EMBL

Sustainability Report

2023

embl.org

European Molecular Biology Laboratory

2023 Highlights

-18%
in energy-related carbon footprint*

-24%
in energy intensity*

3198 tonnes
CO^2e saved due to energy saving measures

-70%
in business travel emissions*

-30%
in residual waste*

100%
of labs taking part in LEAF

*compared to 2019

Welcome from our Director General

EMBL's sustainability strategy has seen marked progress in 2023 – both in terms of operations and the scope of our research. It was an exemplary year that showed EMBL's ongoing commitment to a sustainable future.

Within EMBL's research portfolio several exciting projects that entail environmentally relevant research are ongoing at EMBL in the context of the Molecules to Ecosystems programme, including the exploration of the impact of environmental change on biodiversity at land-sea interfaces across European coastlines (TREC) and the search for useful biomarkers for tipping points in arid ecosystems (SYNTERRA); as well as a host of Planetary Biology seed-funded research projects and initiatives such as the EMBL Global Biodiversity Platform.

Additionally, we are thinking about our future and operating even more sustainably. We announced the opening of the new Thornton building at EMBL-EBI which will incorporate a variety of energy efficient technologies. This building will provide a great collaborative workspace but also serve as a model for future sustainable scientific infrastructure.

At EMBL, our view towards sustainability is holistic, and 2023 was the epitome of that approach. Thefollowing pages provide a detailed account of the initiatives, achievements, and future goals we hold for conducting science sustainably and leading by example.

Prof. Edith Heard
Director General

Welcome from the Sustainability Office

The work of the Sustainability Office was dominated by the organisation's roll out of the Laboratory Efficiency Assessment Framework (LEAF). We set ourselves the challenge of having all of our research groups signing up to LEAF in 2023, and I am happy to report that this goal was achieved, with all wet research and service labs, 82 in total, having joined and 70% having achieved a certification.

The energy crisis was still a big topic for the organisation, and we set ourselves a target to reduce our energy use by 15% in 2023 compared to 2021. Although a lot of the measures to achieve this were taken in 2022, we made additional savings in 2023, and ended up reducing our total energy consumption by 19% compared to 2021.

We also made significant progress in improving our waste management in Heidelberg where we are responsible for our waste disposal. All our labs now have recycling bins for packaging materials and paper, and we introduced dedicated recycling bins for tip boxes which are collected and recycled locally.

Our sustainability transition is only possible thanks to the work of our staff and there have been some lovely examples of their dedication throughout 2023. From our TREC team taking part in a beach clean in Bilbao, to our Heidelberg Green Group creating an art work highlighting the problem of plastic waste, through to five EMBL-EBI colleagues winning Sustainability Star awards from the Wellcome Genome Campus. I would like to take this opportunity to thank all our staff for their support.

Brendan Rouse
Head of Sustainability

Marta Rodríguez-Martínez
Sustainability Officer

Download our materiality assessment

Sustainability Strategy

Materiality

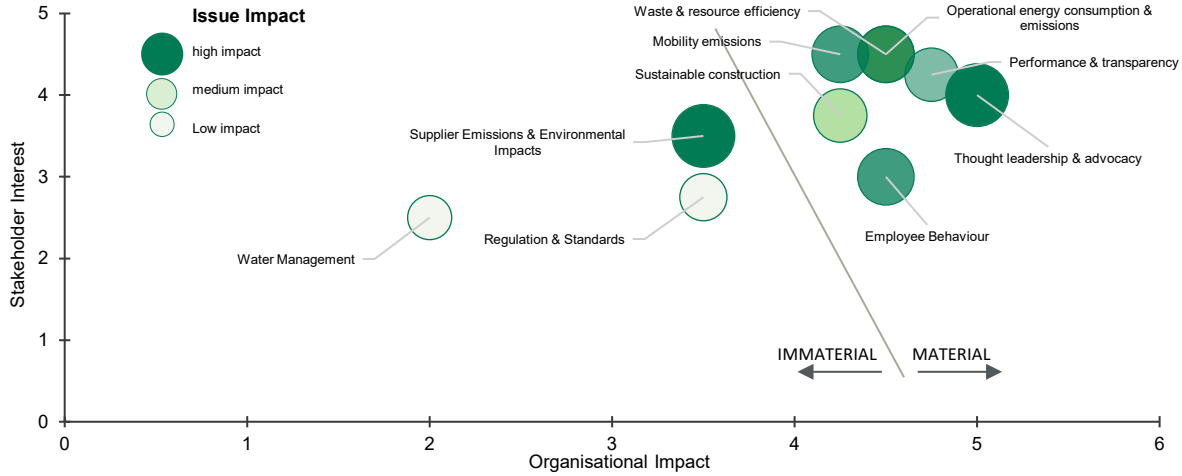
In 2021 we undertook a materiality assessment to guide the development of our Sustainability Strategy. We commissioned a sustainability consultancy to carry out a desktop analysis of the organisation and the wider life science community to recommend a range of relevant sustainability issues which could be ranked in terms of their materiality to the organisation.

The process then involved a set of interviews with internal and external stakeholders, chosen to cover a range of interests, seniority, and varying levels of interest in sustainability. The interviewees were asked to consider each topic and to give an indication of their perception of the topic's impact in terms of the stakeholder interest, the degree of the impact on EMBL as an organisation, and the magnitude of EMBL's impact on the topic.

Seven topics have been identified as material and have been included in our strategy. These make up three pillars of sustainability at EMBL as shown on the page opposite. Three topics have been deemed immaterial and are not included in our sustainability strategy; Water Management, Regulation & Standards, and Supplier Emissions & Environmental Impact.

Internal Stakeholders	External Stakeholders
• Director General • Chief Operations Officer • Head of Facilities Management • Group leader representative • Staff association representatives • Sustainable science expert	• EMBL Council member • Head of Sustainability at research institute • Sustainability experts at key funders • Representative from Stadt Heidelberg

MATERIALITY MATRIX



Download our Sustainability Strategy

The three pillars that make up sustainability at EMBL are shown below. Pillar 1 focuses on the topics which are associated with how we operate. Under this pillar, we are working on reducing our energy consumption, reducing the size of our carbon footprint, reducing the impact of our resource consumption and waste generation, and finally, ensuring that we build sustainable buildings. Pillar 2 recognises that the research we do can uncover new knowledge on environmental issues, which is a natural result of the topics included in our 2022-26 scientific programme 'Molecules to Ecosystems'. Finally, Pillar 3 is about using our reputation and networks to promote sustainable science within and outside of our organisation.

