uni umweltbericht

2019/2020

Albert-Ludwigs-Universität Freiburg

UNI FREIBURG

Content

The PV system on the University Library was installed in 2015. It produced more than 200,000 kWh in 2019, covering an average of about 10% of the building's electricity consumption. *Cover photo: Sebastian Bender*

A young tree and in the background the signet of the University of Freiburg in front of the Faculty of Biology.

Photo: Sandra Meyndt

Foreword by the Chancellor

Our new environmental report comes at a time of social upheaval. Its focus on 2019, the year before the Corona pandemic greatly changed our private and professional lives, gives it special significance as a future reference. Since 2020, the pandemic has had a major impact on the common activities and processes of the University of Freiburg. The changes will be observed in the evaluations of future environmental data. Presumably, the use of predominantly online teaching and the rise in home office workers are expected to have a significant impact on the university‘s energy consumption and carbon footprint.

The challenges of the Corona pandemic have further emphasized the role of science and research in times of great uncertainty and risk. We have learned that the use of science-based action early on in addressing such global challenges leads to less severe consequences and lower costs. Appropriate lessons and consequences should be drawn from this for other major societal challenges as well, such as climate change.

For this reason, the University of Freiburg has taken the initiative to develop a climate protection concept with clear goals and effective measures to reduce its carbon footprint. Relative to the year 1990, the CO_2 emissions from electricity and heat consumption at the University of Freiburg are to be reduced by 80% by the year 2040 and by 90% by the year 2050. These are ambitious goals, but the university has committed itself to set an example, not only in research and teaching, but also as a responsible institution in contributing to more practical climate protection in its campus operations. This climate protection concept will be published in the university‘s sustainability report.

Every great transformation begins with an assessment of the current state. In this environmental report, emissions from waste, water, procurement and the vehicle fleet are published for the first time.

Photo: Harald Neumann

Matthias Schenek
Chancellor

Environmental Guidelines

for the Albert-Ludwig University of Freiburg

Preamble

As places of creative forward thinking and motors of change, universities bear a special responsibility for the conscious use of our resources and the resilient, sustainable development of society.

For the University of Freiburg, sustainability is not only a continuous challenge for its own daily operations and social responsibility, but also an essential topic of academic research, teaching, export of technology, scientific further education and practical professional training, with the aim of strengthening the basis for sustainable solutions in the state, the economy and society.

With this comprehensive objective, sustainability becomes an integral part of the mission and vision of the University of Freiburg and at the same time provides its internal and social legitimacy.

These guidelines not only represent a commitment for the institution, but also, in the context of a sustainability culture, for each university community and member to use their influence in such a way that these common goals are achieved.

Development and implementation of ambitious guidelines

The university sets itself the goal of contributing to environmental conservation, climate protection and sustainability, beyond the legal requirements.

Minimization of greenhouse gas emissions and other environmental impacts

The university commits as far as possible to avoid negative impacts on the environment and climate through its activities. This applies in particular to emissions, effluents, noise, waste, air pollution, mobility and land use. The university strives for climate neutrality as an important goal, which is also key to the strategy of the Federal State of Baden-Württemberg.

Use of resources

The economic and efficient use of all resources has top priority, with the guiding principle for the use of materials being the following sequence: reduce – efficient use – repair – reuse – new procurement.

Embedding sustainability in research and teaching

Sustainability is integrated as a crosscutting theme in research and teaching. Conscious of its function as a disseminator of knowledge, the university wishes to raise students' awareness of the impacts of human intervention in the environment and discuss possible solutions.

Continuous improvement of environmental performance

The University of Freiburg constantly works to improve its environmental performance.

Involvement and training of employees

The environmental awareness and competence of employees is promoted and they are encouraged to set an example for students, employees and partner organizations. Employees are given the opportunity to participate in discussions on the implementation and definition of environmental goals to achieve the best possible integration of the environmental guidelines into operational practice. The university also supports internal communication with regard to the environment, and the exchange of information between all its members.

Financial support for sustainability projects

The university management particularly supports projects that primarily pursue sustainable development goals and contribute positively to climate protection. Great importance is attached to interdisciplinary thinking.

Sustainable procurement and investments

Environmental parameters are taken into consideration in procurement and investments, and preference is given to environmentally compatible alternatives. The university works towards environmental improvements with its suppliers and contract partners.

Construction

In cooperation with the federal state, the university is striving to fundamentally improve its environmental performance by refurbishing and modernizing existing building stock. Ecological aspects are taken into account from the beginning in all construction activities, and efforts are made to use environmentally friendly materials, optimize land utilization and improve resource efficiency of future management. The maintenance of outdoor areas, green spaces and water bodies is also carried out in an environmentally friendly manner. Renewable energies are given high priority.

Improvement of the work environment and extensive health protection

The health and safety of the members of the university are a priority. This is ensured by a health management system for employees and students based on leading approaches

Effective public relations and transparent environmental reporting

Annual environmental reports and triennial sustainability reports provide information on environmental performance status and goals and present the university's environmental policy in a comprehensible, transparent, assessable and comparable way. The university welcomes suggestions from outside in an open dialogue. Regional cooperation with business and further education programs for various target groups from outside higher education are being strengthened.

The carbon footprint of the University of Freiburg

The University of Freiburg aims to be predominantly climate neutral by 2040, in line with the objectives of the climate strategy of the state of Baden-Württemberg.

