

Sustainability Strategy



Forewords



EMBL accepts its responsibility to help address the urgent challenges facing humanity and the planet. From the loss of biodiversity to the pollution of our seas and, of course, the changing climate, our response will focus on three key areas. First, we must ensure our research is relevant to the current environmental challenges, contributes to new understanding of the natural world in changing environments, and helps us to understand life in context. Second, as an organisation, we must ensure our operations are environmentally responsible and that we embed processes to continually reduce our own impact. Third, our unique position as Europe's life sciences research institute provides an opportunity to exemplify and promote sustainable science. Our Sustainability Strategy sets out the ways in which we will respond in these three areas to achieve our ambition to significantly reduce our environmental impact by 2030.

Edith Heard – Director General



For more than 45 years, EMBL has delivered enormous benefit to European and global society - through the discoveries of our staff; the scientific services and facilities for our member states that enable even further discovery; and the training, knowledge transfer, and collaborations enabled by our core advanced training and conferences services. We will continue to deliver, and expand, these vital benefits and will strive to do so in less energy- and resource-intensive ways. We have recently installed our first photovoltaic (PV) array and electric vehicle (EV) charging points, for example, but I know we need to do more and I am proud that EMBL is committed to doing so. The stretch targets included in this strategy aim to ensure EMBL transitions more rapidly to a truly sustainable organisation. In this way, we will properly respond to the wishes of our enthusiastic staff and our wider community, and meet our responsibilities to global society.

Matti Tiirakari – Chief Operating Officer



This is a critical decade in humanity's response to climate change. The global consensus is that carbon emissions must halve over these 10 years to avoid the worst forecast impacts of climate change. I am proud that EMBL is committing to halving its own carbon footprint over this decade and aligning with the scientific consensus, in addition to making ambitious reductions in waste and resource use. This strategy was developed following a materiality assessment in which we engaged with key external stakeholders and our staff. This has led to a more insightful strategy, which recognises that along with making our operations more sustainable, our biggest impact may come from our research and using our voice to speak up for sustainable science. I hope other organisations will take note of what we are trying to achieve at EMBL, including our stretch targets.

Brendan Rouse – Environmental Officer

By 2030, we aim to achieve



* against our 2019 baseline; [†] target set for 2025

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Introduction

Since its founding in 1974, the European Molecular Biology Laboratory (EMBL) has sought to serve its member states by making fundamental discoveries in molecular biology that fuel a rich economy of knowledge, as well as by developing new technologies that meet societal needs in the areas of medicine, agriculture, and ecology. Our foundational research has, during the past four decades, enabled a better understanding of the molecular basis of life.

EMBL is Europe's intergovernmental organisation for life sciences research. Nearly 2,000 research, technical, and support personnel from more than 90 countries deliver knowledge and societal benefit from our six sites: our main site in Heidelberg and our structural biology facilities in EMBL Hamburg in Germany; EMBL's European Bioinformatics Institute (EMBL-EBI) in Hinxton in the United Kingdom; our structural biology facilities in EMBL Grenoble in France; epigenetics and neurobiology in EMBL Rome in Italy; and tissue and organ development in EMBL Barcelona in Spain.

Our activities are planned in five-year cycles and outlined in the EMBL Programme. Our next programme, Molecules to Ecosystems (2022–2026), seeks to build on our existing and globally recognised expertise in molecular biology to expand into new research areas including planetary biology, microbial ecosystems, human ecosystems, and infection biology.

We recognise that we are living in a time of climate and ecological crisis, and this strategy sets out how EMBL will respond to the challenge by becoming even more environmentally responsible.

Top Down – Bottom Up

Green EMBL, a staff-led initiative, was established in 2019 at a brainstorming session for the new EMBL Programme in recognition of the desire of our staff to contribute to environmental improvement. This initiative was preceded by the launch of the EMBL Staff Association's own Green Initiatives Working Group. Green groups had also been set up across all six sites.

Our staff are extremely passionate about environmental issues, and the key factor determining the success of this Sustainability Strategy is combining the ideas, grassroots enthusiasm, and expectations of our staff with the leadership and commitment to a sustainable transition shown by EMBL.



So, what does success look like? Our ambition is that EMBL is recognised as a leader in developing new ways to carry out environmentally conscious, responsible research practices as well as creating an environmentally friendly workplace. Furthermore, the novel discoveries and tools expected from the new Molecules to Ecosystems programme should make EMBL a model for research and services in ecologically relevant areas.

Materiality Assessment

We conducted a materiality assessment in 2020 with input from staff, our leadership team, and key external stakeholders. A detailed description of the assessment can be found on our website. The assessment identified seven material topics to incorporate in the strategy, and they are grouped in three pillars in our Sustainability Strategy.

The Three Pillars of Sustainability at EMBL



The three pillars and main topics of our Sustainability Strategy. Credit: Brendan Rouse/EMBL



EMBL Rome. Credit: Lucas Baldrini/EMBL

Positively Sustainable

We believe that sustainability is not a trade-off between research and the environment. A sustainable research organisation both delivers great science and minimises its environmental impact. There are many benefits to becoming sustainable.

Sustainability in operations and research practices enables efficiency, which in turn frees more funds for investment in research.