Pillar 1.	Pillar 2.	Pillar 3.
Environmentally responsible research	Environmentally relevant research	Promoting sustainable science

Our sustainability targets

50% reduction of our energy-based emissions *

On track to achieve

Page 7

We have reduced our emissions by 18% to date, which is aligned to our reduction pathway.

90% recycling of all residual waste *§

Making progress

Page 11

We have introduced new recycling streams in 2023, which has brought our recycling rate up to 39%

50% reduction of our business travel emissions *

Achieving target

Page 9

We have reduced our emissions by 70% to date.

20% reduction of total waste we generate *§

Missing target

Page 11

Our total waste generation has increased by 26%

ZERO non-essential single-use plastic +

On track to achieve

Page 11

All our wet labs are taking part in LEAF and our food service has removed single use cutlery and containers

10% of project budgets dedicated to sustainability

Achieving target

Page 14

The Thornton Building is achieving this investment in sustainability.

* by 2030 against our 2019 baseline
+ by 2025
§ Heidelberg only

Environmentally responsible research

EMBL is committed to operating in a more sustainable way, ensuring that our operations are environmentally responsible and that we embed processes to continually reduce our own impact. We have four areas which are material: energy and carbon emissions, mobility emissions, waste and resource efficiency, and sustainable construction.

Energy and carbon emissions

EMBL's greenhouse gas emissions are calculated in accordance with the internationally recognised methodology of the Greenhouse Gas Protocol*, which categorises emissions into three scopes.

Scope 1 refers to the direct emissions resulting from activities at an organisation's facilities.

Scope 2 refers to indirect emissions related to the generation of electricity, steam, heating or cooling purchased for an organisation's own use.

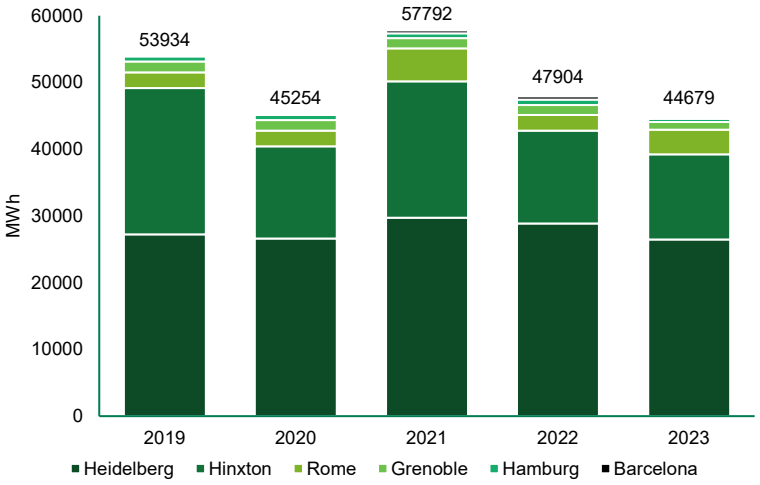
Scope 3 refers to all other indirect emissions occurring upstream and downstream of an organisation's activities, such as business travel and procurement.

The energy crisis which began at the end of 2021 facilitated an organisation-wide focus on energy consumption. We set ourselves a target of reducing total energy consumption by 15% in 2023 compared to 2021. In 2023, we used 4,469 MWh of energy across all our sites. This is a 19% reduction on 2021's energy use.

Many measures were taken across all of our sites to reduce energy use. By far the biggest saving, over 200 MWh, has been achieved in decreasing our gas use through reducing heating setpoints, increasing the out-of-hours period, and removing hot water from hand-washing sinks. We have also benefitted from the Wellcome Genome Campus not running its CHP throughout 2023, which saved 70 MWh of gas. We also increased the set-point on our air conditioning systems and improved the energy efficiency of our data centres.

Finally, we worked with our scientists to reduce the energy use of laboratory equipment and delivered behaviour change throughout the organisation using the Laboratory Efficiency Assessment Framework (see page 18).

REDUCING ENERGY CONSUMPTION



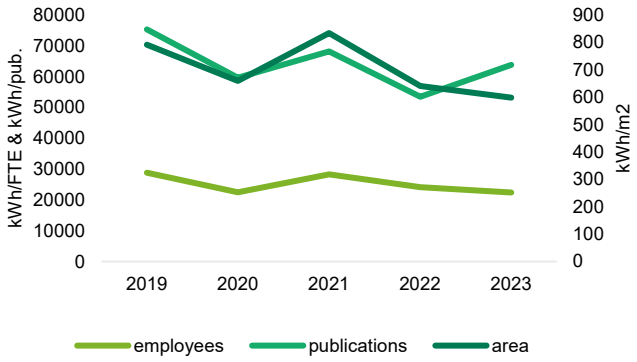
Savings: -6.5% (2023 vs 2022)

All our sites have reduced total energy consumption compared to 2021. We are significantly down from the pre-pandemic levels (2019) and almost at 2020's level which was during a lockdown.

* https://ghgprotocol.org/

Other metrics show that our energy consumption is heading in the right direction. Compared to 2019, our energy intensity (based on occupied area (kWh/m^2)) has been on a downward trend and is now 24% lower than in 2019. The trend is also evident when comparing the energy used per full-time employee and the number of publications.

REDUCING ENERGY INTENSITY



Saving: -24% (2023 vs 2019)

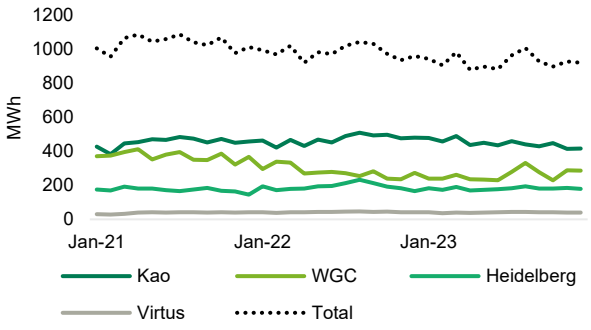
To account for the organisation's growth in terms of campus size, number of personnel, and number of publications, we monitor energy intensity against these three metrics. All three are on a downward trend.