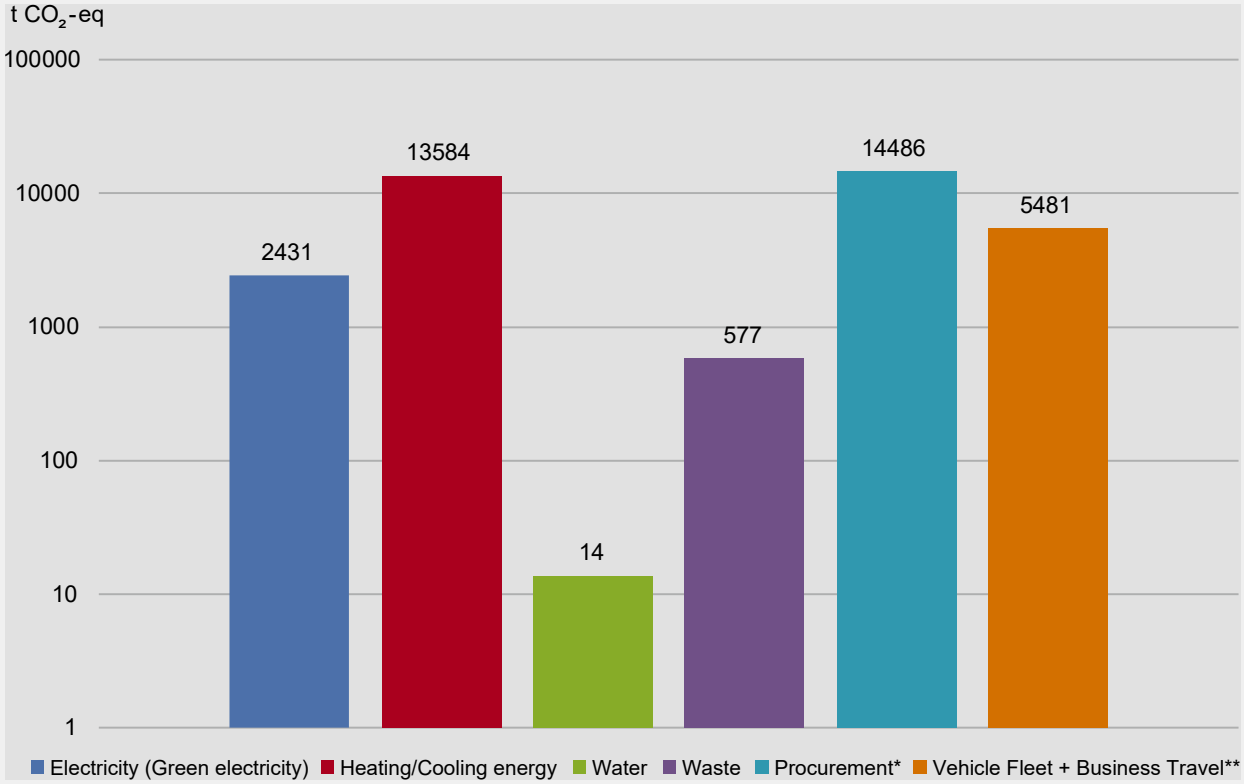
In this environmental report, emissions from waste, water, procurement and the vehicle fleet are published for the first time. The emissions include all types of goods and services purchased by the university in 2017. Since there is no data available for specific emissions from business travel for 2019, a projection based on the pilot project measuring emissions from business travel in 2018 was used. The pilot project was already described in the last 2018/2019 Environmental Report and a solution to assess all flight emissions is currently being developed.

Emissions from the vehicle fleet result from the combined gasoline and diesel fuel consumed by company cars. Another future goal for data collection is to estimate the indirect transport emissions caused by the commuting of employees and students to and from the university to obtain a more comprehensive overview of the total emissions. The climate protection concept with targets and measures to achieve the climate goals of the state of Baden-Württemberg by 2040 will be published in the first sustainability report 2021/2022.

Illustration: Jürgen Oschwald

Since 2013, the University of Freiburg has been purchasing green electricity from certified hydropower plants. The use of green electricity results in over 30% fewer CO_2-eq emissions compared to the use of the German electricity mix. In the area of the Technical Faculty at the airfield, electricity is obtained from the combined heat and power plant of the University Hospital.

Logarithmic representation of the university carbon footprint (Green electricity)



* The emissions from procurement are based on the university expenditures in 2017.

** The emissions from business travel are based on a projection for the year 2018.

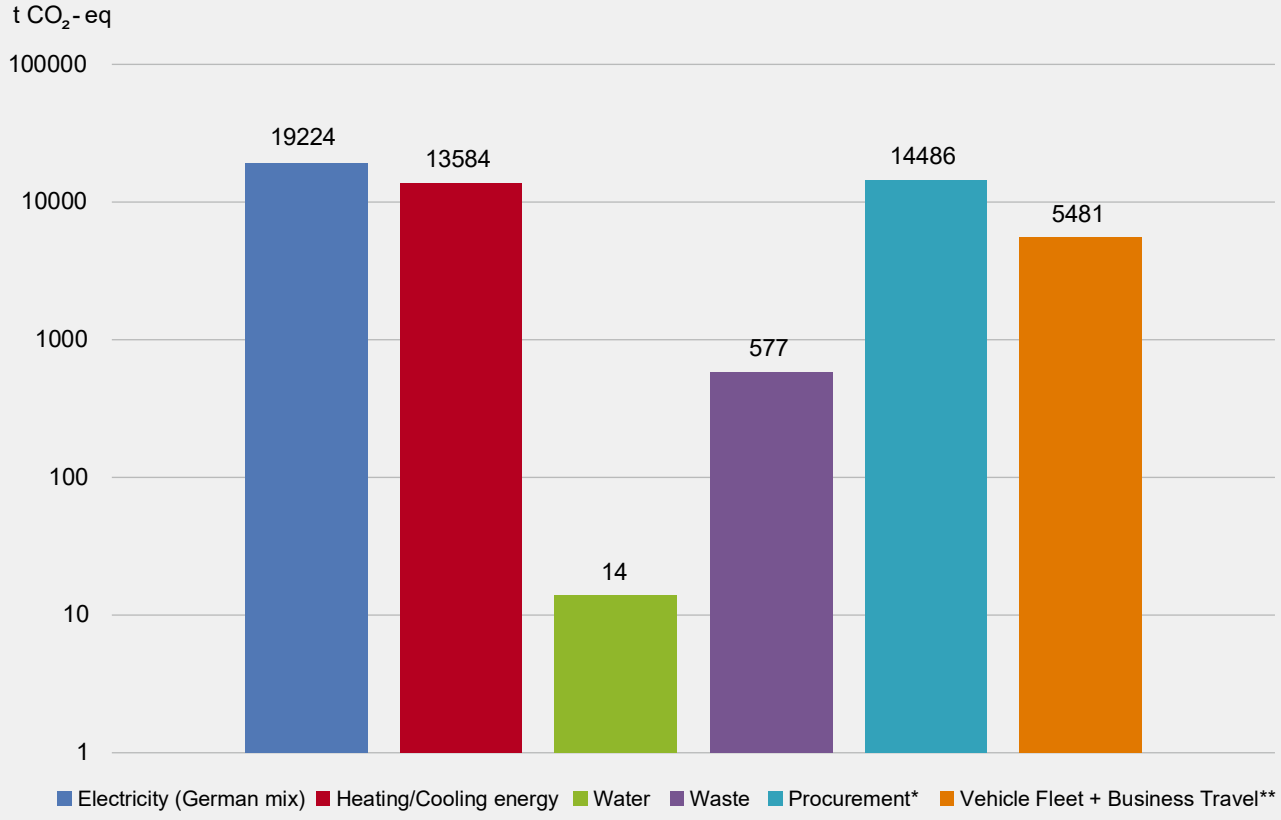
Total emissions 2019: **37.376 tonnes CO_2-eq**

Emissions per member of the university: **1,2 tonnes CO_2-eq**

Based on these calculations, the emissions per member of the university, i.e. students and employees, amount to 1.2 tonnes of CO_2-eq. For comparison, to achieve the two-degree warming target of the Paris Agreement, the CO_2 budget per person is 2.3 tonnes of CO_2/a.

