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**Fraunhofer-Gesellschaft**



# 2025 Sustainability Statement

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# Foreword

**Dear Readers,**

Through our research, we contribute to sustainable development that is consistent with an environmentally friendly, economically successful and socially equitable world. We believe that this is our responsibility. As an organization dedicated to applied research, we are committed to implementing scientific findings in real-world solutions, contributing to the future viability of industry, society and the environment.

The challenges of our time—from climate change and a secure energy supply to health, digitalization, security and resilient infrastructure—demand innovative technologies and collaboration. Working together with partners from industry, science, government and civil society, the Fraunhofer-Gesellschaft’s institutes develop solutions that accelerate the transfer of research to practical applications and especially strengthen industrial innovation and competitiveness.

An important framework for this is provided by the United Nations’ 17 Sustainable Development Goals (SDGs). They unite environmental, economic and social dimensions of sustainable development and also provide key insights for our research. Many of our projects help support these goals through technological innovations. Fraunhofer has been a member of the UN Global Compact since 2017 and is committed to the ongoing implementation of its ten principles and to supporting the SDGs.

For Fraunhofer, however, sustainability means more than simply driving change through research. It is also a guiding principle for the continuing development of our organization. A responsible organizational structure, attractive and fair working conditions for our employees, conscientious use of resources and high standards in research ethics, compliance and procurement, are key elements of our approach to sustainability.

This report provides insight into the wide-ranging contributions of the Fraunhofer-Gesellschaft to sustainable development in our research and in our organizational practices. We also see this as expressing our commitment to transparency and continual development.

We invite you to explore our commitment.

The executive board of the Fraunhofer-Gesellschaft

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 Learn more about Fraunhofer's executive board members.



Photo: Fraunhofer / Stefan Obermeier

**The executive board**

**Constantin Häfner**  
Executive Board Member for  
Research and Transfer

**Sandra Krey**  
Executive Board Member  
for Finances and  
Controlling

**Holger Hanselka**  
President and Chair of the  
Executive Board of the  
Fraunhofer-Gesellschaft

**Elisabeth Ewen**  
Executive Board Member  
for Human Resources,  
Corporate Culture and  
Legal Affairs

**Axel Müller-Groeling**  
Executive Board Member for  
Research Infrastructures and  
Digital Transformation

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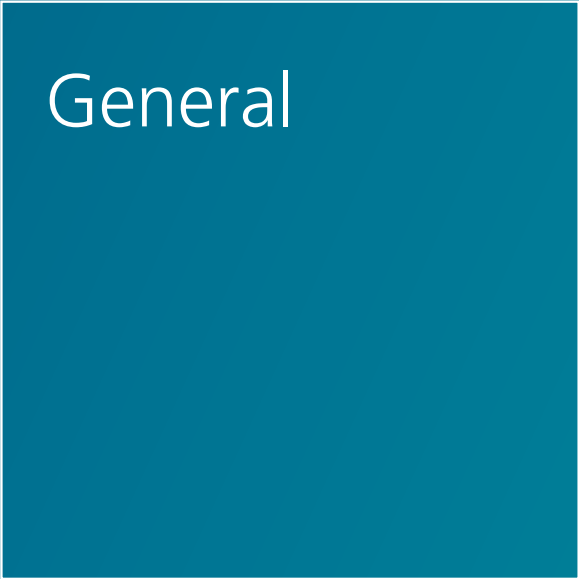
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Basis for report

This sustainability statement from the Fraunhofer-Gesellschaft covers the 2025 reporting year and covers significant developments since the CSR report last published in 2023. It has been prepared based on the respective valid issue of the European Sustainability Reporting Standards (ESRS). No claim is made to complete ESRS compliance. The sustainability statement has not been audited as an overall report in the sense of an independent audit. Specific sustainability disclosures included in the management report were part of the legally required auditing of financial statements pursuant to section 317 of the German Commercial Code (Handelsgesetzbuch, HGB) and were audited by the auditor with reasonable assurance. **These are marked accordingly in the report with vertical lines (I) to the left of the respective paragraphs.**

Structured alignment, reviews and classifications were conducted with the involvement of internal departments, management and selected external experts in order to ensure the quality and plausibility of the content. This report provides a transparent overview of the key social, environmental and governance aspects of the Fraunhofer-Gesellschaft along its value chain and its impact. It is intended for both internal and external stakeholders while also serving as a tool for internal control, further development and continuous improvement in sustainability management. Fraunhofer is continuously working to further develop data, processes and systems in keeping with external requirements and to gradually improve reporting transparency and comparability.

Governance

Fraunhofer is a nonprofit association registered under German law with a governance structure oriented toward transparency, accountability and efficiency. The organization is primarily governed by the executive board and the senate. The executive board of the Fraunhofer- Gesellschaft currently operates as a collective body consisting of the president and chair of the executive board together with 4 additional members. It is responsible for the general management of the organization and for its strategic direction. The conduct of the executive board shapes the corporate culture and, for the Fraunhofer-Gesellschaft as a whole, ensures a coherent research portfolio that meets both legal and scientific standards. The executive board establishes and implements the framework necessary for the lawful, proper and cost-effective management of the organization’s activities and those of its institutes and research units. This is achieved through guidelines and control systems. The senate, which comprises up to 26 representatives from research, industry and government, is responsible for advising the executive board, monitoring its activities pursuant to section 13(1) of the Fraunhofer statutes, appointing its members, approving the business plan and making recommendations regarding the establishment of the central elements of the science and research strategy pursuant to sections 13(6c) and (7b) of the Fraunhofer statutes. The senate is supported by three standing committees drawn from among its members: **the audit committee, the committee for executive board affairs and the nomination committee.**

Overall responsibility for sustainability rests with the president of the Fraunhofer-Gesellschaft. Sustainability is understood as a cross-cutting task incumbent on all executive units. The Sustainability Management department, which comes under the auspices of the Presidential Office, coordinates sustainability activities across Fraunhofer in close cooperation with the relevant specialist departments. An interdisciplinary sustainability working group also combines the strategic and operational measures needed to achieve the organization’s sustainability goals. Sustainability considerations are integrated into corporate governance in order to

strengthen the effectiveness and resilience of the organization and ensure it responds appropriately to regulatory, technological and societal change.

Some sustainability aspects are integrated in the incentive systems for the management bodies. This especially includes accounting for diversity goals in the variable compensation of institute management.

The Fraunhofer-Gesellschaft has had an established **compliance management system (CMS)** in place since 2010. This is regularly adapted to reflect increasing regulatory requirements and the growing complexity of the research ecosystem. The CMS is based on a compliance framework consisting of clearly defined regulations, roles and responsibilities, including for sustainability. This framework was developed in cooperation with the research units.

The Fraunhofer-Gesellschaft’s code of conduct, which was revised and updated during the reporting year, defines the core values and principles that guide the actions of all employees as well as those of the executive board and senate. It provides the framework for conduct grounded in integrity and responsibility, while emphasizing the importance of trust, respect and fairness in Fraunhofer’s everyday scientific and administrative work.

In 2024, as part of the Research Manager training program, colleagues from the Fraunhofer institutes collaborated with headquarters Corporate Sustainability Management to develop the Fraunhofer-wide Sustainability@Fraunhofer **e-learning module**. The goal of this module is to raise employees’ awareness of sustainability and to empower them to actively help shape sustainability at Fraunhofer. This training is mandatory for all new employees.

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Sustainability risks are integrated in the central risk management system. Suitable internal control and management mechanisms are in place for sustainability reporting to ensure information reliability and consistency. The Corporate Sustainability Management department was established in 2024 to coordinate sustainability activities throughout Fraunhofer. This department reports to the president's Corporate Strategy directorate and collaborates closely with the other departments at Fraunhofer headquarters and in the Fraunhofer institutes.

Strategy

Profile of the Fraunhofer-Gesellschaft

The Fraunhofer-Gesellschaft, headquartered in Germany, is a leading organization for applied research. Since its founding as a nonprofit in 1949, Fraunhofer has held a unique position in the German research and innovation ecosystem. With over 30,000 employees, Fraunhofer operates 74 institutes and independent research units throughout Germany. Fraunhofer plays a major role in innovation by focusing on cutting-edge technologies and transferring research results to industry to strengthen Germany as a business location and benefit society.