Data centre savings

The demand on our data services has grown over the years and we expect it will continue to grow in the future. Significant increases in our services include the opening of the Imaging Centre in Heidelberg, which generates huge quantities of data for each image, and the launch of the AlphaFold Database in EMBL-EBI. All of the teams managing our data centres have contributed to improving the energy efficiency of our services, meaning while the demand for our services has increased, we have reduced our electricity consumption by 10% since 2021.

REDUCED DATA CENTRE POWER

The majority of our data services are spread over four data centers; our own data centre on our Heidelberg campus, as well as three external data centers in the UK, one on the Wellcome Genome Campus (WGC) and two offsite data centers called Kao and Virus. We have achieved reductions in all four since 2021.



EMBL's IT teams – saving electricity, costs, and carbon

IT services teams across EMBL have been focussing on reducing their energy consumption with impressive results, supporting our budgets and sustainability.

The KAO data centre. cc KAO Data

Scope 1 & 2 emissions

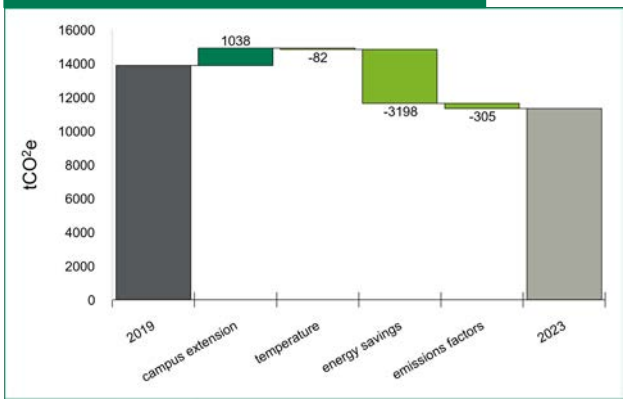
The reduction we have made in our energy consumption is reflected in our Scope 1 & 2 carbon footprint, which has been reduced by 18% compared to 2019 and is on track to achieve our target of a 50% reduction in Scope 1 & 2 emissions by 2030 against a 2019 baseline.

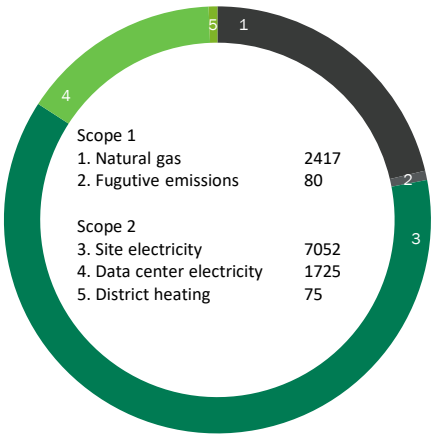
This target was calculated using the Science Based Target Initiatives tool to align with the Paris Climate Agreement to limit global warming to 1.5°C above pre-industrial levels.

Our reduction in carbon emissions has been primarily due to the energy-saving measures we have taken, which we calculate has reduced our carbon footprint by 3,198 tCO^2e. We have also benefited from favourable weather conditions and a reduction in power grid decarbonisation, which together have reduced our footprint by 387 tCO^2e. The reduction in emissions has been achieved despite an increase in our campus size, as we have added the EMBL Imaging Centre and Modular Building and increased the size of the EMBO offices since 2019. These additional buildings have added 1,038 tCO^2e per year to our footprint.

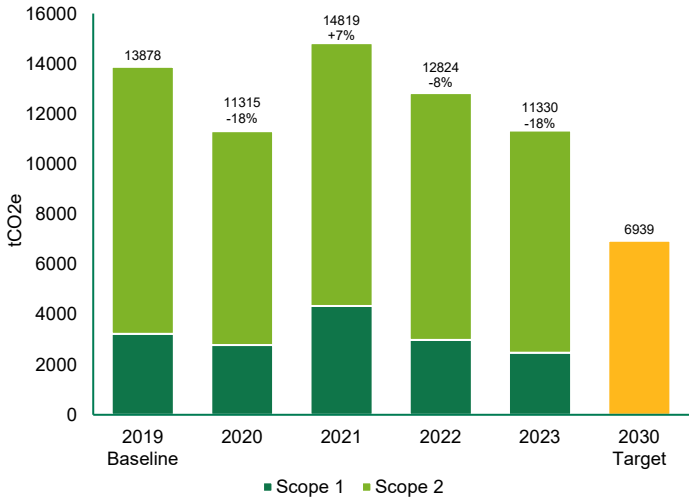
The waterfall chart below shows the factors driving our carbon performance.

HOW WE REDUCED CARBON





ON TARGET TO REDUCE CARBON



Savings: -18% (2023 vs 2019)

Our carbon reduction target is to reduce Scope 1 & 2 carbon emissions by 50% by 2030 against a 2019 baseline. We are on track to achieve this target.

This target was set using the Science Based Target Initiative's* tool and aligns with the global ambition to limit global warming to 1.5°C above pre-industrial temperatures.

*https://sciencebasedtargets.org/

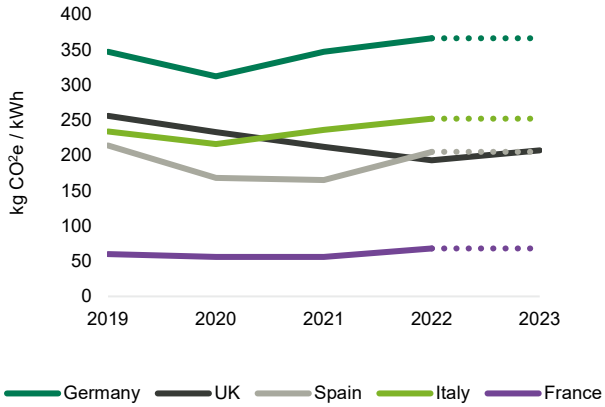
Emission factor increases

We use electricity from all of our host states, and apart from the UK, the carbon factors of electricity in these countries have increased since 2020 as the chart opposite shows. We have achieved carbon reductions every year since 2021 despite these increases. The long-term trend in electricity carbon factors is a reduction and all of our host states have ambitions to reduce their electricity carbon factors as part of their decarbonisation plans.

The 2023 conversion factors for Germany, Spain, Italy, and France are not yet available so 2022's conversion factors have been used for this report.

OUR EMISSION FACTORS

The emission factors we have used for this report. For mainland Europe, these have been increasing since 2020/2021.