Regardless of the purchase of certified green electricity, in practice, the supply of electricity comprises the conventional electricity mix. Therefore, it is meaningful to compare both CO_2 scenarios – with the conventional electricity mix and with purchased green electricity.

Logarithmic representation of the university carbon footprint (German electricity mix)



* The emissions from procurement are based on the university expenditures in 2017.

** The emissions from business travel are based on a projection for the year 2018.

Total emissions 2019: **53.567 tonnes CO_2-eq**

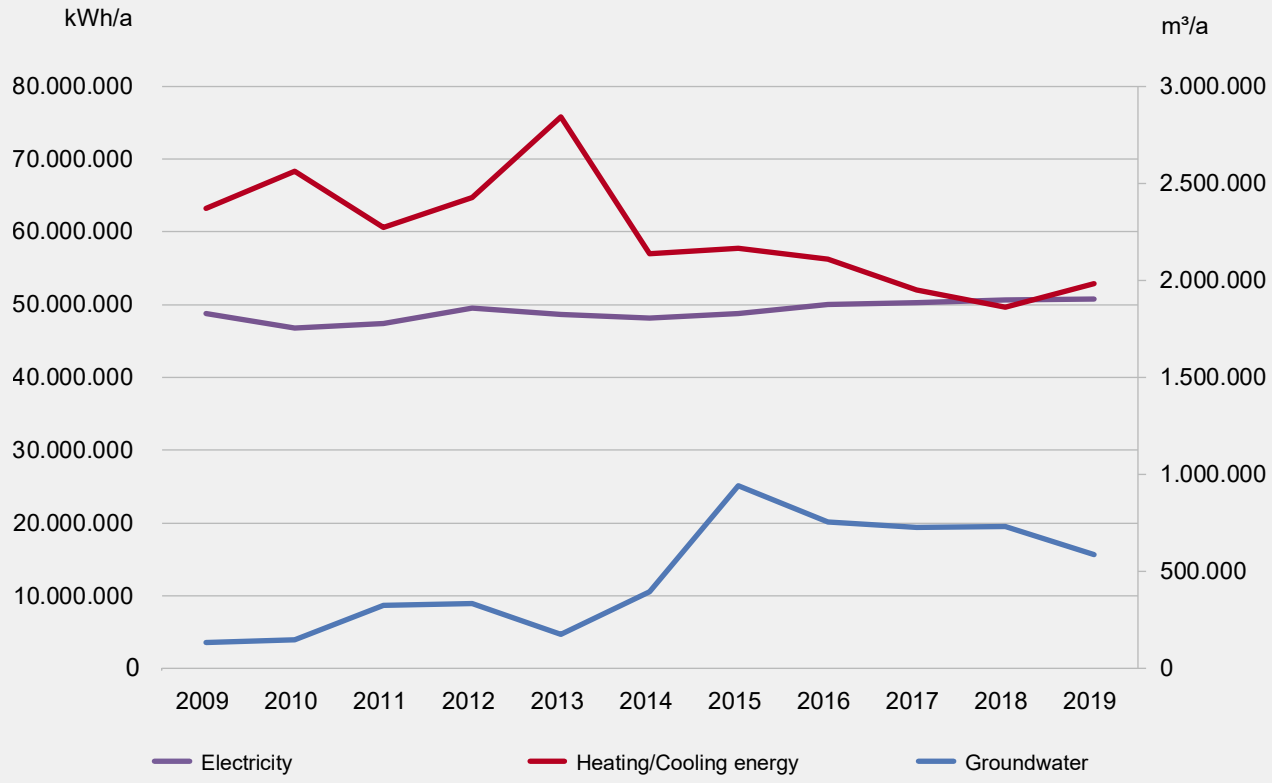
Emissions per member of the university: **1,7 tonnes CO_2-eq**

In this scenario, electricity is determined using the factor of the 2019 German electricity mix (UBA) and it contributes the most to the university's carbon footprint, comprising about 36% of the total emissions. Procurement accounts for about 27% and heating and cooling energy accounts for about 26% of all emissions. Based on these calculations, the emissions per member of the university are 1.7 tonnes CO_2-eq.

The PV system on the University Library with a view toward the Theater Freiburg.
Photo: Sebastian Bender

The photovoltaic (PV) system on the roof of the University Library produced 200,000 kWh in the survey year, covering an average of about 10% of the building's electricity consumption. The solar university PV systems generated an additional 576,000 kWh of electricity in 2019, which is fed into the power grid. In this scenario with certified green electricity, procurement is the largest contribu-tor to the carbon footprint comprising 39% of all emissions, while heating and cooling energy ac-count for about 37% and the vehicle fleet and business travel for about 15% of the total emissions.