Its primary customer base comprises large and medium-sized companies, which utilize Fraunhofer's expertise to boost their competitiveness with new technologies. For years, Fraunhofer has been one of the most active patent applicants in Germany and Europe. Its international patent portfolio is the basis for technology transfer through research projects, spin-offs and licensing. Moreover, Fraunhofer addresses societal goals in key technology sectors through interdisciplinary and international partnerships in specific markets. Examples include solutions for microelectronics, artificial intelligence and quantum computing, healthcare, the circular economy, new materials, energy, critical infrastructure security, and defense.

Fraunhofer is a sought-after and established partner in publicly funded projects with industry partner involvement. It is also instrumental in strengthening Germany as a hub for innovation and business, ensuring its future viability. Its activities create jobs in Germany, increase public-sector investments, give companies a competitive edge and foster public acceptance of advanced technology. International partnerships with excellent research organizations and companies around the world directly connect the Fraunhofer-Gesellschaft with the most influential research communities and economic areas.

Fraunhofer's total annual budget amounts to 3.6 billion euros. Contract research, Fraunhofer's core business, generates 3.2 billion of this budget. Unlike other public research organizations, institutional funding from federal and state governments accounts for no more than one-third of its contract research budget, thus providing merely the base. Fraunhofer generates at least two-thirds of this budget from competitive contracts with the private and public sectors. Unlike in organizations that are largely institutionally funded, the resulting strong incentive to develop business fosters entrepreneurial spirit, ensuring that Fraunhofer continuously develops solutions for current and future economic and societal needs. In 2025, industrial revenue accounted for 966 million euros.

Value chain

The Fraunhofer-Gesellschaft's value chain shows how research, development and technology transfer can use upstream scientific, financial and infrastructure resources to generate benefits for science, industry, society and the environment. The key resources include collaboration with partners from science, industry and the public sector, qualified employees, the Fraunhofer funding model comprising base funding, public funding and industry contracts and physical and digital research resources. These are subject to binding requirements, such as for scientific integrity, data protection, information security and export controls.

These resources are channelled into applied research in the core activities. The Fraunhofer-Gesellschaft addresses societal and economic needs, conducts research and development in laboratory and test environments and transfers these results into practical applications, such as through collaboration with companies, licensing agreements, spin-offs or pilot projects. Support functions such as research infrastructure, HR management, procurement and facility management ensure the organization's quality, regulatory compliance and performance.

The effect of research at Fraunhofer is evaluated on the output, outcome and impact levels. Output comprises direct research results such as publications, patents, software or prototypes. Outcome describes their use by external partners, such as in new products, processes or infrastructure. Impact refers to the resulting scientific, economic, social and environmental effects, such as those from innovation, the dissemination of knowledge, competitiveness, resource efficiency or contributions to climate protection (see figure on page 8).

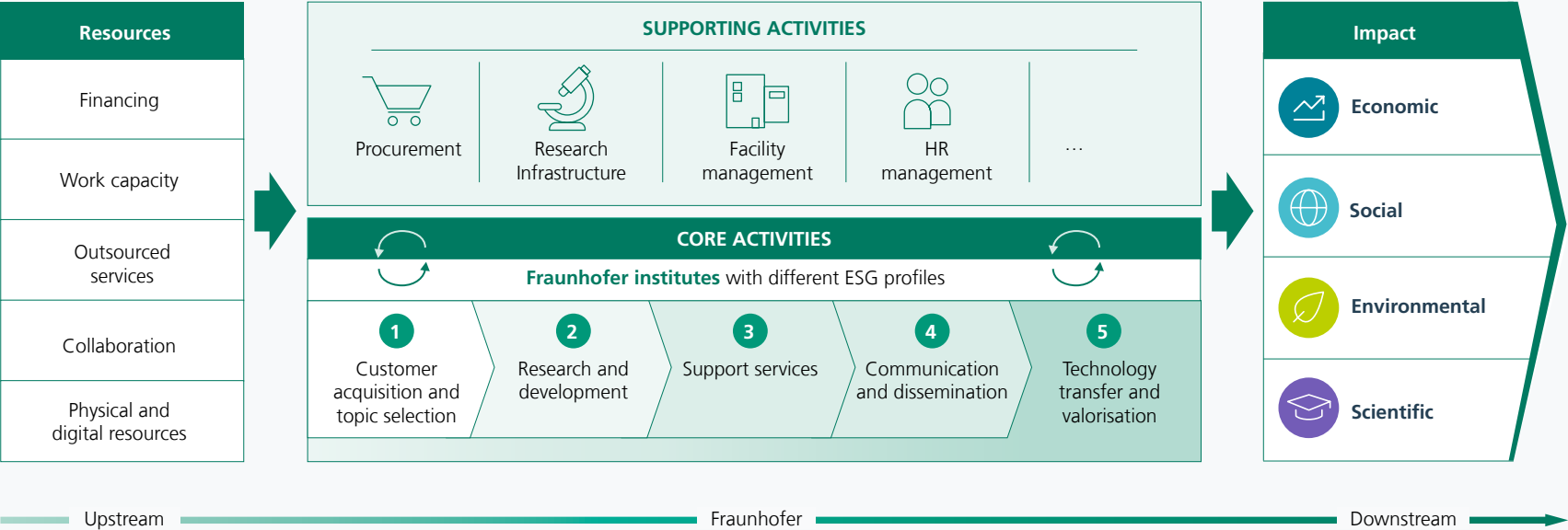
The Fraunhofer-Gesellschaft's industrial revenue for 2025, structured according to the NACE classification, further illustrates the distribution of revenues generated through contract research across sectors and highlights the strong focus on industry-specific value creation and knowledge-intensive services (see figure on page 9).

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The Fraunhofer-specific value chain model



The Fraunhofer-specific value chain model based on Porter's value chain logic, expanded to include ESRS-relevant upstream and downstream activities as well as the impact-oriented perspective of research. This provides a simplified representation of value creation from upstream resources through research and technology transfer to impact.

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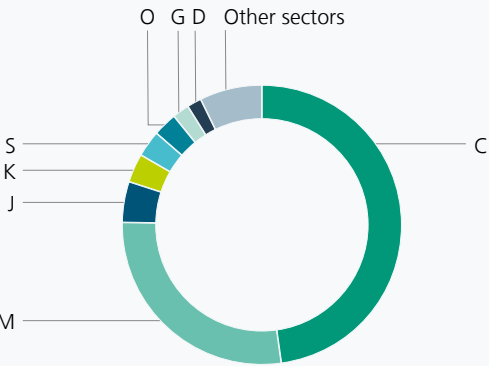
Industrial revenue in 2025 by industry<sup>1</sup>

| NACE code <sup>2</sup>                                                                              |           |                                                                              |       | %        |            |
|-----------------------------------------------------------------------------------------------------|-----------|------------------------------------------------------------------------------|-------|----------|------------|
| based on the statistical classification of economic activities in the European Community since 2008 |           |                                                                              |       | of total | Cumulative |
| C                                                                                                   | of which: | Manufacturing                                                                |       | 48.0%    | 48.0%      |
|                                                                                                     | 26        | Manufacture of computer, electronic and optical products                     | 15.1% |          |            |
|                                                                                                     | 28        | Manufacture of machinery and equipment                                       | 7.1%  |          |            |
|                                                                                                     | 29        | Manufacture of motor vehicles, trailers and semi-trailers                    | 4.6%  |          |            |
|                                                                                                     | 21        | Manufacture of basic pharmaceutical products and pharmaceutical preparations | 3.7%  |          |            |
|                                                                                                     | 27        | Manufacture of electrical equipment                                          | 3.1%  |          |            |
|                                                                                                     |           | Other manufacturing                                                          | 14.4% |          |            |
| M                                                                                                   |           | Professional, scientific and technical activities                            |       | 27.8%    | 75.8%      |
| J                                                                                                   |           | Information and communication                                                |       | 4.6%     | 80.4%      |
| K                                                                                                   |           | Financial and insurance activities                                           |       | 3.6%     | 84.0%      |
| S                                                                                                   |           | Other service activities                                                     |       | 3.0%     | 87.0%      |
| O                                                                                                   |           | Public administration and defense; compulsory social security                |       | 2.6%     | 89.6%      |
| G                                                                                                   |           | Wholesale and retail trade; repair of motor vehicles and motorcycles         |       | 2.1%     | 91.7%      |
| D                                                                                                   |           | Electricity, gas, steam and air conditioning supply                          |       | 1.6%     | 93.3%      |
|                                                                                                     |           | Other sectors or no sector                                                   |       | 6.7%     | 100.0%     |

<sup>1</sup> Part of the Fraunhofer management report and audited with reasonable assurance by an auditing firm pursuant to section 317 of the German Commercial Code (Handelsgesetzbuch, HGB)

<sup>2</sup> European Commission, Eurostat, (2008). NACE Rev. 2: Statistical classification of economic activities in the European Community. Publications Office. <https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/ks-ra-07-015>

Industrial revenue by industry  
(in % of total)



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Impact, risks and opportunities

Fraunhofer has an impact on the environment and society in many different ways through its business activities. This impact ranges from direct operating effects (such as greenhouse gas emissions) and the shaping of working conditions to the positive impetus provided by applied research for a more sustainable future. The key impacts, risks and opportunities (IROs) were systematically identified, analyzed and evaluated. The identified material IROs are closely related to the strategy of the Fraunhofer-Gesellschaft. They influence both technical strategies and the prioritization of resources and activities along the value chain. These interactions can have short, medium and long-term financial and non-financial effects and are systematically accounted for in the strategic control and further development of sustainability management.