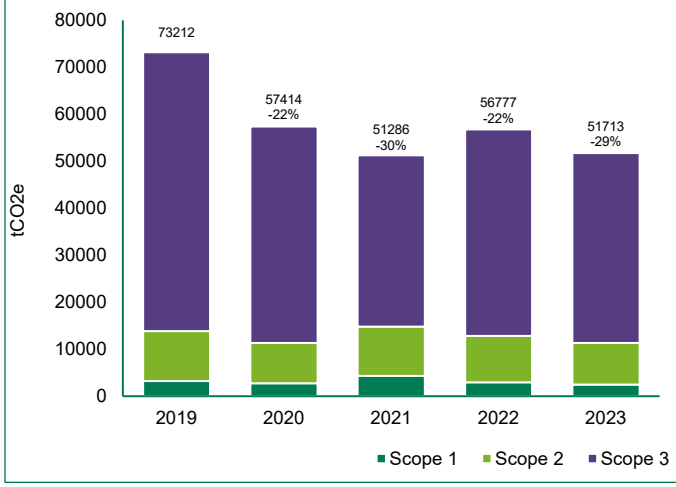


Scope 3 emissions

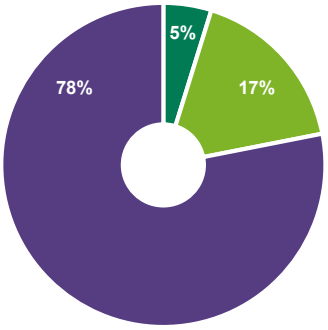
Like many research organisations, the biggest carbon impact we have is not from the energy used on our campuses, but rather in the carbon needed to produce, ship, and dispose of the things we buy and the services we use. These indirect emissions account for 78% of our total carbon footprint as shown in the pie chart below.

We have reduced our total footprint by 29% since 2019, saving 21,500 tCO^2e per year. However, it should be pointed out that most of these savings have come from a reduction in construction activities as we were building the Imaging Centre in 2019.

TOTAL FOOTPRINT REDUCTIONS



Savings: -29% (2023 vs 2019)



Mobility emissions

The environmental impact of academic flying is a topic which is a concern to many scientists and mobility emissions was identified as a material topic for EMBL in our materiality assessment.

As one of EMBL's main scope 3 emission sources, we set a reduction target of 50% by 2030 against our 2019 baseline. This target was calculated using the Science Based Target Initiative's tool to align with the Paris Climate Agreement to limit global warming to 1.5°C above pre-industrial levels.

In 2020 and 2021, business travel stopped almost completely and we have not witnessed a return to the pre-pandemic levels at EMBL. Our staff continue to use the range of videoconferencing facilities we provide which reduces the need for some trips. We also offer a majority of our conferences and training in a hybrid format.

In 2023, we calculate our business travel footprint to be 2,679 tCO^2e, which is 70% below the 2019 figure. However, this is 38% more than 2022's figure and continues an upward trend since 2021.

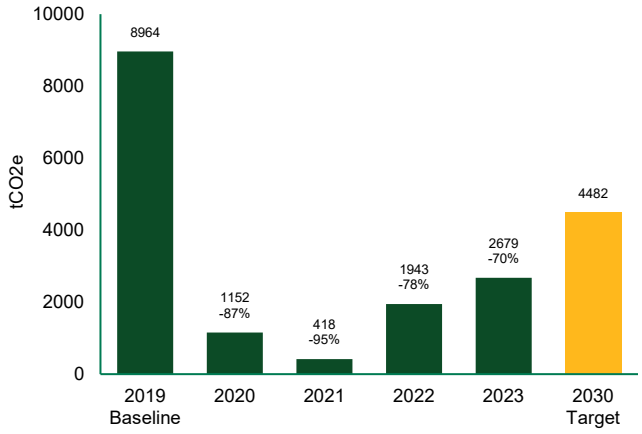
In 2024, we hope to adopt a new travel policy which will have measures to reduce our business travel footprint and will be used to ensure that we do not overshoot our reduction target.

FlyingLess

We are partners of FlyingLess, a research project which is supporting the academic community in Germany in reducing its travel impact.

flyingless

BUSINESS TRAVEL REDUCTIONS



Savings: -70%
(2023 vs 2019)

The pandemic put an almost complete stop on business travel in 2020 and 2021. Business travel has increased from this low level in 2022 and 2023, though it is still 70% below 2019's level and is under the targeted level of a 50% reduction by 2030.

Supporting greener travel

EMBL has implemented a number of measures to reduce the impact of travel to our campuses. For staff and participants who are attending conferences or training in Heidelberg, we offer shuttle buses and supplement train travel through the use of the DB Events Ticket.

Currently our staff in Heidelberg can charge EV cars for free, a service which has saved 84 tonnes of CO_2e. Our staff in Hinxton, Hamburg, and Grenoble also have access to EV charging provided by our host organisations.

In Hinxton, our staff also benefit from a shuttle bus service which we supplement along with the other occupants of the Wellcome Genome Campus.

We provide an eBike hire scheme for our staff in Heidelberg which has 240 registered users. In total, these bikes have been driven 6,150 km, which is the equivalent of 688 trips between the campus and the centre of Heidelberg.

EMBL Heidelberg's eBike hire scheme has five bikes for staff to hire. cc Massimo Del Prete / EMBL

Waste and resource efficiency

Waste and resource efficiency was identified as a topic with the highest level of stakeholder interest in our materiality assessment. The use of resources and the large amount of waste generated by bench scientists is way beyond that generated by the average person.

Throughout 2023, we introduced mixed-dry recycling bins to the laboratories in Heidelberg and have introduced a dedicated tip-box recycling scheme. Through these efforts, we have reduced the amount of 'residual' waste by 30% since 2019.