There are also important reputational and organisational benefits. As EMBL is a constantly refreshed organisation, its workforce is attuned to emerging societal demands. Our actions in this strategy are in response to, but also seek to lead, the desire of the next generation of our workforce to work for an environmentally conscious organisation.¹

EMBL is a publicly funded organisation, and we acknowledge the imperative to serve as a model for other life sciences infrastructures. A successful sustainability programme can reinforce our responsibility in this regard.

Finally, research into life in its natural context will stimulate the creation of new partnerships, help to engage industry with our research, and generate outputs that have an impact on environmental policy, clinical practice, and public health.

¹ Cone Communications (2016). Millennial Employee Engagement Study. <u>https://www.conecomm.com/research-blog/2016-millennial-employee-engagement-study</u>

Environmentally Responsible Research

Energy Consumption and Emissions

EMBL will reduce its energy-related emissions by 50 % by 2030, compared to its 2019 baseline.

The Issue

Mitigating and adapting to climate change are today recognised as an urgent global challenge. Since the beginning of the Industrial Era, the increase in greenhouse gases through human activities has led to a warming globe, which has further led to an increase in extreme weather events. Urgent action must now be taken to limit the increase in the average global temperature to 1.5°C above pre-industrial levels. At this level of warming, the Intergovernmental Panel on Climate Change has stated that we have a 50:50 chance of avoiding the worst effects of global warming.²

This means global carbon emissions must be halved by the end of this decade, and net zero has to be achieved by 2050. By then, the world must also have established mechanisms to remove carbon from the atmosphere and to achieve carbon-negative status.

Climate change is high on political, non-governmental organisations, media, and society agendas. As an intergovernmental life sciences organisation, EMBL should set an example in managing its climate impact and in supporting climate science.

Funders and partners are now starting to consider organisational carbon footprints in their decisions about partnering or allocating research grants. Political actors at regional and city levels are already engaging EMBL on the issue of emissions reduction and expect positive contributions to their climate programmes. In the near future, climate policies at national and European Union (EU) levels will likely increasingly influence political decision-making (e.g. about government funding choices).

Our Impact

Life sciences laboratories are energy intensive by the nature of the work they do. Particularly energy-intensive activities include year-round cooling, ventilation, and

² IPCC. (2018). Summary for Policymakers. In: Masson-Delmotte V *et al.* (eds.) Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty World Meteorological Organization, Geneva, Switzerland

ultra-low-temperature freezing, as well as the use of highly specialised energy-intensive equipment like microscopes and structural biology beamlines.

The carbon footprint of our Heidelberg and Hinxton sites in 2019 was 13,711 tonnes. This is the per capita equivalent of 2,000 European inhabitants. Or, to look at it another way, it would take 220,000 trees 10 years to remove a year's worth of carbon emissions from those two sites.

Our Response

Our approach to minimising our Scope 1 and 2 carbon footprint will be to prioritise a reduction of our energy use and then to identify the cleanest sources of energy, whether that includes generating renewable energy on site, removing combustion from our sites, or contracting with clean energy providers.

Across our sites, we can reduce energy consumption and therefore our carbon footprint through behavioural change (e.g. switching equipment off when not in use), optimising the management of labs and facilities (e.g. optimising ventilation and the correct use of freezers), using energy-efficient technology (e.g. LED lighting), and installing on-site renewable energy technology (e.g. solar panels).

There is an opportunity to better understand how we use energy across our sites. We currently lack data on energy use at our sites in Barcelona, Grenoble, Hamburg, and Rome. We will work with our hosts at these sites to install metering systems to better understand how we are using energy across all our operations. We can use this data to identify energy that is being wasted and to ensure that we pay for the energy we use.

Managing and reducing our energy use will help us to meet pressing and rapidly evolving stakeholder expectations on climate action and sustainability. This will enhance our reputation and credibility as a leading international life sciences organisation. Given that sustainability is in its infancy within the scientific community, we have an opportunity to establish ourselves as a role model in the area of energy-efficient and low-carbon life sciences research.

We can achieve this both by raising awareness within the life sciences community and by influencing employees' behaviour while they are at EMBL, so that when they move on to other organisations, they take their knowledge and habits to their new place of work. Reducing operational energy consumption will also result in immediate and significant cost savings. Investments in energy-efficient technology will be paid back in the medium to long term through reduced energy bills and compliance costs.

Our Energy Consumption and Emissions Target

Our 2019 carbon emissions have been assessed by the Science Based Targets initiative tool, which calculated that a 50 % reduction of our Scope 1 and 2 emissions is

in line with the Paris Agreement to limit global warming to 1.5°C above pre-industrial levels. This level of ambition will also assist our host states to achieve their own carbon targets.

Scope 1 and 2 emissions are emissions associated with our energy use only. Scope 1 emissions are emissions that are generated by us on our sites – for example, by burning gas in our boilers. Scope 2 emissions are emissions from the energy that we buy. When calculating our emissions, we will use location-based emission factors, meaning the average national emission factors of our host states.

The only sites that are covered by this target are Heidelberg and Hinxton, as they are the only sites for which we currently have energy consumption data. We will work with our hosts at other sites to obtain consumption data, and we will then incorporate those sites into our target.