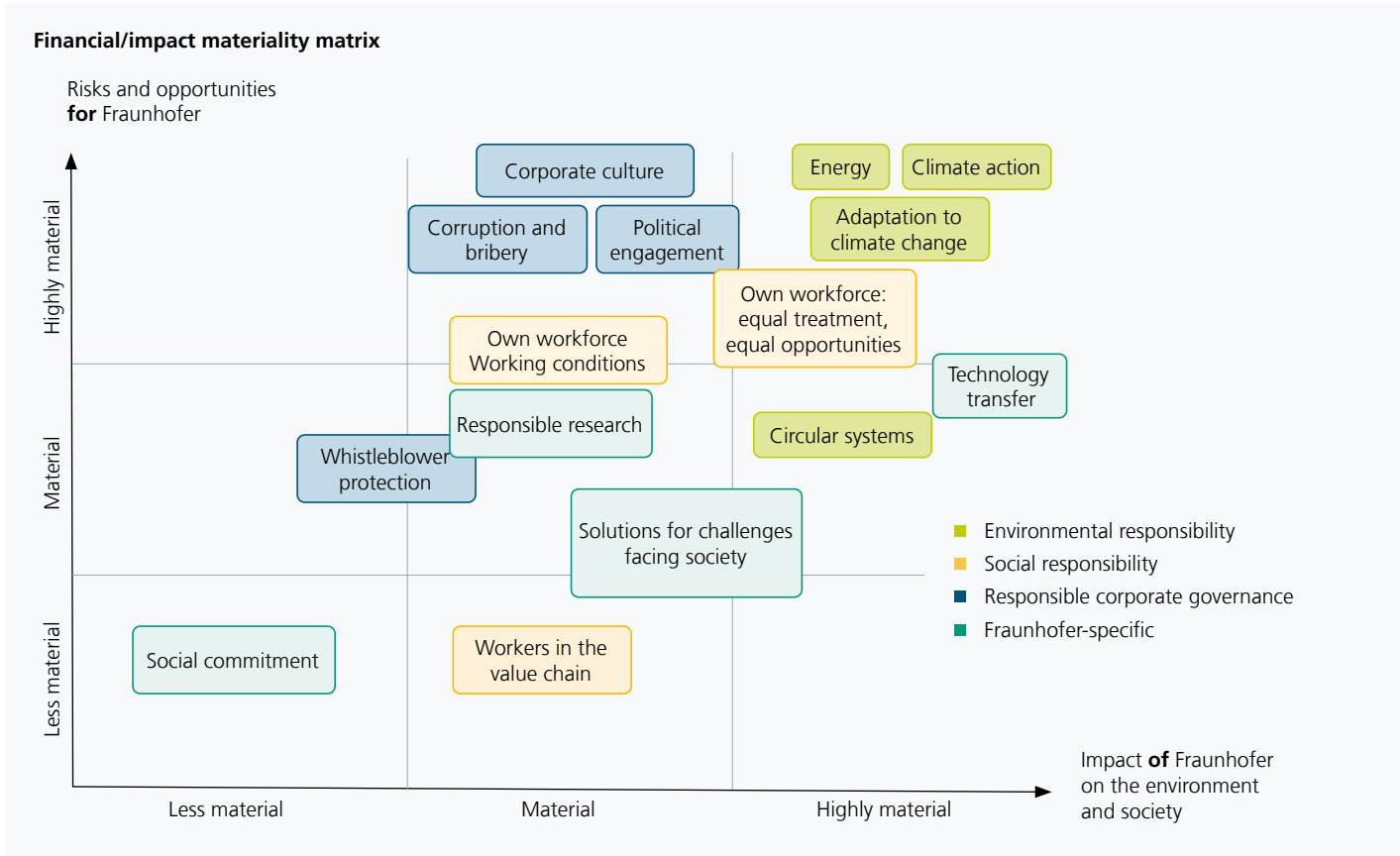
In the first step, potential IROs were jointly identified with internal stakeholders and evaluated along the value chain in terms of type, characteristics, time horizon and impact. Following the principle of dual materiality, both the impact perspective (effects on the environment and society) and the financial perspective (risks and opportunities for Fraunhofer) were accounted for and combined in a materiality matrix. In a second step, a structured survey of external stakeholders was conducted to verify and prioritize the results.

The materiality analysis was validated in an iterative process for quality assurance and to ensure relevance, acceptance and an organizational basis. This included workshops with internal experts from all executive units (four-eyes principle), ongoing involvement of the Corporate Social Responsibility Working Group as a central cross-functional committee, a survey of external stakeholders and external methodological validations and the exchange of best practices.

The analysis shows that Fraunhofer’s impact is in part ambivalent and remains closely linked to its research mission. While negative effects result primarily from operations, they are offset by substantial positive effects from research, technology transfer and the organizational culture. These results are further described in the following sustainability statement. The key issues and IROs identified form the basis for the following issue-specific data.

Fraunhofer-Gesellschaft stakeholder groups

- Employees
- Internal committees and officers
- Grant authorities
- Policy makers
- Companies and business associations
- Contracting authorities
- Civil society organizations
- University students
- Interested members of the public
- Science and scientific collaboration partners



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Parameters and goals

Further development of Fraunhofer sustainability initiatives is currently following a structured process derived directly from the Fraunhofer guiding principles and the action areas of the framework strategy. The goal is to systematically address sustainability-specific impacts, risks and opportunities and to integrate these in strategic organizational management. This process employs interdisciplinary strategic dialogues to develop a consistent vision, specific objectives and measurable metrics. The initial objectives and measures are already presented in the topic-specific sections of this report and will be further developed and implemented in stages.

Fraunhofer takes a holistic approach to sustainability. Fraunhofer is concentrating its sustainability activities in two key focal areas:

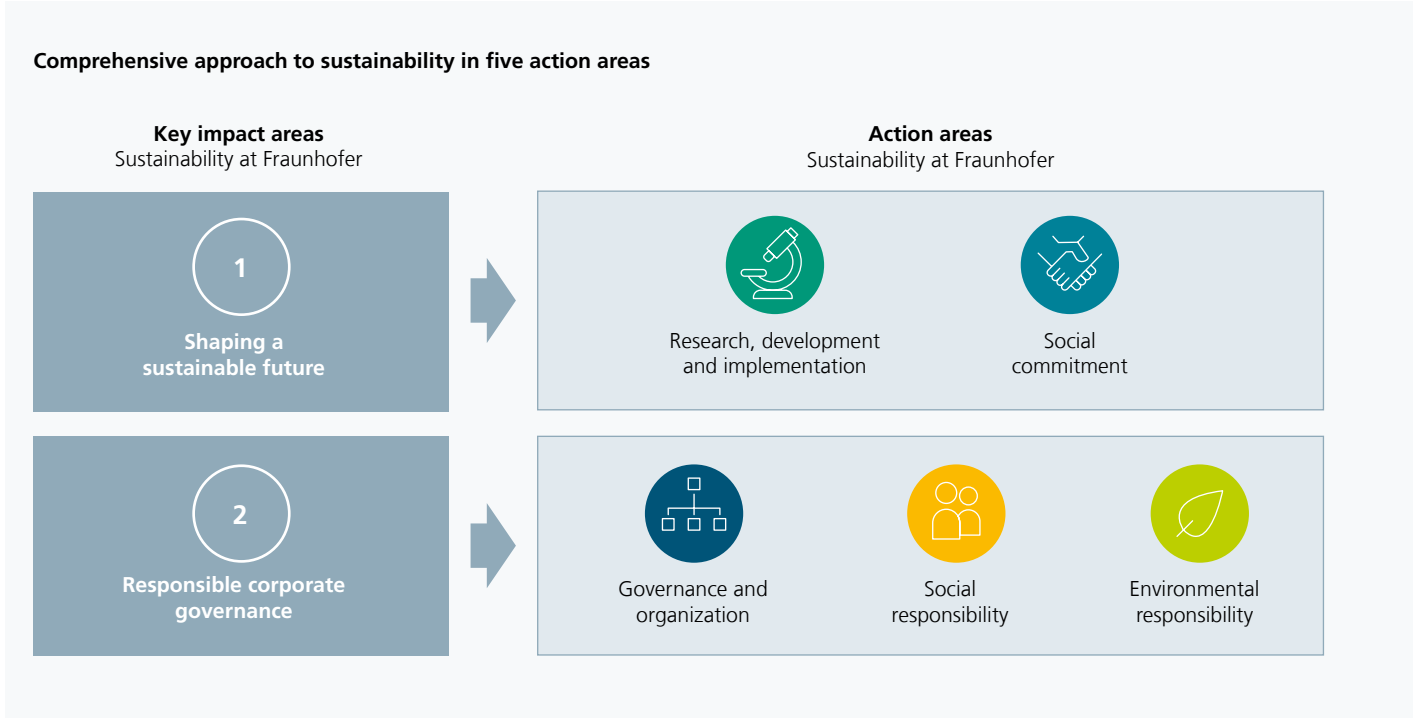
- **Shaping a sustainable future**  
Contributions through research, development and implementation and through engagement in society
- **Responsible organizational structure**  
Governance and organization, social responsibility and environmental responsibility