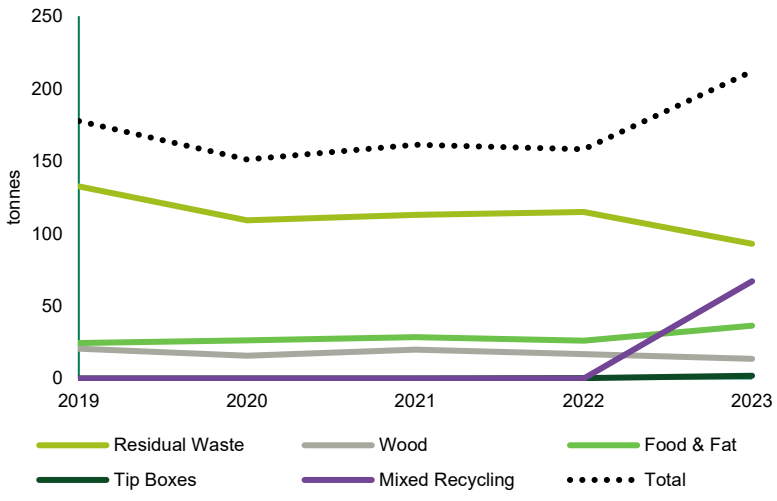
We set ourselves a target to reduce total waste generation by 20% by 2030 compared to 2019, and we are failing to achieve this target as our total reported waste has increased by 26% in this time. We attribute this to the increase in campus size and the number of full-time employees over this period.

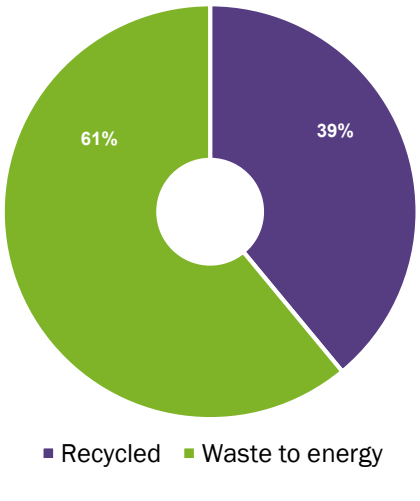
We also set a target to recycle 90% of our waste by 2030, and we are making progress in achieving this target as shown in the charts below.

Single-use plastic

We have a target to remove non-essential single-use plastic by 2025. Our canteen and cafeteria have removed single-use take-away coffee cups and food containers, by providing reusable cups and lunch boxes through a deposit scheme. Our events catering has removed single-use plastic from its offering. In the labs, we are reintroducing glassware for applicable experiments, and through LEAF, we are encouraging a reduction of consumables.

WASTE DISPOSAL





Tip box recycling scheme

We have partnered with a Mannheim based plastic wholesaler called Rixius, who have set up a plastic recycling scheme for the Rhein Neckar region. The scheme, which only accepts high-quality PP and PE type plastics, aims to minimise the reduction in material value which typically hampers recycling schemes. At EMBL, the typical tip boxes we use are a perfect source of this plastic, and we use over 20,000 tip boxes per year.

In the first year of the scheme, we have sent 15 m^3 of tip boxes to be recycled using this scheme. We have a similar scheme in place in Grenoble and in Hamburg, where empty tip boxes are collected and returned to suppliers using a supplier return scheme.

The Heidelberg lab kitchens still collect and refill tip boxes for the three most commonly used brands: Gilson, Brand, and Star Lab.

Do we really need that many tip boxes?

EMBL's core facilities, scientists, and suppliers have collaborated to address waste generation during omics research.

EMBL Heidelberg's new tip box recycling point and mixed recycling bins for labs. Cc Stuart Ingham/EMBL & Brendan Rouse/EMBL

Art installation: 4 Weeks of Pipetting

As part of our Green Week in 2023, members of the EMBL Heidelberg Green Action group created an art exhibition to illustrate the vast amount of plastic which is created through our research activities and to promote the tip box recycling scheme.

Titled ‘4 Weeks of Pipetting’, 1,5 tonnes of tip boxes were collected throughout the month of August and were turned into an eye-catching waterfall of boxes, which spilled out of a water feature near the Heidelberg cafeteria.

Cc Kinga Lubowiecka/EMBL & Brendan Rouse/EMBL

Sustainable construction

The Thornton Building on the Wellcome Genome Campus will be the latest addition to our building stock. This new building is by far the most sustainable building project we have delivered.

- A fully timber-framed building, significantly reducing the embodied carbon of the project by reducing the need for carbon-intense concrete and steel.
- Biophilic design, incorporating natural materials and vegetation.
- Natural light throughout the floor plate thanks to large roof lights and full-height atriums.
- Fully electric HVAC systems incorporating air source heat pumps and electric water boilers, with solar panels reducing the need for grid electricity.
- Extensively landscaped grounds surrounding the building, with support to increase the campus' biodiversity score.
- Additional bike storage and cycling facilities, including showers and lockers.
- Ten electric vehicle charge points installed as part of the project.

The Thornton Building is due to reach practical completion and handover in 2024.

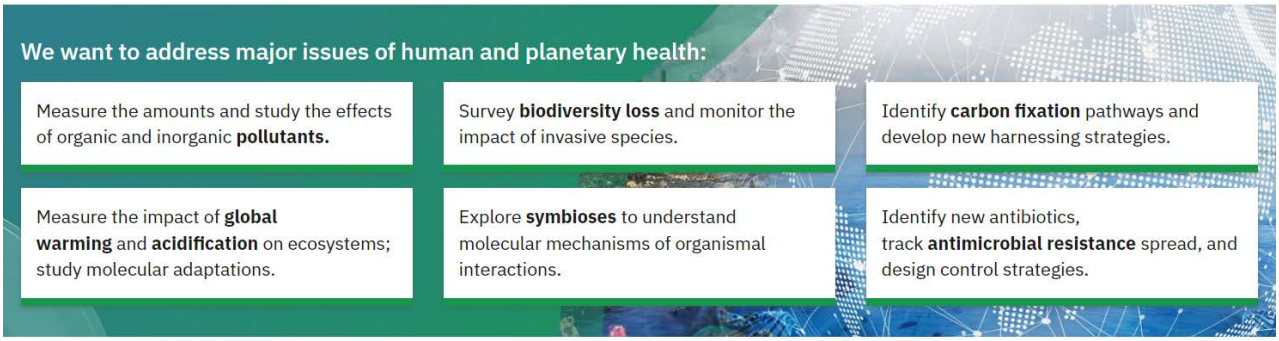
Architects render of the Thornton Building. Cc feilden bradley clegg Studios

Environmentally Relevant Research

Based on the results of the materiality assessment, the area in which EMBL can have the biggest impact on the environment is through the research we conduct. With climate change and the state of our environment becoming a matter of urgency, internal and external stakeholders expect EMBL to apply its expertise in these areas and to contribute positively to finding solutions.