Time horizon	Action	Sites
Short term	Install submeters with data collection and visualisation software	All
Short term	Implement energy-reducing behaviour change campaign for laboratories and administration staff	All
Short term	EMBL-EBI LED project	HI
Short term	Manage computer power – suspend when idle	All
Short term	Review heating and cooling schedule	HD, HI
Short term	Review and optimise data centre temperature	HD, HI
Medium term	Develop campus-wide Solar PV Project	HD
Medium term	Conduct feasibility study on point-of-use water heaters	HD
Medium term	Conduct feasibility study on office FCU presence controllers	All
Medium term	Create policy on minimum energy efficiency for computers	All
Long term	Convert chiller refrigerants to carbon-neutral types	HD
Long term	Optimise central ventilation plant	HD

Action Plan

2022 Key Performance Indicator

Action	Success	Overachieve	Exceptional
Install submeters at all EMBL sites with data collection and visualisation	By end of year, all sites (excluding EMBL Rome) have an electricity smart meter installed at building level	A monthly report is issued to all sites showing energy use	Gas and heat smart meters are installed at building level
Implement energy-reducing behaviour change campaign for laboratories and administration staff	By end of year, a poster campaign has been rolled out across all sites with nudges to save energy in labs	The campaign has been extended through additional communication channels	The impact of the campaign is monitored using submeters and IoT devices



To increase our share of renewable energy, we installed a 190kWp solar array in 2020 in Heidelberg. Credit: Kinga Lubowiecka/EMBL

Waste and Resource Efficiency

- EMBL will reduce its total annual waste by 20 % by 2030, compared to its 2019 baseline.
- EMBL will eliminate all non-essential single-use plastic by 2025.
- EMBL will recycle 90 % of its waste by 2030.

The Issue

Humans share Earth with countless other species, from small microbes in the soil to huge whales in the oceans. We occupy not the entire planet but rather a relatively thin layer of Earth's surface and atmosphere, which some refer to as the 'critical zone' in which all of life's processes take place. We must learn to live within Earth's ecological boundaries, to use its resources wisely, and not to pollute it and make it uninhabitable.

What does this mean in practice? We have got to learn to use fewer resources and to responsibly dispose of the waste we generate.

Plastic pollution has become one of the world's most urgent environmental issues. The rapidly increasing use of plastics has overwhelmed the world's ability to deal with the resulting waste. Plastic is now found throughout the natural world and throughout food chains.

Our Impact

EMBL's operations, like all scientific laboratories, produce significant volumes of hazardous and non-hazardous waste. In 2019, we generated 215 tonnes of waste, including nine tonnes of hazardous or contaminated waste. We also use significant amounts of single-use plastic. For example, in 2019 we used more than two million non-filtered pipette tips, all of which would have been thrown away – along with the 23,000 racks they were stored in and their associated packaging.

In addition to the downstream impacts of waste treatment, there are upstream impacts from our consumption of materials. Items we bought and discarded in 2019 are estimated to represent the second-highest carbon impact we had in that year. At 20,500 tonnes of CO_2 equivalent, it produced the same carbon footprint as our energy use and flight emissions combined.

Our Response

We want to use the principles of the waste hierarchy and the circular economy to focus our immediate efforts on reducing the amount of materials and consumables we use; reusing as many of the materials and consumables as possible; selecting products with a smaller environmental footprint; and, finally, recycling what must be disposed of as much as possible.

How will this be done in practice? We will start by re-evaluating the behaviours and norms of our staff as they carry out experiments and order materials and consumables. We will find ways to reuse as much as possible and reduce the amount of single-use materials while maintaining experimental integrity. We will identify suppliers who reduce the amount of packaging they use and push other suppliers to be more responsible in their packaging habits. We will share more equipment across our groups and extend items' lifespans by donating what we do not need.

We recognise that our operations will always generate some waste that cannot be avoided – be it hazardous or clinical waste. Where this is the case, we are committed to disposing of this waste responsibly. We must always aim to recycle as much as possible to avoid EMBL waste ending up in landfill.

There are reputational benefits to pursuing this agenda. Policymakers are setting ambitious targets and guidelines in the areas of circular economy and plastics (e.g. EU Circular Economy Package, EU Taxonomy), and they are interested in organisational approaches to advancing these agendas. Reducing our waste and aiming for a circular economy approach will have a positive effect on EMBL's reputation and credibility with internal and external stakeholders. Our staff also want to reduce the waste they generate, and our goal is to help them do so.

Less waste and resource use will not only benefit the environment but also translate into reduced indirect greenhouse gas emissions over the life cycle of products (e.g. from production and transport).

For the organisation, reducing waste and resource use will also lower our operating costs and provide better value for our member states.

By developing effective approaches and new solutions, EMBL can also influence waste management and resource use within the life sciences by sharing best practice and establishing collaborations.

Our Waste and Resource Efficiency Targets

There are many good examples of scientific organisations setting ambitious targets for waste reduction. These targets include becoming single-use plastic-free and having very high recycling rates. We believe the most ambitious and effective target is to reduce the total waste generated, as this will ultimately have the biggest environmental impact and maximise savings by reducing waste contractor costs. We also recognise the importance of eliminating non-essential single-use plastic and of high recycling rates.