This structure serves as a general framework for deriving and implementing strategies, measures and goals in accordance with the ESRS and supports impact-oriented management of key sustainability aspects.

ESG ratings and customer requirements

To meet the growing demands of customers and partners, the Fraunhofer-Gesellschaft uses established ESG rating platforms (including EcoVadis, IntegrityNext, Supplier Assurance and Dun & Bradstreet). The evaluation is usually performed centrally via a standardized profile from Fraunhofer headquarters. This ensures consistent reporting of sustainability performance.

The EcoVadis rating awarded Fraunhofer a bronze medal for the first time in 2025 (63/100 points; top 28 percent of rated organizations). The results both ensure external transparency and support internal development of sustainability management.



Selected sustainability figures from 2025

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<sup>1</sup> This is based on the SDG classification in the Dimensions.ai publication database, which uses automated text analysis to assign publications to specific SDGs.  
<sup>2</sup> Consolidated Fraunhofer GHG Inventory for 2025 in accordance with the GHG Protocol; Scope 1-3 (marked-based); Main categories: 3.2 (building construction only), 3.3, 3.5, 3.6, 3.7  
<sup>3</sup> Research and technical staff, trainees, students  
<sup>4</sup> Science support, administration, infrastructure  
<sup>5</sup> TVöD pay group 13 (German Collective Bargaining Agreement for the Public Service (Tarifvertrag für den öffentlichen Dienst)) TVöD (German Collective Bargaining Agreement for the Public Service (Tarifvertrag für den öffentlichen Dienst)) pay group 13 and upwards with scientific responsibilities

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# Fraunhofer- specific topics



## Our commitment to sustainability

Through our research we contribute to sustainable development that is consistent with an environmentally friendly, economically successful and socially equitable world. We believe that this is our responsibility. Our research follows the principles of scientific integrity, transparency and ethical responsibility.

As a non-profit research organization with a public mandate, we see engagement in society as a mutually beneficial activity. We promote dialogue between science and society, find new ideas and shape transformation together. We foster educational initiatives, support for young talent and programs for participation to open up Fraunhofer for exchange, learning and sustainable development.



# Technology transfer

## Materiality for Fraunhofer

Transferring knowledge to the worlds of industry, society and politics and engaging in dialogue with these stakeholder groups—these activities are not only crucial to our mission as an applied research organization but are also important factors in ensuring that research results are harnessed effectively.

## Technology transfer to industry

For over 75 years, the Fraunhofer-Gesellschaft has been helping to successfully transfer the technological knowledge and expertise generated by its institutes to industry and society through new products, services and processes. Fraunhofer uses various technology transfer routes to ensure successful technology commercialization. These include cooperative efforts, IP commercialization, spin-offs, continuing education, knowledge transfer through people and standardization. Examples:

### Strategic cooperation and customer acquisition

Contract research for industry with companies forms a key strategic technology transfer route. Large companies comprise roughly 10 percent of our customers but generate more than a third of our industrial revenue. Furthermore, collaboration with small and medium-sized enterprises (SMEs) and the medium-sized industrial sector plays a central role, especially in the practical implementation of innovations and the integration of sustainability along industrial value chains. Sustainability is becoming increasingly important for companies that plan for the long term. Fraunhofer addresses this need through structured, strategic support and works together with companies to develop technologies combining

economic performance with environmental requirements. This trusting partnership over many years makes it possible to identify future research needs at an early stage and to continuously generate new projects. Through its public-private acquisition offers, Fraunhofer contributes significantly to the development of technological solutions with economic and social benefits. Innovation partnerships—often with companies—generate projects that help municipalities, government agencies and other public institutions in overcoming key challenges. This also includes climate-resilient infrastructure, smart transportation concepts, the deployment of modern technologies for security agencies and digital administrative processes. Fraunhofer thus strengthens Germany's innovation and competitiveness on the social, environmental and economic planes.

### Spin-offs and patents

The AHEAD technology transfer program has been supporting technology driven spin-offs since 2019. The program took on 60 project teams in 2025, including 18 focused on sustainability in the SDG track. This specific track in AHEAD is designed for projects focused on SDG-compliant sustainability. It offers additional coaching with impact experts and supports the development of sustainable business and licensing models promising sustainable value.

The Fraunhofer spin-off premium promotes dynamic startups and helps institutes efficiently transfer human resources and knowledge in spin-offs. The Fraunhofer Founder Award has also been presented in collaboration with High-Tech Gründerfonds since 2016. With a prize of 50,000 euros, the award is intended for spin-offs that have successfully established solutions providing social value through their technological originality and innovative strength.

In 2025, Fraunhofer continued to pursue its intellectual property (IP) strategy with a clear focus on securing long-term patent protection for inventions with strong potential for exploitation. The institutes are aligning decisions on patent applications and maintenance even more closely with strategic and economic criteria to ensure that resources are used efficiently and IP portfolios streamlined further. The Fraunhofer institutes are also making extensive use of the far-reaching international coverage offered by the EU unitary patent. In 2025, 589 inventions were reported and 538 patent applications claiming rights of priority were submitted. The European Patent Office's Technology Dashboard 2025, formerly the Patent Index, identifies the Fraunhofer-Gesellschaft as the leading European research institution for patent applications. The portfolio of active patent families remained stable year on year at around 7,000. This shows that the targeted focus and consolidation of the IP strategy is proving successful, allowing Fraunhofer to maintain a high level of intellectual property protection even in increasingly challenging economic conditions.

### Continuing education

The Fraunhofer Academy trains innovators across Germany and Europe with the aim of transferring key technologies into practical applications for a livable future. The transformation toward a sustainable society requires companies to take extensive measures to transmit expertise to their employees or give them a new strategic focus. As such, the continuing education and training programs for specialists and managers in industry and public administration represent an important technology transfer channel for Fraunhofer. With initiatives such as European Learning Lab Battery Cells (ELLB), the Fraunhofer Academy and the Fraunhofer Research Institution for Battery Cell Production FFB are addressing the large need for training in the battery sector. Since 2024, the ELLB has

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been providing specialists and managers from various industries with in-depth knowledge in battery cell manufacturing, from basic principles and digitalization to sustainability and recycling.

The [European Battery Business Club](#) (EBBC) of the Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM is expanding its offer for the European market with an innovative e-learning program covering the entire battery value chain on an English-language knowledge platform. The Fraunhofer Academy has been offering practical training courses on sustainability management, climate-resilient urban design and digital sustainability management since 2025. Programs such as [think GREEN, act SMART](#) provide in-depth knowledge in environmental auditing and its integration in corporate processes.