Traversing European Coastlines (TREC)

With TREC, we are embarking on a journey along the European coastlines to explore the biodiversity and molecular adaptability of microbial communities as well as key selected organisms. We focus on coastal habitats as they are the richest in species biodiversity and as they also often present the highest levels of pollution. Through the mechanistic understanding of ecosystems and how they are changing, we can help provide new knowledge and discoveries, as well as diagnostic tools, preventative measures, and potential solutions to reverse detrimental changes in the future. By combining the expertise and infrastructure of EMBL and our multiple European partners, TREC aims to initiate a new era of coastal ecosystems exploration. The goal is timely and ambitious – to observe, model, and understand the effects of changing environments on organisms and communities, at the cellular and molecular levels.



The TREC expedition is supported by the fleet of the EMBL mobile services, which brings cutting-edge technology and methodology to the field to enable unprecedented experimental standardisation, fresh sample processing and data integration. The Advanced Mobile Laboratory (AML) is a containerised mobile experimental lab space which visited five selected partner institutes throughout 2023, providing local researchers access to cutting-edge laboratory services. The AML is also one of our five Gold LEAF labs, bringing sustainable laboratory knowledge around Europe. Along with the research being carried out by the expedition we are engaging European citizens along the TREC route and beyond with human and planetary health through our Science Education and Public Engagement office (SEPE), fostering active science participation, and empowering educators and young learners.

TREC is being delivered with the support of an expanding network of European partner institutions including Tara Oceans Foundation who provide the Tara schooner to carryout ocean sampling and the European Marine Biological Resource Centre who are coordinating marine stations to host the expedition. Thanks to TREC, we have also partnered up with many institutes across Europe, in the context of EU-funded projects (eg BiOcean5D and Blue Remediomics") which are part of the Ocean Health Mission

Acquired for TARA Oceans Expedition at the EMBL ALMF facility. Taxonomy: A Centric Diatom, Class: Coscinodiscophyceae Antarctic Peninsula. cc EMBL

The Advanced Mobile Laboratory in Kristineberg, Sweden cc Tina Wiegand/EMBL

Find out more about TREC

Members of the TREC team sampling on land, the beach and at sea. cc Joanna Zukowska/EMBL and Maéva Bardy/Fondation Tara Ocean

Planetary biology

Under our current scientific programme, Molecules to Ecosystems, a new transversal theme called Planetary Biology was created.

Spanning multiple ecosystems, the Planetary Biology research theme aims to understand, from the molecular to the population level, how microbes, plants, and animals respond to each other and to their environment.

To achieve this, EMBL is combining direct investigation of diverse planetary ecosystems from field studies with controlled laboratory research on experimental model systems. The Planetary Biology theme is addressing fundamental and pressing scientific questions about the influence of environmental parameters on the molecular mechanisms underlying biological processes, while also addressing societal questions about planetary health.

"The Planetary Biology Research Theme is, in many ways, a completely revolutionary way to think about molecular biology and how it can help us understand our planet and the challenges it is currently facing. What's more, we are envisioning using molecular biology approaches to devise potential solutions to some of the huge environmental issues of today, which is one of the most exciting ideas we have ever come across." – Detlev Arendt, Senior Scientist, Group Leader, Co-Chair of Planetary Biology

EXAMPLE PROJECTS

A selection of projects which are receiving seed financing from the Planetary Biology 2023 (co)financing call

- EGBP – EMBL Global Biodiversity Platform: Coordination, annotation, and presentation of global biodiversity datasets. Peter Harrison and Fergal Martin
- FlyAgroToxin – A *Drosophila* platform for studying host-microbiome interaction in physiological and adaptive responses to agrochemicals. Justin Crocker and Michael Zimmermann
- LONGITREAT – A longitudinal study of wastewater treatment plants determining factors triggering the release of antimicrobial resistance events into the environment. Michael Zimmermann with Kathrin Fenner (EAWAG, Zurich), Javier Castro Jimenez (Ifremer)
- MICROSIC – Discovery of novel metabolisms and biochemical cycles in extreme environments from South America. Maria Garcia Alai with María Eugenia Farías (PROIMI, Argentina), Susanne Erdmann (MPG Bremen), Laura Sánchez-García (CSIC, Spain), Daniel Carrizo (CSIC, Spain)
- RECOMB-ADAPT – Mitotic interhomolog recombination in diatom adaptation to the environment. Petra Bulankova with Simone Koehler and Anna Erzberger

2023 SYMPOSIUM

In 2023, EMBL and EMBO hosted a symposium to understand how organisms function together and react or adapt to changes at different molecular levels.

We are at the dawn of a new era of biology where we will start to understand how organisms function together and react or adapt to changes at different molecular levels.

Promoting Sustainable Science

EMBL is a renowned and respected organisation in the field of life sciences research. We want to lead a transition to sustainable science across Europe and to collaborate with other like-minded organisations. This provides an opportunity to amplify the impact that we achieve in delivering this strategy by encouraging and inspiring other life sciences organisations to consider their own sustainability performance.

Laboratory Efficiency Assessment Framework

The Laboratory Efficiency Assessment Framework (LEAF)* is a well-established certification for sustainable labs that was developed by University College London. The framework has 56 criteria which lab groups need to complete to achieve a bronze, silver, and gold certificate.

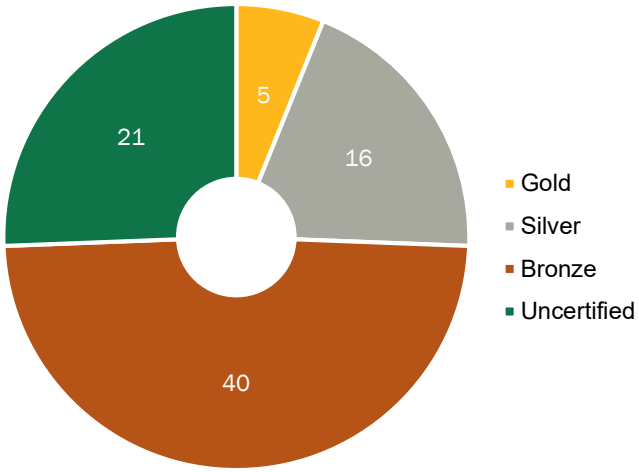
EMBL piloted the framework in 2022 and decided to proceed with a full roll-out afterwards. Our goal was to achieve 100% sign-up of our labs in 2023 which we managed to achieve.

LEAF has proven to be a fantastic behaviour change tool for us to engage with our scientists. There has never been a shortage of desire to be more sustainable within our scientific community, but there was a lack of clarity on what actions they should take. The LEAF criteria provides our scientists with an easy-to-understand list of actions they should take to work more sustainably.