Our targets currently cover the waste generated by our Heidelberg campus only, as this is the only site for which we have reliable data and control of waste management. We will work with the host organisations of our other sites to improve the reporting of waste data so that these sites can also be included in our targets.

Time horizon	Action	Sites
Short term	Set up system to collect and report monthly waste data	HD, HI
Short term	Analyse purchasing and Stores data to identify key products and suppliers	HD
Short term	Identify waste hotspots within the laboratory and work with groups to manage resources better	HD, HI
Short term	Launch waste-reducing behaviour change campaign	All
Short term	Complete feasibility study on new recycling bins	HD
Medium term	Train new staff members on waste management	All
Medium term	Set up Green Champions, with the goal of one representative per research group	All
Long term	Assess the feasibility of tip-washer machines	All
Long term	Set up database for second-hand furniture, equipment, and IT	HD
Long term	Draft laboratory strip-out waste guide	All
Long term	Become a paperless organisation	All

Action Plan

2022 Key Performance Indicators

Action	Success	Overachieve	Exceptional
Set up system to collect and report monthly waste data	By end of year, Heidelberg waste is reported monthly, identifying all waste streams	EMBL-EBI waste is reported monthly,identifying all individual waste streams	Waste of one additional site is reported monthly
Launch waste-reducing behaviour change campaign	By end of year, a poster campaign has been rolled out regarding the correct disposal of waste	A list of green lab consumables has been created for staff	A special area has been created in Stores for green lab consumables



Waste segregation at EMBL Heidelberg. Credit: Stuart Ingham/EMBL

Business and Commuter Travel

EMBL will reduce its carbon footprint from business travel by 50 % by 2030, compared to its 2019 baseline.

The Issue

The success of scientific discovery relies heavily on collaboration, sharing findings, and maintaining dialogue between scientists all over the world. Conferences and face-to-face meetings are a pivotal part of the scientific process. They enable scientists to share and discuss research findings, to exchange ideas and insights, and to network for collaboration and career development.³ However, we cannot ignore the fact that the environmental impact of mobility features highly on the global sustainability agenda.

Business travel and commuter travel both contribute to global warming, due to the carbon emissions from cars and planes and to poor air quality caused by the particulates from internal combustion engines and tyre wear.

Reaching the goal of limiting global warming to 1.5° C above pre-industrial levels will require a drastic reduction in the emissions from flights and automobiles. Scientific conferences are one of the main causes of carbon emissions associated with academic research. Studies estimate the carbon footprint of a conference to be 0.5-0.8 tonnes of CO₂ per participant, which is equivalent to 5-10 % of Europe's annual emissions per capita.⁴

EMBL's staff identified travel emissions as a key area for action in the context of our environmental impact. Our funders also raised travel emissions as a key environmental impact. For example, Wellcome, one of our bigger funders, has made it mandatory for all research that it funds to offset 100 % of the emissions attributable to the travel requirements of the project.

As well as affecting global warming, air pollution causes heart and lung disease. Exposure to particulate matter has been estimated to have resulted in approximately 417,000 premature deaths in Europe in 2018.⁵ Clean air is essential for our health and well-being, and the health of the planet.

³ Sarabipour S et al. (2021). Changing scientific meetings for the better. Nat Hum Behav 5, 296–300.

https://doi.org/10.1038/s41562-021-01067-y

⁴ Rodríguez-Martínez M. (2020). Environmentally sustainable research is the only way forward. FEBS Network.

https://network.febs.org/posts/environmentally-sustainable-research-is-the-only-way-forward the state of th

⁵ European Environment Agency. (2020). Air quality in Europe. DOI: 10.2800/786656

Our Impact

EMBL has six sites across Europe, and our scientists travel the world to attend meetings and conferences, with the result that EMBL staff took more than 7,500 flights in 2019. The carbon emissions attributable to our business travel flights totalled around 7,000 tonnes in 2019, which makes flying the fourth biggest source of carbon emissions from our activities.

For individual researchers, conference attendance accounts for an average of 35 % of their carbon footprint.⁶

We do not have a figure for the impact of commuter travel, but three of our sites – Heidelberg, Hinxton, and Rome – could be considered remote, with infrequent public transport connections.

Our Response

As an international organisation that provides training, conferences, and services for scientists around the world, EMBL will always be a place where people meet and collaborate. Our approach will be to remain an organisation with a rigorous exchange of ideas, knowledge, and skills, but to do so in a way that reduces the environmental impact by targeting unnecessary business travel and unsustainable commuting.

COVID lockdowns have led to the rapid development and acceptance of the use of virtual platforms. Fully virtual meetings and seminars have been normalised, and our conference organisers have rapidly found ways of integrating a virtual presence into our conferences. The lockdowns have also shown that although face-to-face meetings are vital in science, combining them with virtual formats brings additional benefits – such as increased inclusivity and larger attendance. However, the virtual user experience is still not as well perceived as in-person attendance.

Our approach will be to identify the unnecessary air travel taken by our staff and to find and encourage alternatives. This could be in the form of alternative modes of transport, such as trains, or virtual attendance where suitable.