Collaboration

High-performance centers are regional, technology transfer-oriented collaborative efforts between Fraunhofer institutes, universities and research institutions. The objective is to further pursue key research areas and to increase the impact of R&D projects on the economy and society. Several of the 20 high-performance centers in the competitive omnibus model either directly or indirectly address sustainability issues. For example, the [Sustainability high-performance center](#) in Freiburg has pursued engineering sustainability research since 2015. In 2025, projects including the ECO-KÜHL demonstrator project received specific funding for technology transfer to demonstrate electrocaloric cooling systems with optimized heat dissipation and a greater temperature lift for quiet, pollution-free efficiency. The goal of ECO-KÜHL is to scale up the technology as the basis for a spin-off. Another example is the [GreenMat4H<sub>2</sub> high-performance center](#), which invited representatives from industry and the scientific community to the Fraunhofer Institute for Structural Durability and System Reliability

LBF in Darmstadt for its hydrogen round table in December 2025. There the center presented the latest collaborative developments in the sustainability and reliability of materials, components (such as solid-state storage elements) and systems (e.g., fuel cells and Type 4 H<sub>2</sub> tanks) for the hydrogen economy.



Selected technology transfer examples

Next-generation battery technologies

Spun off from the Fraunhofer Institute for Production Technology IPT and FFB in the AHEAD SDG track, MANUGY has made the leap from research to practical application. Efforts in 2025 focused on the first flexible cell assembly line, while new pilot projects with industry partners were launched in parallel. This brought the spin-off that much closer to its goal of making Europe's battery cell production more flexible and sustainable.

Circular economy with AI

WeSort.AI GmbH, a spin-off from the Fraunhofer Institute for Integrated Circuits IIS founded in 2024, is setting new standards in AI-supported waste sorting. Using groundbreaking technology for automated detection and separation of recyclable materials and hazardous substances, the company impressed the German Startup Awards jury, winning in the *StartUp 2024* category.

Cell-based fish instead of overfishing

Spun off from the Fraunhofer Institute for Toxicology and Experimental Medicine ITEM (formerly EMB) in 2020, BLUU Seafood GmbH is establishing an alternative to conventional fish production. What started as a research project is now a European fish farming pioneer—with low emissions and high animal welfare standards. BLUU Seafood was nominated for the 2024 German Founder Award in the *StartUp* category and took second place. The company was also the Hamburg regional winner of the 2024 Gründen award from German bank KfW.



Bluu Seafood GmbH develops cultured fish from fish cells as an alternative to industrial fishing.  
Photo: Bluu Seafood GmbH

Cost reduction for III-V multi-junction solar cells

Working in collaboration with the Werner Siemens Foundation, the Fraunhofer Institute for Solar Energy Systems ISE has started a project to significantly reduce the manufacturing costs of III-V multi-junction solar cells and enable their implementation in ground-based facilities. The goal is to improve the cost-effectiveness of these highly efficient solar cells with innovative and scalable manufacturing processes and reusable substrates, thus promoting the energy transition. The Werner Siemens Foundation is supporting the project with 14 million euros to promote applied research and disruptive innovations in photovoltaics.

Accelerating the sustainable transformation of global supply chains

An example of the successful integration of research and industrial application in developing sustainable solutions is the strategic collaboration between the Fraunhofer-Gesellschaft and the Procter & Gamble (P&G) Product Supply Innovation Center (PSIC) in Kronberg. The partnership in the Joint Innovation Platform was further strengthened in July 2023 to more closely integrate Fraunhofer's interdisciplinary expertise with the PSIC. The goal is to jointly develop innovative and sustainable supply chain solutions that will help P&G on its path to climate neutrality by 2040. P&G has committed to achieving net-zero GHG emissions in all of its production sites and distribution and technical centers and its over 100,000 transport routes by 2040. The company also plans to protect the affected watershed areas at its locations and to reduce annual freshwater use by more than 11 billion liters. A further key focus is on building robust sustainability data systems to provide verifiable and accessible data for internal and external reporting purposes. The Joint Innovation Platform links specialist departments in the Fraunhofer-Gesellschaft at more than 50 locations with the PSIC and enables rapid access to expertise in the four strategic areas of transport, Scope 1 and Scope 2 emissions, water and ESG data.

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Technology transfer to society

Research findings

Open-access publishing of research results is critical to making research findings and scientific developments immediately available to the public. The Fraunhofer-Gesellschaft supports this through initiatives such as the [Fraunhofer Publica](#) central repository. Public access to data and research tools and methods improves the transparency of research processes and results and strengthens the digital sovereignty of research scientists.

The current dependence on commercial scientific publishers is viewed with increasing skepticism and necessitates alternative publication forms. Publishing under the Diamond Open Access model provides approaches to increasing research scientists’ independence. This model charges no fees to either authors or readers. Funding is provided through institutional grants, supported by scientific consortia such as libraries, universities and non-university research institutions. This model is already gaining support around the world. The Fraunhofer-Gesellschaft is in active exchange with other research institutions through the Alliance of Science Organisations in Germany to enable measures in keeping with science policy.

The transformation of publication funding structures is only one aspect of strengthening digital sovereignty. This topic has become a highly urgent one in the current times of new global political uncertainty. Establishing or strengthening European infrastructure is another measure in efforts to reduce global dependencies. The primary focus is on reliably securing our own research data and information while also preserving data integrity. Based on the motto of *resilience through redundancy*, the objective is to mirror data sets that are at risk while also establishing an independent, resilient data infrastructure.

Participatory research

Many Fraunhofer institutes are committed to social engagement with a participatory approach. For example, the development and implementation of participatory research and innovation processes is a key research field at the [Center for Responsible Research and Innovation](#) (CeRRI) at the Fraunhofer Institute for Industrial Engineering IAO. Participatory approaches contribute significantly to systematically including societal needs in research and innovation and in increasing their acceptance and impact. With this background, CeRRI has been working since 2024 as a partner in the [PartWiss conference series](#) funded by the German Federal Ministry of Research, Technology and Space (BMFTR). This joint research project is headed by Chemnitz University of Technology and is implemented jointly with the Technische Universität Berlin and the Helmholtz Centre for Environmental Research.

Since the first event in 2022, PartWiss has become a key forum uniting researchers, civil society, project sponsors and research funders throughout Germany and across communities. In 2024, CeRRI hosted this conference in Berlin under the motto *Guidelines for Participation in Research*. The 2025 event in Leipzig gathered 400 participants under the motto *Researching Together—Impulses From Citizen Science, Participatory and Transdisciplinary Research*. Through dialogue on conditions for success, challenges and impacts of participatory research, this conference strengthens the quality of participatory and transdisciplinary scientific practices and ensures their long-term inclusion in research and innovation.

Science communications with society

The Fraunhofer-Gesellschaft actively enables dialogue between science, industry, government, the media and society with its communication activities. For example, the Fraunhofer institutes offered roughly 260 events for the public during the reporting year. Furthermore, the Public Liaison Officer from headquarters presented *H2 – The Journey*, an interactive exhibit about future energy in the context of Science Year 2025 at locations including on board the [MS Wissenschaft](#), at the Festival der Zukunft at the Deutsches Museum in Munich and at the Berlin Science Week. Fraunhofer has also been making specific use of science festivals since 2022 to raise awareness of its research and its societal benefits. A special highlight in 2025 was the Space Camp at the Wacken Open Air festival. This was organized jointly with the Fraunhofer AVIATION & SPACE alliance and partners such as the German Society for Aeronautics and Astronautics (DGLR) and the German Aerospace Industries Association (BDLI). This event was a huge success, with over 18,000 visitors and sold-out presentations.

The [Fraunhofer Science, Art and Design network \(WKD\)](#) promotes interdisciplinary projects at the intersection of science, art and design. Examples include Speculative Futures on bio-based value creation and FungiFacturingArt on innovative fungus-based materials. Five such projects on sustainable materials research were featured in the *FUTURES* exhibition: *Material and Design of Tomorrow* in the GRASSI Museum of Applied Arts in Leipzig. WKD is also organizing an annual [summer camp](#) which brought together students and researchers at Fraunhofer IAO in 2025. With the theme *RECL:AI:MING THE CITY—Digital Solutions for the City of Tomorrow*, they collaborated on ideas for urban solutions of the future.

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Young researchers

Fraunhofer has been committed to supporting young talent in STEM for many years. The [Fraunhofer Talent Schools](#) form a key element here, where students in grades 10 through 13 gain insights into current research fields and work together with researchers on practical scientific and technical challenges.