With a new EMBL Green Lab Guide, assistance from our services such as Facilities Management, Scientific Instrumentation Maintenance, and our Lab Kitchens, and additional facilities such as the tip box recycling scheme, we have managed to get over 70% of our labs certified.

100% participation

All 82 of our experimental (wet) research and service labs are taking part



* https://www.ucl.ac.uk/sustainable/take-action/staff-action/leaf-laboratory-efficiency-assessment-framework

LEAF STATISTICS

81 lab audits
carried out by the sustainability office in 2023

Over 70%
of ULT freezers turned up from -80°C to -70°C

140 recycling bins
for paper and plastic handed out to LEAF labs

GOLD LEAF LABS

- Schwab Lab
- Deo Lab
- Cuylen Lab
- EICAT Training Lab
- Advanced Mobile Lab

The Schwab Lab, our first gold lab, receiving their certificate. cc Stuart Ingham/EMBL

Further engagement

Throughout 2023, EMBL engaged with many networks to promote sustainable science and to share our transition. We have also been instrumental in setting up new networks to serve the wider science community, such as the Heidelberg Sustainable Labs Forum.

Green Labs: a guide to developing sustainable science in your organisation

The Sustainability Office co-authored this article, published in *Immunology & Cell Biology*.

Sustainable European Laboratories Network (SELs)

This year, EMBL joined the SELs Network, a network of national and international green lab groups. The networks' missions are to collect and make available knowledge on sustainable laboratory practices, to assist in the establishment of green lab initiatives across Europe, to harness the power of collective voices to drive change, and to facilitate the creation and collaboration of new networks.

EIROforum Sustainability Working Group

EMBL's Head of Sustainability is co-chair of the EIROforum working group which has been created to share knowledge on transitioning European research facilities to sustainability. In 2023, the group facilitated an application to a Horizon Europe fund and held an in-person meeting at the European Space Agency's headquarters in Paris.

PRBB Sustainability Group

EMBL employees in our Barcelona site, with support from the Sustainability Office, were among the founding members of a new sustainability group for the PRBB centre in Barcelona.

Data Tables

Carbon Targets

We have one target related to reducing scope 1 & 2 emissions and one target related to business travel emissions. Scope 1 & 2 emissions are calculated using location-based emission factors. For our sites in Germany, Italy, France, and Spain, 2022's emission factors have been used for 2023.

		2019 Baseline	2020	2021	2022	2023	% Change to baseline
Scope 1	tCO2e	3,230	2,782	4,333	2,986	2,497	-23%
Scope 2	tCO2e	10,648	8,533	10,486	9,838	8,852	-17%
Scope 1 & 2	tCO2e	13,878	11,315	14,819	12,824	11,349	-18%
Target	tCO2e	13,878	13,247	12,616	11,986	11,355	
Progress against Target	%	-	-15%	17%	7%	0%	
Business travel	tCO2e	8,964	1,152	418	1,943	2,679	-70%
Target	tCO2e	8,964	8,557	8,149	7,742	7,334	
Progress against Target	%	-	-87%	-95%	-75%	-63%	

Table 1. Progress against our organisational carbon targets.

Total carbon footprint

The total carbon footprint table below includes indirect emissions from our upstream and downstream value chain (scope 3 emissions). There are six GHG protocol scope 3 categories which are applicable to our operations. For 2023, we have included a figure for commuter travel, the source of which is the electricity used by our EV charging points in Heidelberg.

The breakdown of our total carbon footprint shows that 78% of our carbon impact comes from these indirect sources. Our purchased goods and services and capital goods account for 92% of our indirect emissions. These are displayed in blue on the chart opposite. The other significant scope 3 emission is business travel, which makes up 6% of our scope 3 emissions. For scope 2, the electricity used in our Heidelberg campus is by far the largest source, with data centre use being the second biggest source.

		2019 Baseline	2020	2021	2022	2023	% Change to baseline
Natural gas	tCO^2e	2,818	2,735	3,606	2,803	2,417	-14%
Fugitive emissions	tCO^2e	412	47	727	183	61	-85%
Scope 1	tCO^2e	3,230	2,782	4,333	2,986	2,478	-16%
Electricity	tCO^2e	7,018	6,318	7,032	7,147	7,052	0%
Hosted data centres	tCO^2e	1,684	1,639	1,679	1,521	1,725	+2%
CCHP gas	tCO^2e	1,843	468	1,661	1,069	0	-100%
District heat and steam	tCO^2e	103	107	114	101	75	-27%
Scope 2	tCO^2e	10,648	8,533	10,486	9,838	8,852	-17%
1. Purchased goods & services	tCO^2e	21,924	26,883	19,481	30,160	25,066	14%
2. Capital goods	tCO^2e	28,128	17,808	16,312	11,583	12,349	-56%
4. Upstream transportation and distribution	tCO^2e	94	99	95	163	151	61%
6. Business travel	tCO^2e	8,964	1,152	418	1,943	2,679	-70%
7. Employee commuting	tCO^2e					28	NA
8. Upstream leased assets	tCO^2e	225	157	161	104	110	-51%
Scope 3	tCO^2e	59,335	46,099	36,467	43,952	40,383	-32%
Total emissions	tCO^2e	73,212	57,414	51,286	56,776	51,713	-29%