Energy graph: Heating-Cooling-Electricity-Groundwater



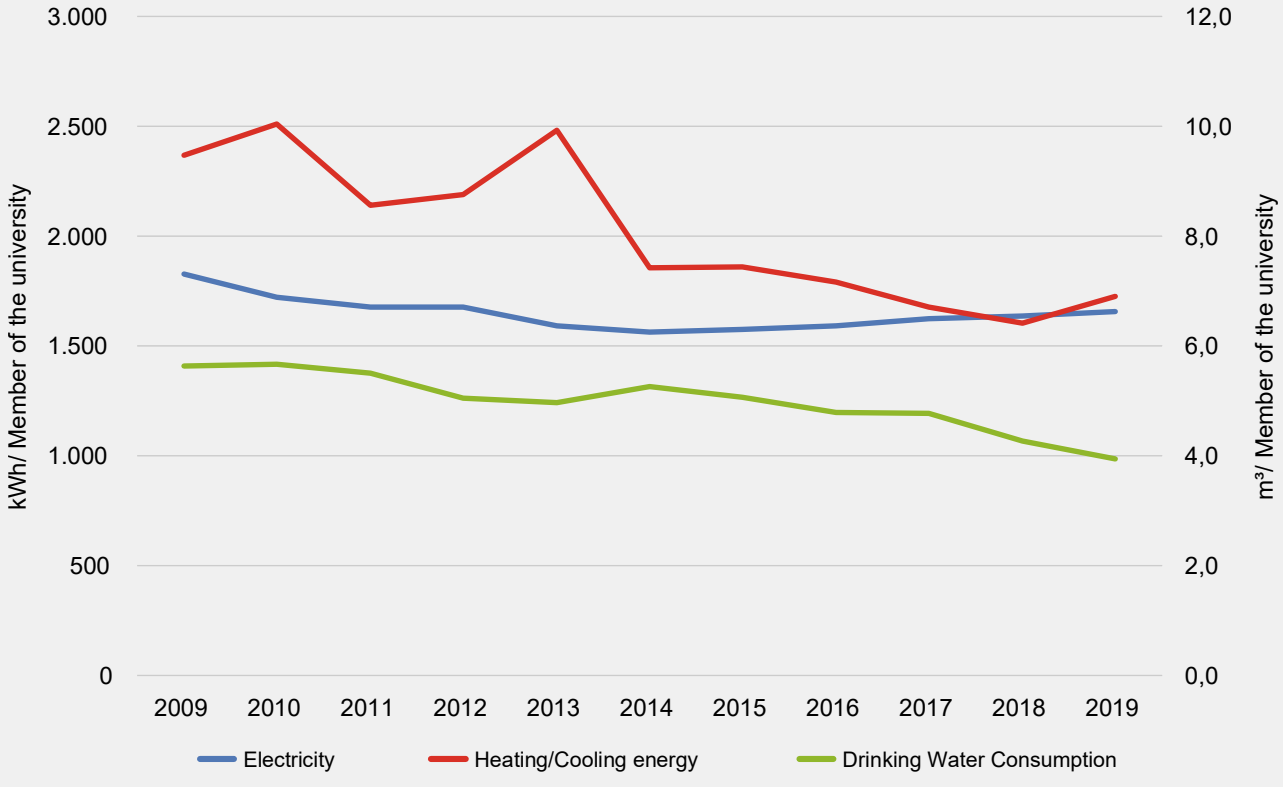
Energy used for heating and cooling increased significantly in 2019, exceeding electricity consumption. This rise occurred as the groundwater systems did not function properly during the survey period due to technical problems and construction work. As a result, less groundwater could be used for cooling. This malfunction increased electricity and steam consumption. Each year, the university's groundwater systems save significant amounts of electricity and steam for cooling.

The infrastructure supply channel contains the pipes for the groundwater cooling system and for the technical wastewater for treatment in the neutralization plant. It is about 250 meters long. With a maximum withdrawal volume of about 700,000 cubic meters per year, the groundwater cooling system saves a lot of electricity and steam for cooling.

Photo: uniCROSS/Vanessa Nicklaus

Photo: Rodolfo Clix/Pexels

Specific energy use per member of the university



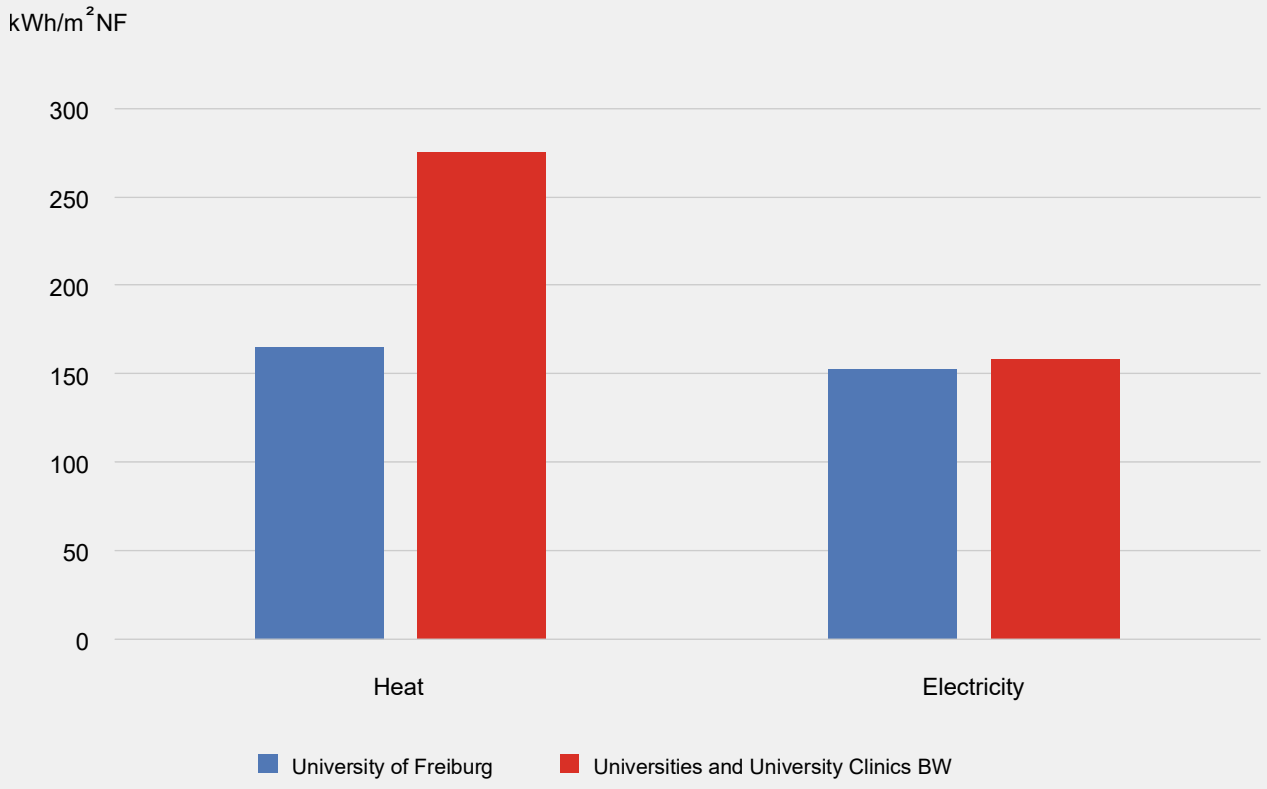
The significant increase in heating/cooling energy consumption and electricity consumption is illustrated in the previous diagram. In part, the increase in energy consumption per member of the university results from a decrease in the number of students and an increase in third-party funding in the laboratory buildings.