An example is the International Fraunhofer Talent School Bremen that the Fraunhofer Institute for Digital Medicine MEVIS conducted for the sixth time in 2025. The event focused on investigating creative multidisciplinary and transdisciplinary approaches in digital medicine. In the [STEAM Imaging residency program](#), students engage with researchers and creative thinkers in addressing future questions in digital medicine. The program combines scientific and artistic perspectives and promotes technical understanding, social participation and a reflective approach to new technologies.

In the [2025 Fraunhofer European Talent School](#) in Italy, researchers from the Fraunhofer Institute for Building Physics IBP offered the *Life Cycle Assessment—Calculating Sustainability* workshop. This program for students focused on collaborative, project-oriented work. Participants worked together on solutions to problems drawn from a wide range of fields in modern research, including mathematics, computer science, natural science and technology. The life cycle assessment workshop investigated sustainability and what it means for society, companies and individuals. Based on the life cycle of a cup of coffee, the participants analyzed its environmental impact and collaborated on developing a life cycle assessment model. The roles of the various stakeholders and possible individual actions were discussed.

Many Fraunhofer institutes also participate in the annual Girls’ Day. Another established educational offering under Girls’ Days is the *Roberta* programming platform, which has seen success for over 20 years. The spin-off of nonprofit [Roberta gGmbH](#) established an impact-driven structure for the long-term promotion of digital and STEM skills. The open-source learning platform reaches roughly one million secondary school students in Germany each year, helping to promote digital skills, fair opportunities and the future viability of society.



This year's program, titled *Resonant Connection Through Design and Data*, involves collaborating on MRI sequence development. Together with researchers, glass artist and engineer Gregory Alliss will present the world of so-called no-field, low-field and research MRIs, their data and their design.

Photo: Fraunhofer MEVIS



At the 2025 Girls’ Day at Fraunhofer IMWS, twelve high school students toured the institute and gained practical insights into research. They prepared samples and used high-resolution material diagnostics, investigated the cleaning performance of toothbrushes and toothpastes from sample preparation and experimental procedure to microscopic analysis and gained hands-on experience with machines, tools and materials in the precision engineering workshop.

Photo: Fraunhofer IMWS

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International technology transfer

International cooperation: technology transfer for impact

International cooperation is a key aspect for reaching the United Nations’ 17 Sustainable Development Goals. As a leading organization in applied research, networking with partner institutions around the world is a given for the Fraunhofer-Gesellschaft.

Since technology transfer is no longer limited to the national context, Fraunhofer has been cooperating not only with institutes from leading industrial nations and innovation markets but has also been specifically working on establishing partnerships in countries with middle and low-income economies (according to the World Bank definition). Because of their high economic and population growth, some of these countries count as emerging markets for the German and European economies and are therefore also gaining importance for Fraunhofer. Fraunhofer is also centrally active in international initiatives and networks to complement the Fraunhofer institutes’ project-specific activities in these markets and to strengthen technology transfer.

Since 2025, Fraunhofer has been the first research organization worldwide to be involved as a knowledge and innovation partner in the *ONE World Sustainability Awards* initiative of the United Nations Industrial Development Organization (UNIDO). The awards were presented in November 2025 during the 21st UNIDO general conference in Saudi Arabia. The goal of UNIDO is to promote economic growth, employment and environmental sustainability through industrial innovation, technology transfer and capacity building.

Fraunhofer is also a member of the World Association of Industrial and Technological Research Organizations (WAITRO), after previously heading its secretariat for several years. In 2025, in addition to the new secretariat, a new operative arm was established with WAITRO Operations e.V. in Germany, which will also be available as a consortium partner in future projects.

In May 2025, this entity organized the first Regional Strategy Workshop Europe in Cologne, where European member institutions developed a common action plan for the coming years. In 2025, the WAITRO Capacity Development Initiative was also launched, in which presenters from several Fraunhofer institutes shared their expertise on subjects including consortium formation and technology transfer with other members in online workshops.

The next WAITRO Summit is scheduled for October 2026 in Turkey.

Example projects in global future markets:

In the HyAfrica project (2022–2025), The Fraunhofer Institute for Energy Economics and Energy System Technology IEE collaborated with partners from various African universities in researching the occurrence of natural hydrogen in Morocco, Mozambique, South Africa and Togo in order to provide local power generation alternatives.

The SETI project (2023–2028), in which the Fraunhofer Institute for Systems and Innovation Research ISI is participating, supports the sustainable energy transition in Indonesia.

The Fraunhofer Innovation Platform for New Food Systems at ITAL (FIP-NFS@ITAL) in Brazil enables joint research between the Fraunhofer Institute for Process Engineering and Packaging IVV and Brazilian research institutes. The goal is to make the agrifood sector more sustainable by using new raw materials and waste materials.



HyAfrica: In a field campaign in the Nkangala district of Mpumalanga, South Africa, bachelor’s and master’s students are collecting data to analyze geological structures and generate 3D models of magnetic and gravimetric anomalies in areas of potential hydrogen sources.

Photo: Pablo Mesquita

# Responsible research

## Materiality for Fraunhofer

As one of the world’s leading organizations for applied research, the Fraunhofer-Gesellschaft has a special responsibility for the social, environmental and safety impacts of its research and technology transfer activities. Rapid technological developments such as in artificial intelligence, security research or new materials technologies as well as geopolitical and social dynamics are increasing the complexity of research processes and their impact. This entails both opportunities and risks. On the one hand, the Fraunhofer-Gesellschaft can use its research to develop technologies with large benefits to society and strengthen trust with government, industry and the public. On the other hand, there are potential risks from unintended negative impacts, potential for misuse (such as dual-use tech), ethically problematic applications or damage to reputation.

The systematic integration of scientific integrity, ethical reflection, security awareness and responsible knowledge transfer is therefore a key success factor. Good scientific practice forms the basis for integrity, quality and excellence in research at Fraunhofer.

Fraunhofer systematically incorporates a commitment to socially responsible research in the entire research and innovation process, from topic selection and project implementation to results transfer. The goal is to equally ensure scientific excellence, benefits to society and responsible risk management.

## A basis for good scientific practice and integrity

The Fraunhofer-Gesellschaft implemented the *Guidelines for Safe-guarding Good Research Practice* code published by the German Research Foundation (DFG) in 2019 through a binding internal regulation that has been in effect throughout the organization since August 2021. This governs aspects including responsibilities, procedures for ensuring scientific integrity and for dealing with sci-entific misconduct. An organization-wide ombudsperson network has been established with at least two ombudspersons per institute to provide independent advice and resolve disputes. Optional anti-plagiarism software has also been implemented throughout Fraunhofer since 2025 to support plagiarism prevention, quality assurance and the work of the ombudspersons. Fraunhofer also developed an organization-wide e-learning module in 2025 that systematically trains and sensitizes ombudspersons and employ-ees to the internal regulation and the DFG guidelines to further strengthen implementation.

## Ethical reflection and empowerment in research projects

At Fraunhofer, responsibility in research already starts with research topic selection and explicitly includes the consideration of potential unintended consequences and risks of misuse of research results. This perspective is becoming increasingly important, especially in security-related or socially sensitive research areas. The Ethics unit supports researchers with advice and guidance in research projects, such as in ethical questions, research on human subjects or assess-ing potential risks.

Fraunhofer has developed a cross-institute guideline for ethical reflection in research projects for operational support for project teams. This enables project managers and employees to discuss

ethical questions in a structured and practical manner in the team. As a supplement, the continuing education course titled *Tech-nology Ethics and Ethical Reflection in Project Management* was also developed, piloted in 2023 and included in the standardized Fraunhofer continuing education program in 2025.

## Security-related and responsible research

In 2025, Fraunhofer developed a comprehensive internal guideline, the Fraunhofer guideline for security-related projects. This is espe-cially intended for research projects in defense, critical infrastruc-ture protection (KRITIS) and cybersecurity. This provides a practical framework for planning and implementing these projects. The guideline integrates mandatory requirements such as for informa-tion security, supplementing them with specific requirements in the areas of classified information protection, foreign trade law and export controls, administrative requirements and the ethical impli-cations of security-related research. In this way, Fraunhofer ensures that security-related research is legally compliant, responsible and in keeping with societal and ethical expectations.

## Collaboration with research organizations

Fraunhofer is also actively involved in further developing respon-sible research practices on a systems level. In the guidelines for sustainability management in non-university research institutions (LeNa) joint research project and its continuation *LeNa Shape* (up to 2024), practical approaches for incorporating sustainability, ethics and impact-oriented approaches in research organizations were developed in collaboration with other research and research-related organizations.