We also recognise that we can help scientists from other organisations to travel less when taking advantage of EMBL's conferences, training, and scientific services. Our staff have embraced virtual and hybrid events during the COVID lockdowns, and we now have systems in place to continue to give our staff the choice between in-person or virtual attendance. Our Scientific Services and Core Facilities teams

⁶ Achten W *et al.* (2013). Carbon footprint of science: more than flying. *Ecol. Indic.* 34 352–5. https://doi.org/10.1016/j.ecolind.2013.05.025.

across our sites have also made a number of our scientific services available by remote access from anywhere in the world.



EMBL Grenoble's High Throughput Crystallization and Fragment Screening Facility offers researchers remote services and removes the need to travel. Credit: Marietta Schupp/EMBL

The issue of scientists taking frequent international travel is not one EMBL can solve on its own. Nor should we place restrictions on our staff if the rest of the scientific community does not change its expectations of a scientist's travel behaviour. We must work with the scientific community to promote the expansion of virtual and hybrid events so that our staff can reduce their impact without adversely affecting their careers or research.

Reducing the number of trips our staff take will have additional benefits. It will reduce our costs and reduce the amount of time our staff are in transit and therefore not being productive. Pursuing active commuting and reduced business travel will also benefit staff well-being. Business trips take up a lot of time and mean time spent away from family and friends and relaxing. Active commuting, like walking and cycling, improves physical and mental health.

Our Business and Commuter Travel Target

The carbon emissions associated with our business travel are our biggest regular Scope 3 emission source. It is therefore responsible to set a long-term target to reduce this impact.

The Science Based Targets tool has indicated a 50 % reduction of this source of emissions is in line with the Paris Agreement to limit global warming to 1.5°C above

pre-industrial levels. This target covers business travel paid for by EMBL, including travel by visitors to EMBL sites whom EMBL funds. It does not include travel by visitors that is not paid for by EMBL.

Action Plan

Time horizon	Action	Sites
Short term	Provide sufficient EV charging points at suitable sites	All
Short term	Install e-bike hub at suitable sites	All
Short term	Amend EMBL's Travel Policy	All
Short term	Draft Flight Emission Offset Policy	All
Long term	Collaborate with partners to promote virtual and hybrid conferences	All

2022 Key Performance Indicators

Action	Success	Overachieve	Exceptional
Install e-bike hub at suitable sites	By the summer, an e-bike hub has been installed in Heidelberg as a pilot	By end of year, an e-bike hub has been installed at one additional site	By end of year, an e-bike hub has been installed at another additional site
Amend EMBL's Travel Policy	A Travel Policy for EMBL staff business travel has been drafted	Directorate and Council have approved Travel Policy	Policy has been formally adopted



EMBL's eBike Hire Scheme. Credit: Massimo Del Prete/EMBL

Sustainable Construction

- EMBL will apply its Sustainable Construction Principles to all new developments.
- 10 % of project budgets will be ring-fenced for sustainable design and construction items.

The Issue

The statistics around the environmental impact of building construction reflect the significance of this issue. The built environment requires vast amounts of resources and globally accounts for about 50 % of all extracted material. The construction sector is also responsible for more than 35 % of the EU's total waste generation. Furthermore, greenhouse gas emissions from material extraction, manufacturing of construction products, and construction and renovation of buildings are estimated to make up 5-12 % of total national emissions.⁷

Along with the environmental impact of new buildings, the design of a building can affect its operational performance throughout its lifetime and can have a major impact on the ecosystem it is part of – both its surroundings and the people who use the building.

The indoor working environment can have a big impact on people's health and productivity. Humans have become an indoor species, spending 87 % of their time inside⁸, so it is important that indoor environments provide for essential needs like fresh air, natural light, and peace and quiet. However, a building's design and construction can result in spaces that do not provide these needs – for example, producing higher levels of carbon monoxide because ventilation systems are insufficient, elevated levels of volatile organic compounds due to the choice of paints and furnishings, or excess noise because of insufficient sound insulation.

Our Impact

Based on the conversion of capital spent on construction activities to an average carbon emission rate per amount spent, we have calculated that the construction of the Imaging Centre was by far EMBL's biggest source of carbon emissions in 2019 and 2020. EMBL has a pipeline of new buildings and refurbishments at various stages of design and planning over the coming decade. If we deliver these projects, then our

⁷ European Commission. (2021). https://ec.europa.eu/growth/industry/sustainability/built-environment_en

⁸ Klepeis N *et al.* (2001). The National Human Activity Pattern Survey (NHAPS): a resource for assessing exposure to environmental pollutants. *J Expo Anal Environ Epidemiol.* 11(3):231-52. DOI: 10.1038/sj.jea.7500165.

construction activities could well be the biggest source of our environmental impact over this period.

Furthermore, as buildings have an average lifetime of 60 years, constructing unsustainable buildings will have decades-long impacts through higher running costs and unnecessarily high carbon emissions.

Our Response

Our large pipeline of developments and refurbishments presents a huge opportunity for EMBL to provide new spaces that are more sustainable and environmentally friendly.

Positive characteristics of sustainable buildings include energy efficiency, which reduces operating costs; improvement in the local environment and new habitats for local wildlife, which increase an area's biodiversity value; and provision of inspiring interiors and workplaces, which enhance the well-being of staff and visitors, with resulting increases in productivity and innovation.