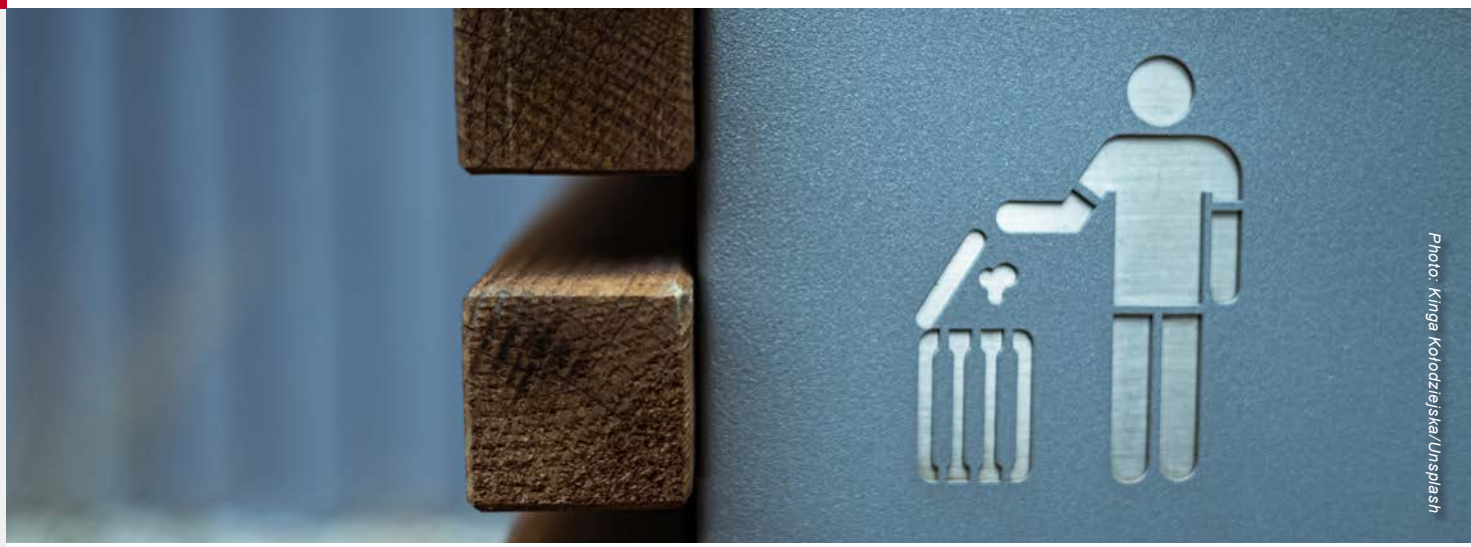
There is again a decline in specific drinking water consumption, as the last university buildings are currently converted from cooling with drinking water to cooling circuits.

The specific heat consumption of the University of Freiburg in 2019 of 165 kWh per m² effective floor area (EFA) is significantly lower than the average specific consumption of universities and university hospitals in Baden-Württemberg, which is 275 kWh/m² EFA. The other state buildings consumed 152 kWh/m² EFA of heat. The university's specific electricity consumption of 158 kWh/m² EFA in 2019 is also lower than the average specific electricity consumption of universities and university hospitals in Baden-Württemberg (177 kWh/m² EFA).[1]

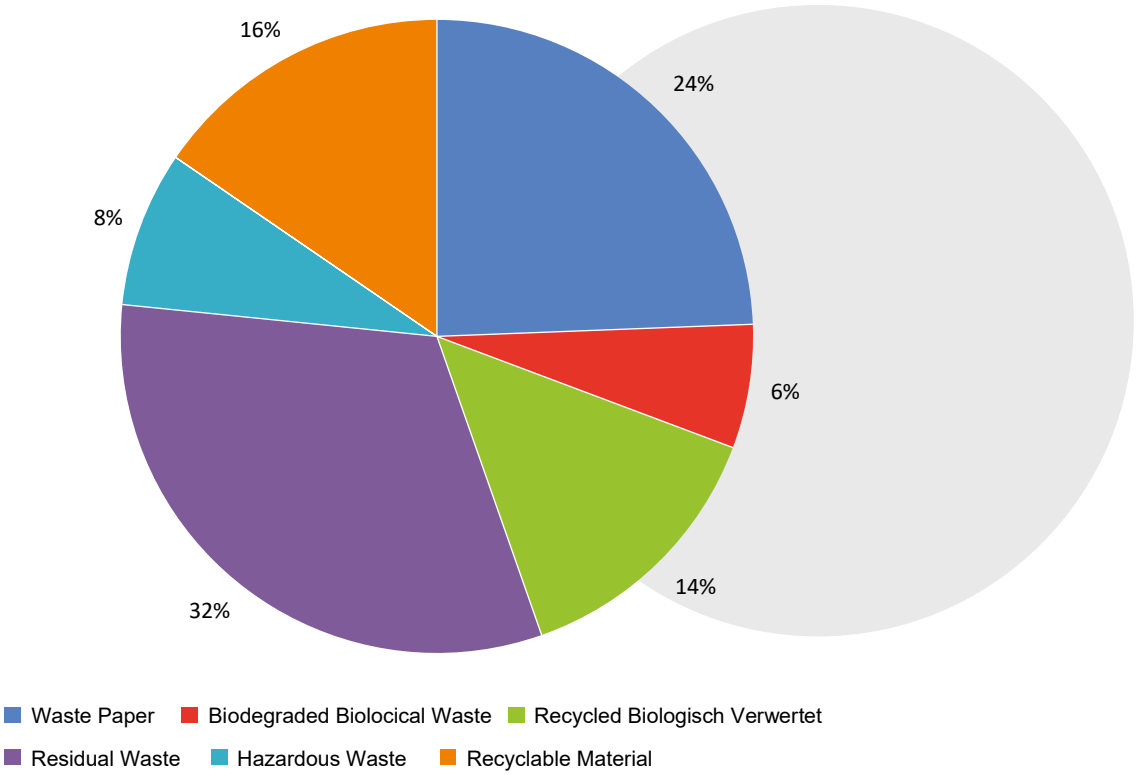
[1] Energiebericht 2020 Energie- und Klimaschutzkonzept 2020–2050
Staatliche Vermögens- und Hochbauverwaltung Baden-Württemberg

Specific heat and electricity consumption per effective floor area





Waste amount by waste type 2019 (1107 t Waste/a)