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In LeNa Shape, for example, the Fraunhofer Institute for Systems and Innovation Research ISI contributed to the *LeNa Value* module and the Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT contributed to the *LeNa Move* module. LeNa Value addressed research quality, impact on society and the responsibility of science and impact research. In contrast, LeNa Move dealt with researching conditions for success and the development of tools and methods to simplify implementation of the LeNa reflection framework in everyday research.

The results are incorporated in the continuous further development of the Fraunhofer internal guidelines, instruments and continuing education offerings. Fraunhofer UMSICHT also developed the *LeNa Printbox* specifically for socially responsible research, which is intended to provide guidance in the implementation of socially responsible research processes. The printbox contains materials suitable for all levels of knowledge and use cases, from systematic and instructive to inspiring and open.



In *LeNa Shape*, various resources and tools were developed to support research in societal responsibility for all stakeholders in the scientific system. Playful elements and the ability to set the focus of the application based on individual prior experience motivate its use in everyday research.





# Solutions for challenges facing society

## Materiality for Fraunhofer

Through its research, the Fraunhofer-Gesellschaft contributes to sustainable development in the sense of an ecologically intact, economically successful and socially balanced world. Considering global transformation processes in areas such as climate protection, resource efficiency, the energy supply, health, security and digitalization, applied research plays a key role here.

For Fraunhofer, the SDGs form an internationally recognized guideline framework for systematically linking research activities with global sustainability goals. SDG 9 (Industry, Innovation and Infrastructure) and SDG 17 (Partnerships for the Goals) are especially closely linked to Fraunhofer's mission. Sustainable technologies and innovative industrial solutions are developed in close collaboration with partners from industry, science and the public sector. Aligning our research with the needs of society and global sustainability goals is both a reflection of the organization's self-image and a central element of its strategic activities.

## The Fraunhofer Future Foundation

The funding program of the [Fraunhofer Future Foundation](#) is oriented to the SDGs. With an annual funding volume of 5 million euros, it enables researchers from the Fraunhofer-Gesellschaft to develop products, services and business models aimed at helping to make the world more environmentally friendly, socially equitable and financially viable. Through its funding, the foundation aims to strengthen technology transfer in particular. It thus regards itself as building bridges for the "last mile," i.e., the transfer of technological solutions in practical applications. The foundation

explicitly promotes the involvement of members of civil society, such as NGOs or affected citizens. Through collaboration in pilot applications, the needs and suggestions of future users are to be incorporated in the product design process at an early stage. The aim is not just to accelerate the successful transfer of innovation to practical application but also to build trust in these collaboratively developed technologies.

The funding decision ensures that both of the foundation's objectives are equally fulfilled. These require on the one hand that projects must contribute meaningfully to the SDGs while on the other hand, they must already be at a level of technological maturity pointing to prompt practical implementation.

This is ensured by two expert committees that independently review all applications. The *Technology Transfer Potential* panel evaluates technological maturity, intellectual property rights and market conditions, while the *Societal Impact of Research* committee considers the relevance and contribution to the SDGs as well as societal impact indicators. Both committees can veto applications and remove them from the process if they do not meet the relevant requirements. This is intended to ensure that all projects in the funding program live up to the motto of *Technology Transfer for Sustainable Development*.

## Sustainable reconstruction in Ukraine

As a member of the Alliance of Science Organisations in Germany, the Fraunhofer-Gesellschaft is part of the International Coalition for Science, Research and Innovation in Ukraine. This body was established at the Ukraine Recovery Conference (URC) in Rome on July 11, 2025 by the Ministry of Education and Science of Ukraine, the

Italian Ministry of University and Research, the European Commission, UNESCO, the Polish Ministry of Science and Higher Education and the BMFTR.

The purpose of this community is to promote the international exchange of expertise, best practices and solutions for deploying science, technology and innovation in the sustainable reconstruction of Ukraine. With this in mind, various Fraunhofer institutes have been conducting a total of 14 projects in Ukraine since 2023. They are collaborating with German and local partners to implement sustainable technologies to address the war situation and support the ongoing reconstruction efforts.

These projects are funded by the [Rebuilding Ukraine—Resilient and Sustainable](#) program of the Fraunhofer Future Foundation. Topics range from detecting and removing mines and unexploded ordnance to power supply via smart grids with photovoltaic systems and hydrogen technologies and include medical technology applications to improve treatment of severe war injuries.

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Fraunhofer research examples

The contributions of Fraunhofer research to the SDGs are indicatively categorized in the quantitative analysis of scientific publications on the following page. This provides a thematic approximation but does not reflect the entire research portfolio. It is based on an analysis of the Dimensions.ai publication database (status: February 2026). The SDG classification there is based on automated text analysis and curated training data sets oriented to the official UN definitions. This is used to assign scientific publications to specific SDGs.

The analysis shows a significant increase in publications with clear SDG references for the period from 2016 to 2025 (see figure on page 24). Especially dynamic development is seen in contributions to SDG 7 (Affordable and Clean Energy), SDG 3 (Good Health and Well-being), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action). The overall trend in SDG-related publications is comparable to German and international averages. However, a distinctive aspect is that, in comparison with national and global trends, contributions related to SDG 3 (Good Health and Well-Being) have grown disproportionately by a factor of 1.5 to 2 over the review period. A more detailed review of report years 2023 through 2025 also highlights the current key research areas related to the SDGs (see figure on page 24).

Since not all research activities are published, especially industry-driven contract research for industry, this analysis only represents a portion of the research portfolio and serves primarily as an indication of research focal points. The classification is intentionally conservative and only includes publications with a clear reference to the SDGs. This ensures a robust methodology despite tending to underestimate the actual scope of Fraunhofer research's contributions to the global sustainability goals.

Selected research and project examples are presented below to illustrate these contributions. This is based on an organization-wide analysis of Fraunhofer's research activities, identifying projects with a clear reference to individual SDGs. Both ongoing and completed

projects covering a range of topics are accounted for and specifically selected for their differing sizes to reflect the breadth of the Fraunhofer-Gesellschaft's research activities.

The selection is based on an internal catalog of criteria referencing the sub-goals of the SDGs. This ensures that the examples given are evaluated following a consistent logic and that they make a verifiable contribution to the respective sustainability goals.

This presentation makes no claim to completeness but rather shows examples of key research areas. The **order** of the SDGs and the number of projects assigned per SDG provide an indicative estimate of the focal areas of the research portfolio.