The TSOP development at EMBL-EBI is targeting net zero. Credit: Feilden Clegg Bradley Studios

For our stakeholders, this is a really important topic. Our host countries are all pursuing regulations and guidelines that reduce the environmental impact of the built environment. Stadt Heidelberg, for example, is aiming to be carbon neutral by 2050, which can only be achieved through new buildings that meet high standards of energy efficiency like the Passivhaus standard.

The following principles have been created to ensure our new buildings are sustainable in construction and operation. We aim to reserve 10 % of all construction project budgets to ensure that these principles can be applied.

Our Sustainable Construction Principles

Circular economy principles – The old linear process of extract > build > use > demolish > landfill is no longer fit for purpose due to its large environmental impact. New buildings have to be designed with a circular approach so that they are adaptable, flexible, and able to be de-constructed for further use rather than demolished. This extends to modelling building designs on future climate scenarios to ensure new buildings remain fit for purpose with the expected climatic changes brought about by global warming.

Embodied carbon – The carbon emissions associated with the production of the materials used to build a new structure are called its embodied carbon. This can account for up to half of a structure's emissions over its lifetime. Minimising the use of concrete and steel and using natural materials like wood reduce the embodied carbon and therefore the overall environmental impact of a building.

Passivhaus principles – The key principles of the Passivhaus standard are excellent levels of thermal comfort, very low thermal energy demands, high levels of insulation, and airtight design, which result in low energy use.

Energy efficiency – Building systems should be designed to incorporate effective controls and automation via demand-led signals. The use of energy-efficient fittings and equipment will reduce a building's energy consumption, its operational carbon footprint, and its operating cost.

Renewable energies – Building design should maximise the ability of a building to generate its own energy via renewable sources such as solar photovoltaics, solar heating and geothermal heating and cooling.

Electrification – As countries decarbonise their electricity generation, new buildings should move away from combustion activities and embrace the electrification of heating systems using heat pumps and electric heaters.

Well-being – Designing spaces to maximise the well-being and productivity of the occupants is essential. This includes access to natural light cycles (e.g. circadian lighting), thermal comfort, the outdoors, healthy nourishment and good air quality, as well as biophilic design.

Biodiversity – New buildings should not diminish the biodiversity of their settings and, where possible, should be designed in a way that can increase the biodiversity of their settings.

Active and low-carbon travel – Buildings should provide adequate facilities for active travel choices, such as showering facilities, bicycle stores, and electric vehicle charging stations.

Design for Performance (DfP) – One problem with the building sector is that a building in operation rarely achieves the efficiency of the intended design. To combat this, the principles of DfP are critical. DfP requires modelling and simulating a design through multiple scenarios and installing meters and monitoring equipment on a building's services (electricity, gas, heat, and cooling) and environmental conditions (space temperature, carbon monoxide, humidity, occupancy). These measures allow the building operator to identify inefficient operation and energy waste. These measures extend to the commissioning and witnessing of new buildings at handover.

Time horizon	Action	Site
Short term	Influence TOSP design and commissioning to achieve a net zero building	HI
Short term	Apply the 10 principles to the EMBL Rome refurbishment	RO
Short term	Ensure benefits of building the new EMBO extension from timber are understood and communicated	HD
Medium term	Support the development of the HD site master plan	HD
Long term	Apply the 10 principles to the potential new MHPH development	All
Long term	Apply the 10 principles to the potential new EMBL Hamburg development	All

2022 Key Performance Indicators

Action	Success	Overachieve	Exceptional
Influence TOSP design	Design achieves 'Excellent' BREEAM rating	Design is targeting 55 kWh/m² per year	Design meets requirements of LETI Net Zero Operational Carbon buildings



Rendered image of the proposed facade for the refurbished Rome Laboratory. Credit: Obicua

Pillar 2. Environmentally Relevant Research

The Issue

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.

Our Impact

EMBL is already researching areas of environmental interest and contributing knowledge. Examples of ongoing research in this area are shown in the box below. We have also contributed to the discourse on environmental issues through our well-established Science & Society Programme, which includes environmental themes in its mission to create a bridge between EMBL, external stakeholders, and cross-sectoral experts, by undertaking analysis of, and discussion on, the societal impact of scientific research.



Poster for the Science and Society Conference 2020, which focused on mass extinctions and species loss. Credit: Design team/EMBL

Our Response

EMBL's research activities are planned through five-year scientific programmes. This Sustainability Strategy sits alongside the research programme, so that EMBL remains a fundamental research organisation rather than one focused on solving a specific issue such as environmental damage.

However, under the EMBL Programme, Molecules to Ecosystems, which begins in 2022, EMBL intends to propel Europe into a new era of biological understanding, from the molecular building blocks of life through to the complexity of ecosystems – the very context within which all life forms exist. EMBL's ambition is to establish the molecular basis of 'life in context', to gain new knowledge that is relevant to understanding life on Earth and to provide translational potential to support advances in human and planetary health.



Molecules to Ecosystems. Credit: Spencer Phillips/EMBL

Where this leads to research that improves our understanding of environmental issues, such as the impact of pollution on organisms and on entire ecosystems, it is vital that dissemination of this research reaches the environmental community, decision-makers, and the public. Our goal is to do this by hosting events that are targeted at the environmental community and that aim to reach a wider audience than has been achieved in the past.