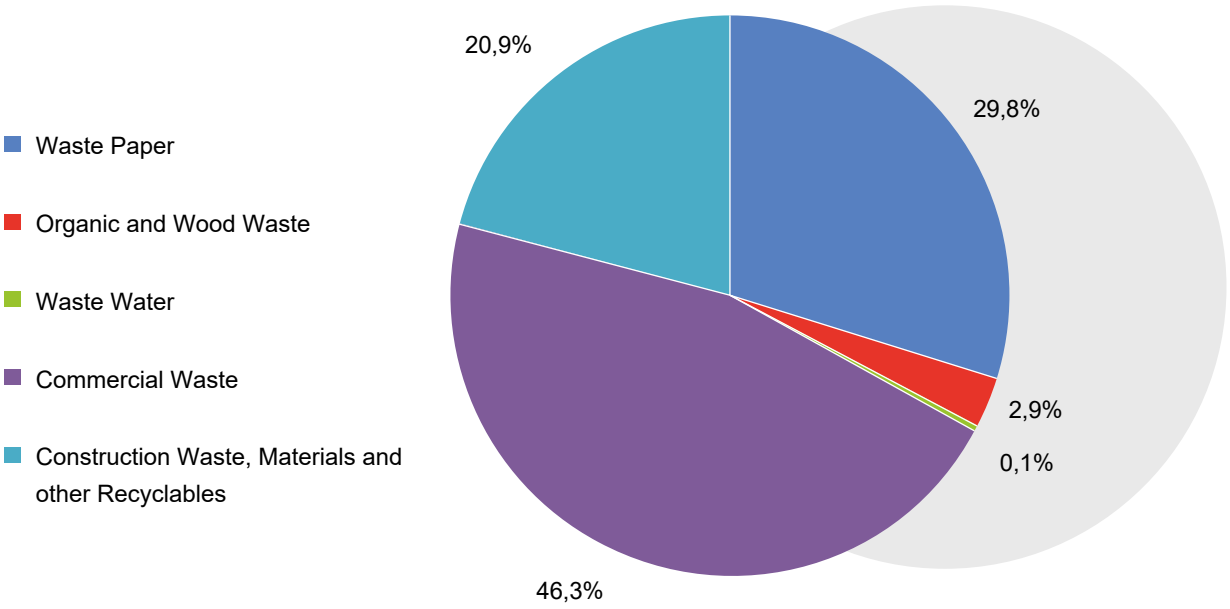


In 2019, the University of Freiburg produced a total of 1107 tonnes of waste. The residual waste is thermally recycled and the recyclable materials are materially recycled. The thermal recycling of the bio-waste takes place in a biogas plant, which produces electricity and uses all the heat generated to dry the compost. The biogas plant uses only bio-waste and no energy crops. The garden and park waste are composted. For social and environmental reasons, no electronic waste from the university is disposed of overseas, but only in Germany, France or Switzerland.

Emissions from the disposal of municipal waste (1019 tonnes) comprise about 76% of all waste emissions. If the emissions from municipal waste are broken down into categories, it can be observed that the disposal of residual waste (354 tonnes) accounts for about 46% and the recycling of waste paper (270 tonnes) for almost 30% of all emissions. Emissions from the disposal of the 88 tonnes of hazardous waste account for about 24% of all waste emissions.

Emissions from municipal waste

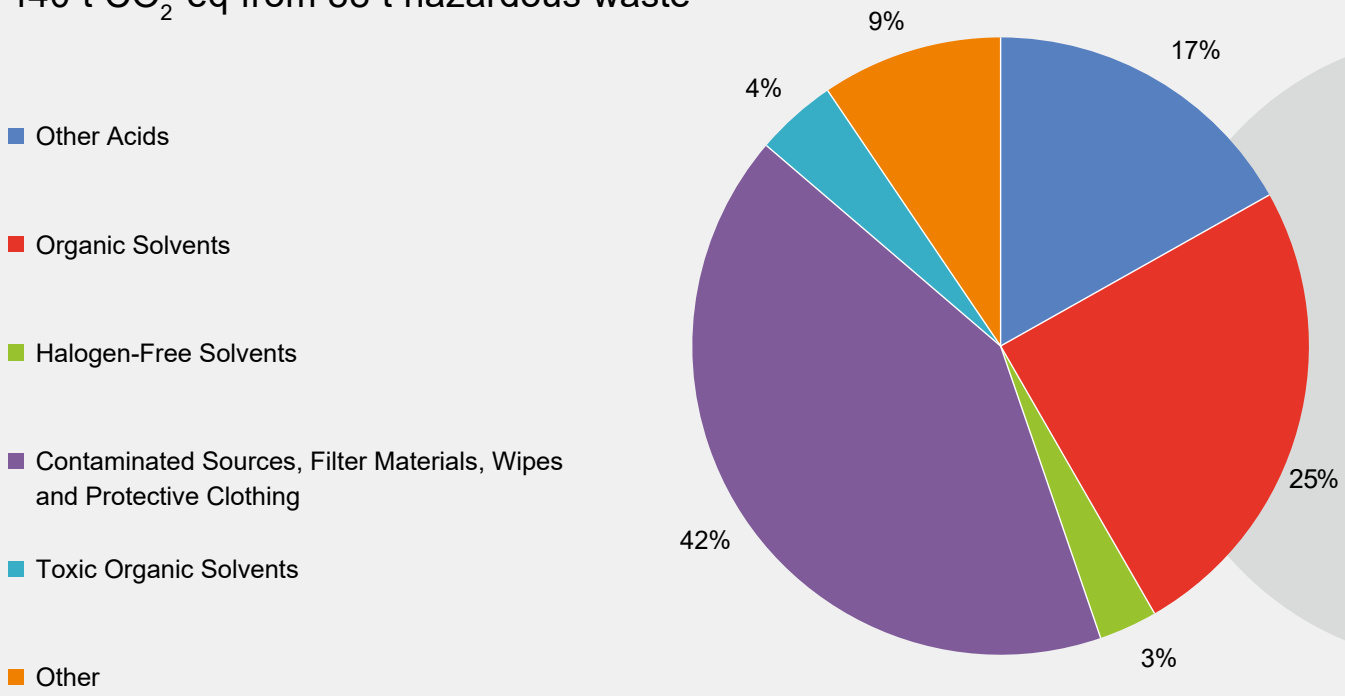
437 t CO_2-eq from 1019 t municipal waste



The paper press enables the separation of waste and the further recycling of waste paper.
Photo: Patrick Seeger