Table 2. Total carbon footprint

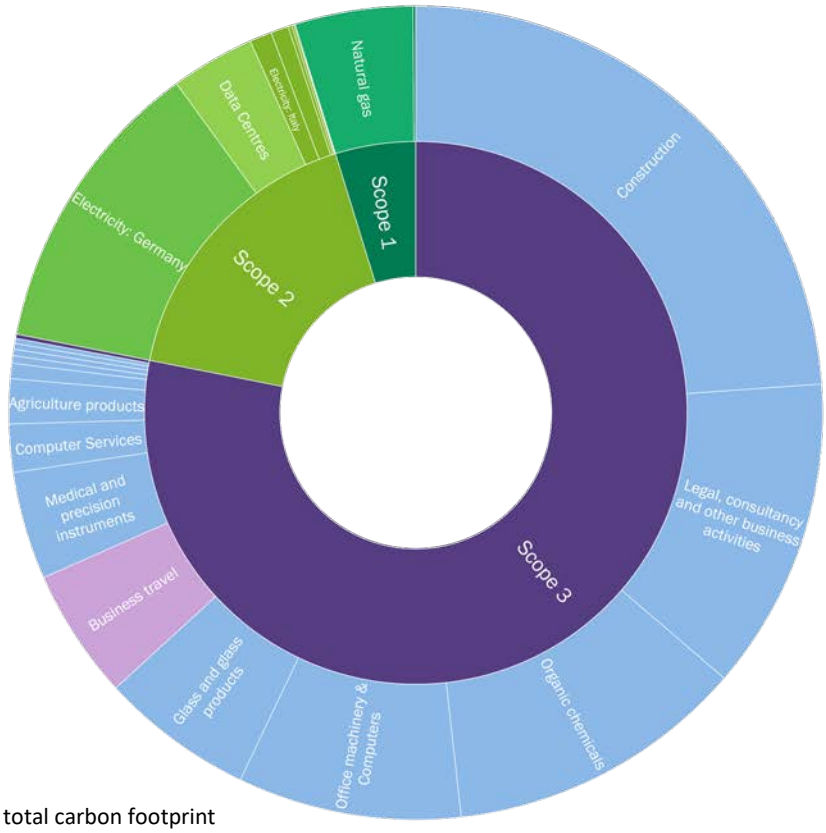


Chart 1. Breakdown of total carbon footprint

Energy & carbon intensities

Three factors are used to compare changes to annual intensities; the size of our campuses (floor area measured in square meters), the size of our staff base (measured in number of full-time employees (FTEs)) and the size of our impact (measured in number of publications).

In 2023, we reduced our energy intensity based on floor area by 7% compared to 2022, and it is now 24% less than it was in 2019. For carbon intensity based on floor area, we have reduced this by 8% compared to 2022 and 38% compared to 2019.

		2019 Baseline	**2020**	**2021**	**2022**	**2023**
Floor area	m^2	65,182	65,182	65,862	74,712	74,712
Full time employees	No.	1,791	1,911	1,945	1,986	
Publications	No.	685	720	806	895	
Total Energy	kWh	51,591,966	42,942,870	54,922,543	47,846,877	44,690,120
Energy Intensity	kWh/m^2	792	659	834	640	598
	kWh/FTE	28,809	22,474	28,241	24,092	
	kWh/pub.	75,317	59,643	68,142	53,460	
Scope 1	tCO^2e	3,230	2,782	4,333	2,986	2,478
Scope 2	tCO^2e	10,648	8,533	10,486	9,838	8,852
Scope 3	tCO^2e	59,335	46,099	36,467	43,953	40,383
Total	tCO^2e	73,213	57,414	51,286	56,777	51,713
Carbon Intensity	tCO^2e/m^2	1,12	0,88	0,78	0,76	0,69
	tCO^2e/FTE	41	30	26	29	
	tCO^2e/pub	107	80	64	63	

Table 3. Energy and carbon intensities.

Waste disposal data

We increased our reported waste in 2023 based on weight. In 2023, we introduced a new mixed dry recycling scheme for our laboratories which has led to an obvious reduction in waste which was disposed in our residual waste stream which is treated by waste-to-energy incineration. The figures for mixed dry recycling have been estimated based on the contracted collections. Unfortunately we do not receive exact details of the collection (weight or volume) as there is no charge for this waste to be collected. Please note, the tip box figures are underreported as some of our collections were attributed to our cleaning contractor.

			2019 Baseline	2020	2021	2022	2023
Residual waste	Waste to energy	tonnes	133	109	113	115	93
Food & fat	Waste to energy	tonnes	24	26	28	26	36
Mixed dry recycling	Recycled	tonnes	*0*	*0*	*0*	*0*	*67*
Tip boxes (PP & PE plastic)	Recycled	tonnes	0	0	0	0	2
Wood	Recycled	tonnes	21	16	20	17	14
Total		tonnes	178	151	161	158	212

Table 4. Waste disposal data by weight

Carbon emission factors

The table of emission factors used to calculate scope 1 & 2 emissions in this report. Please note, the carbon factors for electricity generation in Germany, Italy, France, and Spain have not been published for 2023, so 2022's factors have been used.

		2023	2022	% change
Natural gas	$kgCO_2/kWh$	0.183	0.184	-0.5%
Electricity: UK	$kgCO_2/kWh$	0.225	0.211	+6.6%
Electricity: France	$kgCO_2/kWh$	*0.068*	*0.068*	-
Electricity: Germany	$kgCO_2/kWh$	*0.366*	*0.366*	-
Electricity: Italy	$kgCO_2/kWh$	*0.252*	*0.252*	-
Electricity: Spain	$kgCO_2/kWh$	*0.205*	*0.205*	-
Managed assets : electricity : UK	$kgCO_2/kWh$	0.193	0.193	0%
Electricity: EV charging	$kgCO_2/kWh$	0.386	-	N/A
Onsite heat and steam	$kgCO_2/kWh$	0.180	0.173	4.0%
Fugitive emissions: R410A	kgCO2e/kg	1924	1924	-
Fugitive emissions: R290	kgCO2e/kg	0,06	0,06	-
Fugitive emissions: R744	kgCO2e/kg	1	1	-
Fugitive emissions: HFC-134A	kgCO2e/kg	1300	1300	-
Fugitive emissions: R407C	kgCO2e/kg	1624	1624	-
Fugitive emissions: R32	kgCO2e/kg	677	677	-
Fugitive emissions: R404A	kgCO2e/kg	3942	3942	-

Table 5. Carbon emission factors

Changes to methodologies for 2023 report

1. The method to allocate the electricity produced by the CCHP system on the Wellcome Genome Campus has been changed for this report compared to previous years. In previous years a factor to account for the percentage of electricity produced by the CCHP and the electricity from the power grid was not applied resulting in a double count. A new method has been retrospectively applied to the carbon footprint calculation for the years 2019 – 2022 and has been used for 2023's carbon footprint.

2. We have included fugitive emission calculations for our Heidelberg campus in this report for the years 2019 – 2023.

3. We received electricity and district heat consumption data from our host organisation in Hamburg (DESY) and have included this in 2023's figure. Previous years used estimates for this consumption.

4. Gas consumption of our Heidelberg campus in December 2020 is now an actual figure. Previous reports used an estimate.

5. Emission Factors for 2022 are now published figures. In 2022's report, 2021 emission factors were used.

www.embl.org/about/info/sustainability