Furthermore, where an EMBL research group is doing research that will improve the understanding of environmental topics, we want to provide additional support to them. To that end, the EMBL Office of Resource Development is running a dedicated funding initiative called the Environmental Research Initiative. More details about this initiative are shared below.

We have heard from funders that they want to channel their grant awards towards projects with positive contributions to climate and environment (e.g. Wellcome, UK Research and Innovation), with new funding streams opening up in these areas. Furthermore, the EU's Green Deal and associated funding through Horizon Europe are examples of the way environmental topics are rising up the political agenda.

The Environmental Research Initiative

To further support EMBL researchers who are researching topics that lead to a better understanding of environmental issues, the Environmental Research Initiative was created in 2020. This initiative aims to provide additional financial support to any research carried out at EMBL to tackle environmental issues. The funding, which is being sought from philanthropic donations and which will complement member state funding, will enable researchers from different disciplines to join the EMBL community and form new groups and/or initiate projects that target environmental problems using any aspect of modern biology. Through the Environmental Research Initiative, EMBL will be able to strengthen and further expand its new programme directions to focus on addressing the urgency of finding solutions to society's global environmental challenges, such as pollution, climate change, and loss of biodiversity.

Fighting pesticide pollution with microbes

Pesticides used in agriculture pose a major threat to soil and water ecosystems. Although it is known that microbes can break down pesticides, it is still not well understood which microbes do this and how they do it. This research project will develop novel approaches to answer these questions and help identify ways to better monitor the environment for pesticide contamination, to remove pesticides from the environment, and to design greener chemicals.

Tackling nanoplastic pollution

Eight million tonnes of plastic waste end up in the oceans each year. This plastic waste eventually breaks down into tiny particles called microplastics and nanoplastics, which can wreak havoc on animals, humans, and ecosystems. However, the impact of nanoplastics remains largely unexplored. Scientists at EMBL Hamburg will combine small-angle X-ray scattering technology and biophysical techniques to better understand the links between nanoplastics and their impacts.

Cleaning wastewater polluted by artificial hormones

The daily use of pharmaceuticals introduces a high load of artificial hormones into wastewater and the environment, which is harmful to fish and local ecosystems. However, there are currently major hurdles in detecting and identifying these hormones. EMBL will develop a new approach that combines computer simulations and mass spectrometry to improve detection and identification, which may help find efficient ways to remove artificial hormones from the environment.

Description of three projects funded through the Environmental Research Initiative

The projects detailed here demonstrate the type of projects EMBL can carry out with additional funding through philanthropy, and they serve as inspiration to enable further major donations. Contingent on the amount of philanthropic support EMBL receives, future phases may include continuation of catalyst projects, new environmental research projects or collaborations, and the establishment of new research groups with a specific environmental research focus.

With new developments in research techniques and technologies, EMBL can play a pivotal role in providing society with a better understanding of the world from the molecular level to the ecosystem level. This is a key part of this Sustainability Strategy, and we will ensure that we maximise the societal and environmental benefits of this research.



EMBL's Melissa Graewert and colleagues are taking a structural biologist's approach to better understand nanoplastic particles. Their research will help uncover how plastic infiltration affects our health and food supply, and may lead to novel solutions. Credit: Tobias Graewert/EMBL

Pillar 3.

Promoting Sustainable Science

The Issue

Awareness of sustainability issues among the public, the science community, investors, and regulators is steadily increasing. When it comes to environmental matters, organisations need to manage the risk of being seen as unsustainable by communicating honestly and transparently.

Reporting on our sustainability activities and performance will be key to securing credibility and reputation with internal and external stakeholders. With climate and environmental issues on top of global agendas, our internal and external stakeholders have expressed an interest in the organisation's environmental impacts and its performance on environmental issues.

The EU and its member states, as well as regional and city governments, are looking for support from all actors in society to realise their own climate strategies and targets. EMBL has already been engaged in climate action with Stadt Heidelberg and the State of Baden-Württemberg in Germany.

Big public funders are starting to integrate sustainability criteria into grant applications. Corporate partners pursuing ambitious sustainability strategies of their own might consider our sustainability credentials when deciding whether or not to support the organisation. Finally, other research institutes might also want to consider the sustainability performance of collaborating institutions.

Our Impact

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.

Our Response

Across Europe, there is a lack of transparency on the environmental impact of life sciences research organisations such as EMBL. Though there is an understanding of the high environmental impact of life sciences research, there is no benchmark for a sustainable life sciences organisation. We hope to fill that void by reporting on our environmental footprint, being transparent about our impact, and sharing our success in this transformation. Some of the channels we will use include:

Annual Report – We will begin to report on our environmental impact and the implementation of this strategy in the Annual Report. The report will detail⁹ EMBL's carbon footprint, waste volume, and business travel flights, as well as our progress towards achieving our targets in these areas.

Events – EMBL will take advantage of any opportunities to host or to take part in webinars and speaking opportunities to promote sustainable science and the impact of our research.