Emissions from hazardous waste

140 t CO_2-eq from 88 t hazardous waste



The reusable hazardous waste management system at the University of Freiburg, introduced in 2001, resulted in major ecological and economic benefits and significantly fewer occupational accidents. With the use of reusable canisters and reusable barrels, this system saves material to a considerable extent while reducing CO_2 emissions. In 2019, 89 tonnes of CO_2 were saved in this way. The environmentally friendly hazardous waste management system at the University of Freiburg is described in an article in the Journal of Environmental Safety:

https://www.jstage.jst.go.jp/article/daikankyo/10/2/10_E19SC0301/_article/-char/en

Dr. Jürgen Steck explains the waste management system of the University of Freiburg

Photo: Thomas Kunz

Photo: Thomas Kunz

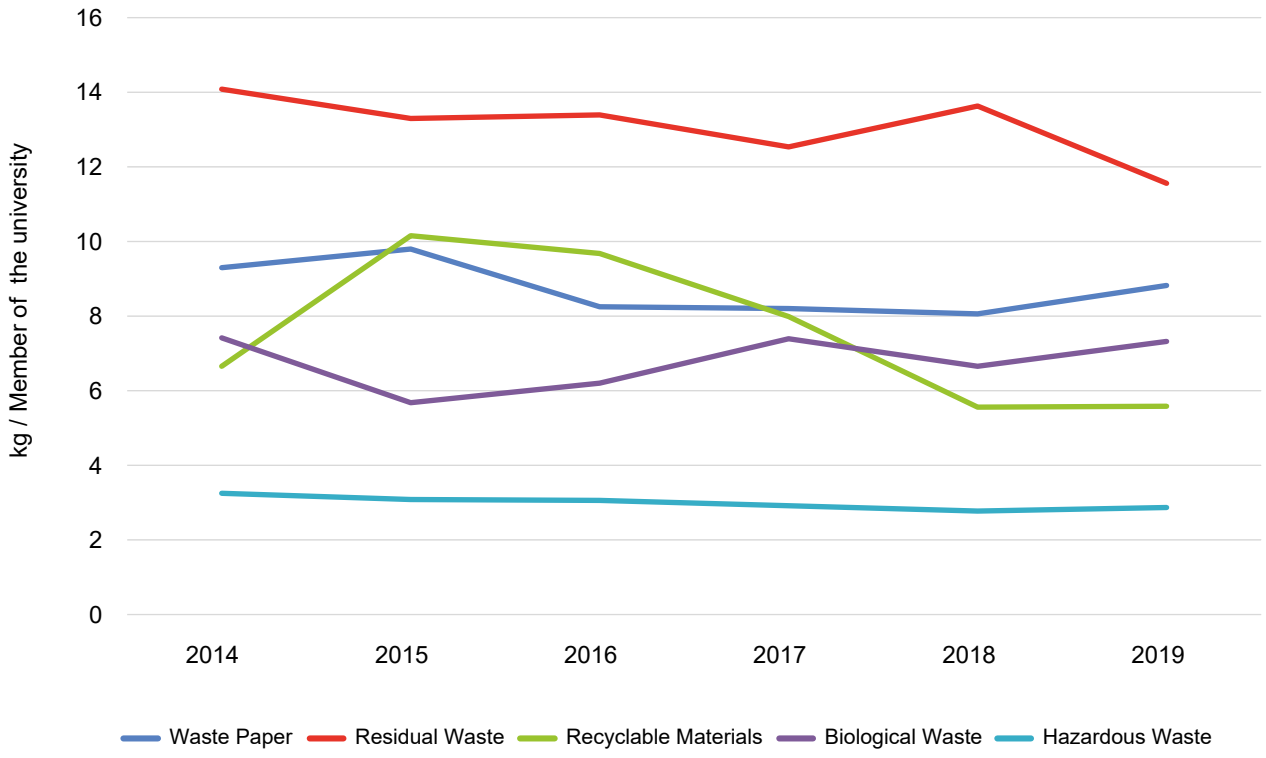
European Week of Waste Reduction

Students of the International Master's Program in Environmental Governance at the University of Freiburg, with the support of the Department of Environmental Protection, organized the first European Week of Waste Reduction from November 16 to 22, 2019, with a series of events, workshops, and discussions. To kick things off on November 16, the team screened the film „Microplastic Madness" at the Greenmotion Film Festival. During a tour of the university canteen, interested parties learned more about the operations of a commercial kitchen and its efforts to reduce waste. There were guided tours of the zero-waste shop „Glaskiste" and the Freiburg biogas plant. Participants were also able to learn more about creative methods of solving waste problems through interactive presentations on electronic and electrical waste by experts in the field.

Students at the first European Week of Waste Reduction.

