodiverse” sees members of the university community exploring species diversity on their campus together. The open spaces relevant to it are no longer mowed. The initiative was launched in 2020 by a group of students and academic and non-academic staff working together. Anyone can join the project and share observations of animals or plants using the iNaturalist app.
- **Studierendenwerk Bremen conserves resources in its work.** The Studierendenwerk, the provider of student services, is committed to using resources sustainably and reducing its ecological and carbon footprints. It is part of the Bremer Bündnis für Mehrweg (“Bremen Recycling Alliance”), invests in energy efficiency, procures local products, reduces food waste, and uses renewable raw materials. It also works together with the International Office to support the Go Green project, where herbs and vegetables are grown locally on campus by students who reside on campus.
- **The University of Bremen supports sustainable and climate-friendly transportation.** Innovative organizational travel initiatives support cycling and the use of public transport for short and long distances. In doing so, they contribute to a significant reduction in private-vehicle traffic and, by extension, reduced carbon emissions.

## Awards

The university’s efforts to reduce carbon emissions have received accolades nationally and internationally.

- **The “GreenMetric” climate-protection ranking** by the University of Indonesia in Jakarta put the University of Bremen in twentieth place, an outstanding result among the 912 higher-education institutions participating. Only one other institution in Germany ranked higher than the university. The judgment criteria comprised a wide range of environmental concerns. The University of Bremen received a particularly good score in the “Energy & Climate Change” category.
- **The innovative organizational travel initiatives** received an award in 2010 for the “Innovative Concepts in Transportation Management 2010” competition run by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety – BMU (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit) and Deutsche Energie-Agentur GmbH – dena (“German Energy Agency”).
- **The University of Bremen’s climate-protection manager** was awarded the Bremer Klimaschutzpreis (“Bremen Climate Protection Award”) in 2014 for her achievements at the University of Bremen and general commitment to climate protection.