For example, EMBL's Science & Society Programme has been running for more than 20 years and seeks to create a bridge between EMBL, external stakeholders, and cross-sectoral experts, by undertaking analysis of and discussion on the societal impact of scientific research. The programme includes a range of internal and external events, designed to facilitate analysis of, and outreach on, scientific issues with societal relevance. Environmental topics have, and will continue to be, an area of focus for the Science & Society Programme. In 2020 we explored mass extinction events and in 2021 the topic is the One Health movement.

Training – EMBL has a number of successful training activities that provide EMBL staff with the opportunity to learn new skills, both scientific and non-scientific, and welcome visitors, trainees, students, and other scientists to EMBL for varying durations of time. The European Learning Laboratory for the Life Sciences also fosters interaction between teachers and scientists. These activities present an opportunity for EMBL to engage a broad audience on the topic of sustainable science, which might then become a seed for growing sustainable science considerations in other organisations.

EU Climate Pact – EMBL's Environmental Officer was appointed as an EU Climate Pact Ambassador in 2020. As an Ambassador, they are committed to lead by example in climate and environmental protection action and to become a proactive bridge between society, stakeholders, and the European Commission.

⁹ Reporting will follow the EMBL Environmental Reporting Guidelines, which will be published on our website and intranet for transparency.

Behaviour Change

The materiality assessment also identified behavioural or attitudinal change as a material topic for sustainability at EMBL.

Why is behavioural change such an important topic for us? Scientists working at organisations like EMBL's enjoy a unique position of relative autonomy. Research groups have the freedom to carry out their research and run their laboratories as they see fit.

This means that as the organisation delivers on this strategy, there is still a great emphasis placed on the behaviour of our staff to voluntarily and willingly adopt more sustainable behaviours. Our staff have shown a desire to be more sustainable, as demonstrated by the Green EMBL Initiative and by the results of a survey carried out in 2019 on sustainability at EMBL.

As an organisation, we will strive to break down the barriers that prevent researchers from changing their behaviour, as well as aiming to understand what motivators we can use to persuade researchers to adopt sustainable behaviours.

A dedicated working group has been set up to deliver this vital area of the strategy. This group will design campaigns around energy use in the labs, buying habits for laboratory consumables, waste disposal behaviour, and travel behaviour. These campaigns will use common branding and imagery to ensure that the Green EMBL Initiative's ambition is visible and unified.



Would you be willing to change your lifestyle in the following areas?



Example of the positive responses received in a 2019 Staff Survey on the Green EMBL Initiative

Governance and Delivery

The governance structure for this Sustainability Strategy is designed to both capture the enthusiasm of our staff and to ensure our leadership team is fully engaged in the initiative.

The Environmental Officer, who has been given delegated responsibility to deliver this Sustainability Strategy, sits within the Chief Operating Officer's (COO) Office and is linked to the Director of Scientific Services and Core Facilities. The Sustainability Strategy is therefore considered a programme under the COO portfolio and is governed under the associated COO portfolio structure.

To this end, a Sustainability Programme Steering Committee will manage the programme's delivery. This committee will sign off on programme and project deliverables and will ensure that issues and risks are managed and/or escalated as needed to the COO Strategy Group. For monitoring the programme, this committee will report to the COO Strategy Group and provide progress updates to the EMBL Operations Portfolio Advisory Committee (once established). The Steering Committee will also work with stakeholders and will support engagement and implementation as needed. For smaller projects, the Steering Committee will take on the responsibilities of a Project Board. For larger projects, a dedicated Project Board will be assigned.

To ensure that the Sustainability Strategy captures the enthusiasm of all staff, four working groups have been set up to give input into the four key environmental topics identified in the materiality assessment: energy and emissions; waste and resource efficiency; mobility emissions; and sustainable construction. These voluntary, staff-led groups are responsible for developing recommendations in their specific topic which, if approved by the Sustainability Programme Steering Committee, will be incorporated into the action plans. A key principle is that all staff are invited to join these working groups and to be involved in developing the action plans, provided their participation is cleared by their line managers.

Finally, it is important that EMBL continues to receive feedback from other stakeholders. In addition to the groups mentioned above, the Staff Association's Green Initiatives Group (SA-GIG) will be available as a place for staff to raise any ideas and concerns. The SA-GIG will have a presence on the Sustainability Programme Steering Committee to ensure the Staff Association is aware of the sustainability plans for EMBL.

The Sustainability Programme Steering Committee will provide reports and updates to EMBL's leadership and the EMBL Council, as well as seeking engagement with our funders and regulators.



Sustainability Strategy Governance Structure

Sustainability Programme Steering Committee Membership

Environmental Officer

Sustainability Officer

Strategy Office

Head of Operation Management Team

Head of Facilities Management

EMBL Hamburg Administrator

EMBL Grenoble Administrator

EMBL Rome Administrator

EMBL Barcelona Administrator

EMBL-EBI Administrator

Environmental Research Initiative representative

Science & Society Programme representative

Staff Association Green Initiatives Group representative

Communications representative

EICAT representative

Science & Research representatives

Core Facilities & Scientific Services representative

Contact



Brendan Rouse Environmental Officer

brendan.rouse@embl.de



Marta Rodriguez Martinez

Scientific Officer / Sustainability Officer

marta.rodriguez@embl.de