Photo: Sofie Hofmand

Waste management trends

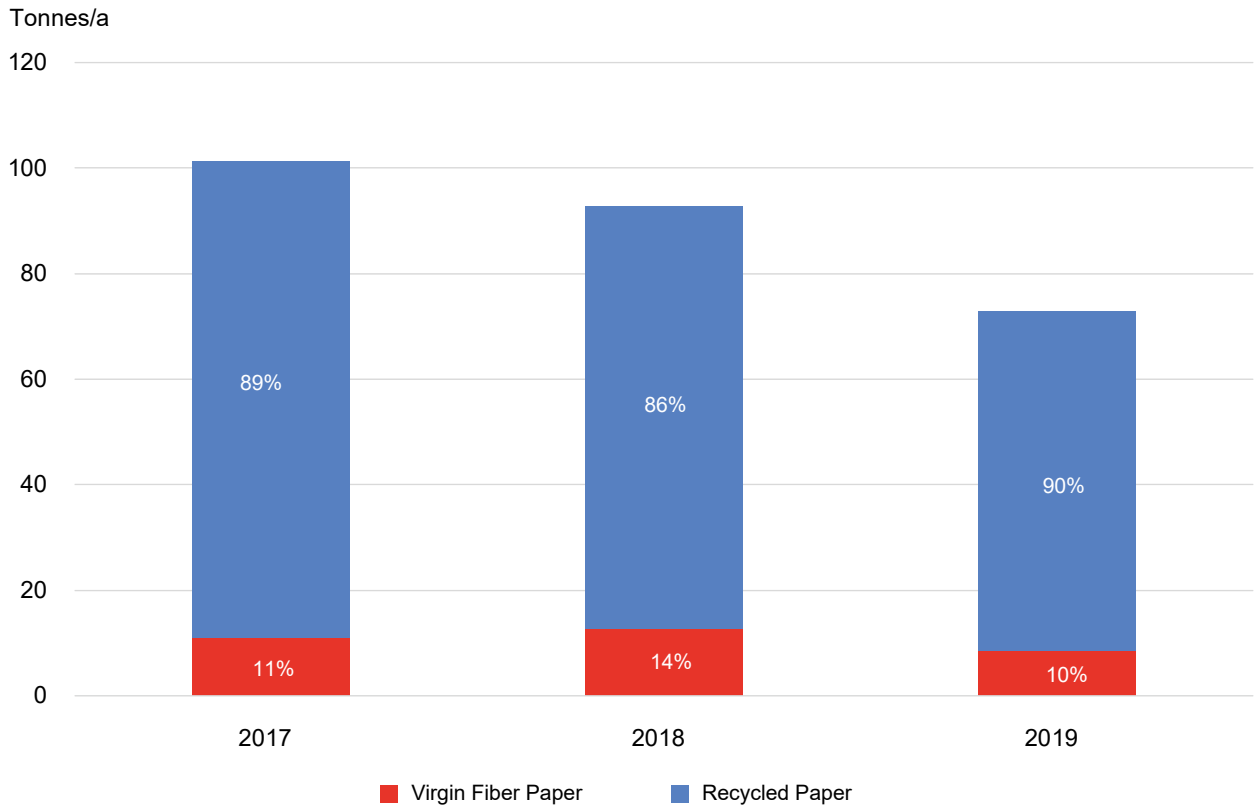


The development in the waste at the university is positive overall compared to recent years. The amount of residual waste has decreased significantly in 2019 and the amounts of paper and recyclables have increased. This could be largely due to many informative and awareness-raising discussions and instructions for the employees of the cleaning companies and the company's cleaning staff in 2018 and 2019. In the course of quality control in the buildings, cleaning companies were repeatedly reminded by their supervisors of the correct disposal of the various types of waste, among other things utilizing of multilingual leaflets on waste separation. The university's cleaning staff were trained several times in the monthly Jour Fixes on how to dispose of the different types of waste correctly. These intensified measures were a response to an increase in the amount of residual waste and the simultaneous decrease in the amount of paper waste in 2018.

The university's hazardous waste is transported in reusable canisters and reusable barrels. This saves a lot of material, money and CO_2 emissions.

Photo: Department of Safety, Environment and Sustainability (SUN2)

Paper consumption



Compared to the previous year, the university increased the use of recycled paper with the eco-label, Blue Angel, from 86% to 90% and the total paper consumption (72 tonnes/a) was reduced by 20%. By using Blue Angel recycled paper instead of virgin fiber paper, the university saved 1,975,784 liters of water and 406,893 kWh of energy (Papieratlas, 2020).

Photo: JJ Jing/unsplash

Mobility

The mobility focus in this environmental report is on promoting cycling for students and employees of the university. More information about the emissions from business travel and our related pilot project can be found in the 2018/2019 Environmental Report.

Photo: Sandra Meyndt

New bicycle stands in the center

At the end of 2019 and beginning of 2020, 384 bicycle parking places were built at the central university buildings Kollegiengebäuden I, III and IV and on Sedan Street, of which 103 are roofed and 281 are open bicycle parking spaces. Nearly 150 bike stands, some of which were damaged and very old, were dismantled and replaced by 147 open, double-sided racks in the same locations. In addition, 198 roofed bicycle parking spaces were dismantled and replaced by new, covered, double-sided bike stands. The University of Freiburg now has 1179 bike stands in the center, 345 of which are covered. In addition, there are 400 spaces in the underground parking garage of the university library.

	Newly built	Replaced old and damaged stands with new double-sided stands
Roofed bike stands	103	198
Open bike stands	281	147
Total	384	345

Bicycle auction instead of disposal of abandoned bicycles

Since 2019, the Department of Environmental Protection, with the help of employees from Facility Management, has begun to hold auctions of abandoned bicycles that are still in working order, instead of disposing of them directly as in previous years. The first lost-and-found bicycle auction took place in November 2019. Twenty-six bikes were sold to students and employees in exchange for bids.

Photo: Sandra Meyndt

Bike Box

Since September 2019, the first two bike boxes at the University of Freiburg have been electrified, allowing employees like Roland Birmele to charge their e-bikes. They are located in the Institutsviertel.

Photo: SUN2

Sources:
The calculation of emissions from waste and water (Ecoinvent 3.6) are based on the Master's thesis of Benjamín Elizalde. The emission factors for electricity and the vehicle fleet are based on the sources of the German Federal Environmental Agency (UBA). The emissions from heating and cooling energy were calculated based on GEMIS and the emission factors of the combined heat and power plant were provided by the University Hospital. The calculation of emissions from procurement is based on the results of the master's thesis by Marcel Eichler, who conducted an input-output analysis based on the university's costs and the product categories to which these costs are distributed.

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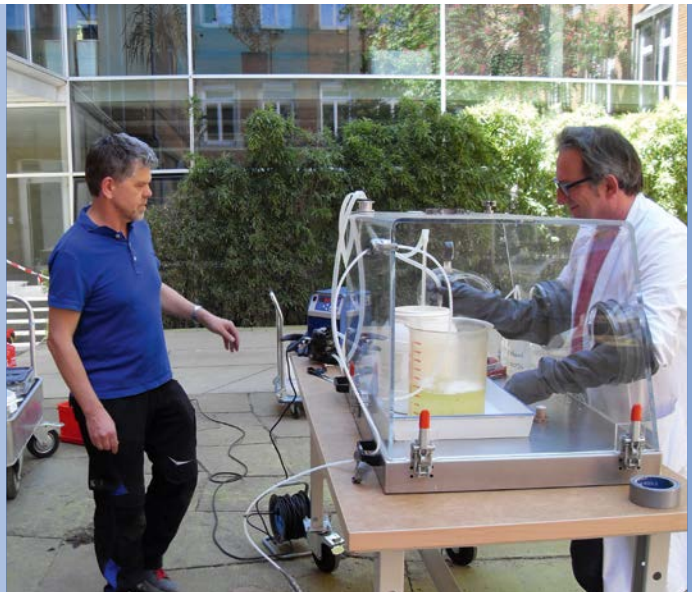
The bike repair station at the Faculty for Biology, Dr. Jürgen Steck, head of the SUN2 department at work, and Lora Gyuzeleva, the sustainability manager of the University of Freiburg.

Photos: Alexander Henkel, Institute of Biology II (bike station), private (J. Steck), Harald Neumann (L. Gyuzeleva)



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