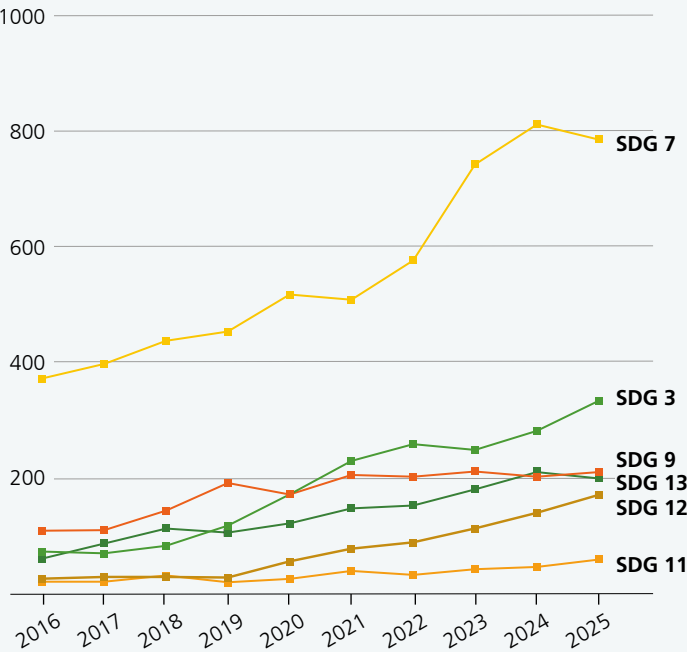


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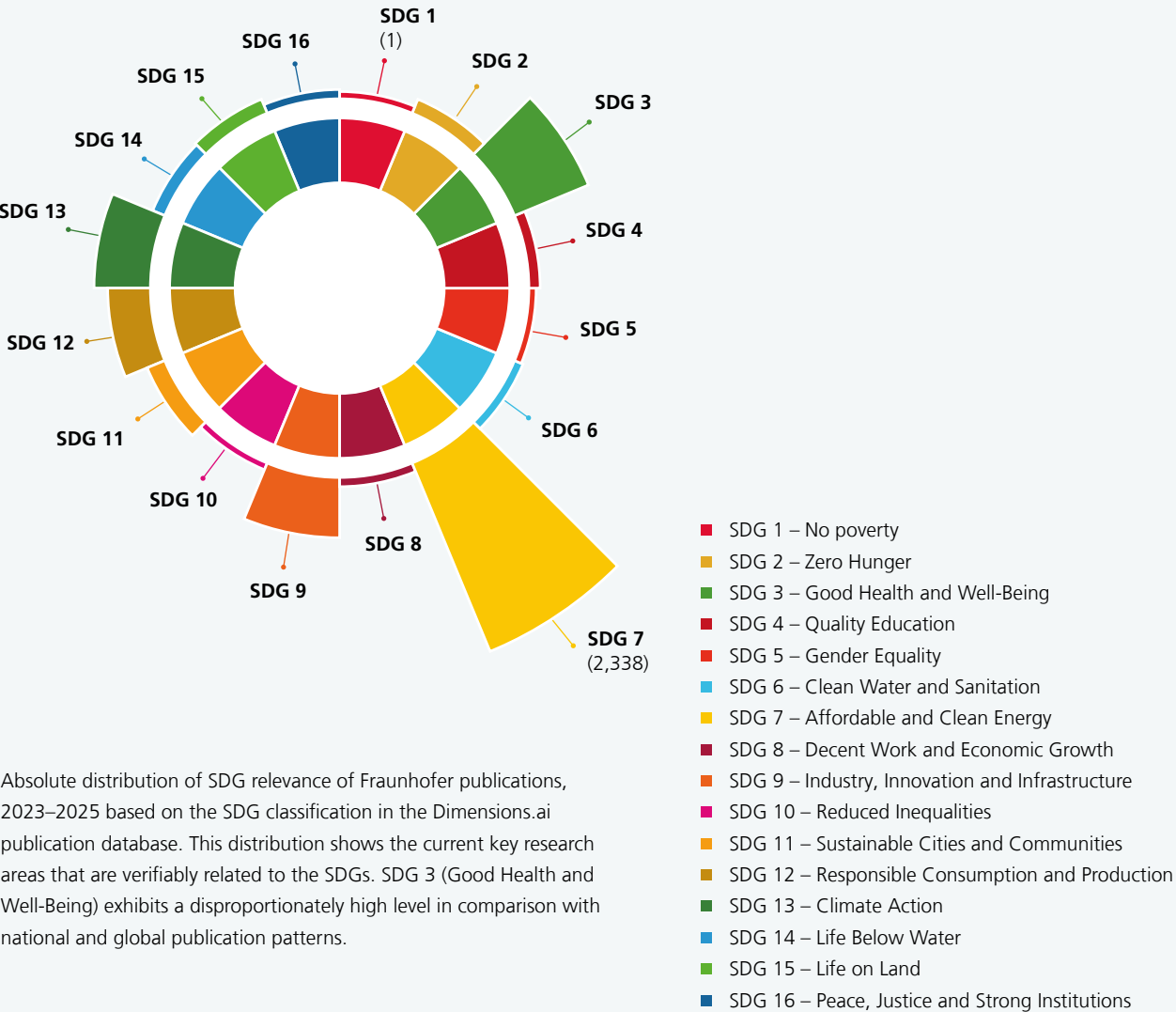


Number of publications referencing the SDGs



Number of Fraunhofer-Gesellschaft publications with a clear reference to SDGs from 2016 to 2025. This is based on the SDG classification in the Dimensions.ai publication database, which uses automated text analysis to assign publications to specific SDGs. The trend reflects publication patterns related to the SDGs in Germany and globally but with disproportionate growth especially as regards SDG 3 (Good Health and Well-Being). Publications related to other SDGs with a smaller scope than SDG 11 are not included for the sake of clarity.

Absolute distribution of SDG relevance of Fraunhofer publications, 2023-2025



Absolute distribution of SDG relevance of Fraunhofer publications, 2023–2025 based on the SDG classification in the Dimensions.ai publication database. This distribution shows the current key research areas that are verifiably related to the SDGs. SDG 3 (Good Health and Well-Being) exhibits a disproportionately high level in comparison with national and global publication patterns.



Ensure access to affordable, reliable, sustainable and modern energy for all

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Optimal management of storage cascades

The massive expansion of offshore wind energy poses growing challenges for the energy system. The large wind farms can generate electric power at enormous rates at times. This is already leading to frequent grid bottlenecks, since the power grid cannot absorb such large production rates. Forecasting errors frequently result in significant schedule deviations that necessitate complex balancing, often on short notice, using costly reserve capacity. The Fraunhofer Institute for Energy Economics and Energy System Technology IEE is working with partners on the WindStore project to develop and analyze a new forecast-based storage management concept to account for these fluctuations and errors. The purpose is to detect significant forecasting errors and extensive power generation fluctuations at an early stage, balancing these out with distributed battery storage systems and electrolyzers and quantifying the remaining uncertainty for optimal flexibility planning. The goal is to optimize offshore wind energy integration in the energy system, reducing system risks due to large fluctuations.

Cold as a sustainable resource

Cooling systems in homes and offices make the summer heat bearable. In industrial operations, they also maintain production equipment at operating temperature, protecting against overheating. However, cooling system operation accounts for nearly 15 percent of electric power consumption in Germany. Meanwhile, ample cold is available at zero cost in the winter and at night. This can be easily used to meet process cooling needs, efficiently and sustainably, even year-round given suitable storage. In the MissEllyDEMO project (Multivalent Seasonal Geothermal Cold Supply—Demonstration, Evaluation, Monitoring and Optimization), the Fraunhofer Research Institution for Energy Infrastructures and Geotechnologies IEG is working to implement a networked, adaptive cooling supply

system centered around the operation of an innovative ground-source cooling storage system that reliably absorbs the user’s regular peak loads. Developed as a demonstration plant at the project partner’s location in Bochum, this system uses conventional cooling units such as open cooling systems, compressor-based refrigeration systems and a cold water storage tank.

Salt and water-based hybrid energy storage systems

The Fraunhofer Institute for Chemical Technology ICT is participating as a partner in the EU SMHYLES project to meet one of the greatest challenges of the 21st century, the transition to renewable energy sources. The purpose of this research project is to develop innovative, sustainable and safe hybrid energy storage systems based on salt and/or water. By combining two storage technologies, these systems should offer both long storage duration and high power density. At the Pfinztal location, an existing redox flow battery is being expanded to a large-scale pilot plant and integrated with a water-based super capacitor and a wind turbine. This will demonstrate reliable energy storage over several days in actual grid operations. The Fraunhofer-Gesellschaft brings its expertise to bear in battery technology, system integration and recycling and evaluates the environmental and reliability benefits of the solutions.



Example North Sea  
wind farm  
Photo: Getty Images



Ensure healthy lives and promote well-being for all at all ages

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CAR T cells fighting solid tumors

Since 2018, the Fraunhofer Institute for Cell Therapy and Immunology IZI has been supporting the University Hospital of Würzburg in developing a new CAR T-cell therapy. Not only are blood cancers to be specifically targeted but also solid tumors such as those found in ovarian and breast cancer. This type of cellular immunotherapy ranks among the most successful treatment methods in recent years. Immune system cells known as T cells are genetically modified to recognize and specifically target tumor cells. In CAR (Chimeric Antigen Receptor) T-cell therapy, these cells are equipped with a receptor programmed for the specific surface molecules (antigens) found in tumor cells. As soon as the immune cells with this receptor bind to the tumor antigen, they are activated and destroy the cancer cells. This form of therapy offers patients the potential for a cure even when all other treatment options have been exhausted.

Surgery of the future—connected, precise and personalized

In collaboration with the Lübeck Innovation Hub for Robotic Surgery (LIROS), the Fraunhofer Research Institution for Individualized Medical Technology and Engineering IMTE is developing one of the most advanced research infrastructures for robotic, automated and AI-supported surgical procedures. This is achieved by solutions such as robot-assisted surgery with a realistic operating room, high-end equipment and anatomical models individualized for the specific patient. The goal is to make surgical procedures more precise, safer and more efficient through connected systems, AI-based assistance and collaborative robots. Areas the research focuses on include gesture and voice control with smart glasses, process optimization in the OR, human/robot collaboration, automated analysis of training videos and user-friendly, vendor-neutral equipment interfaces. LIROS is thus contributing to high-quality care and to systematic training and continuing education in robotic surgery in both clinical and research settings.

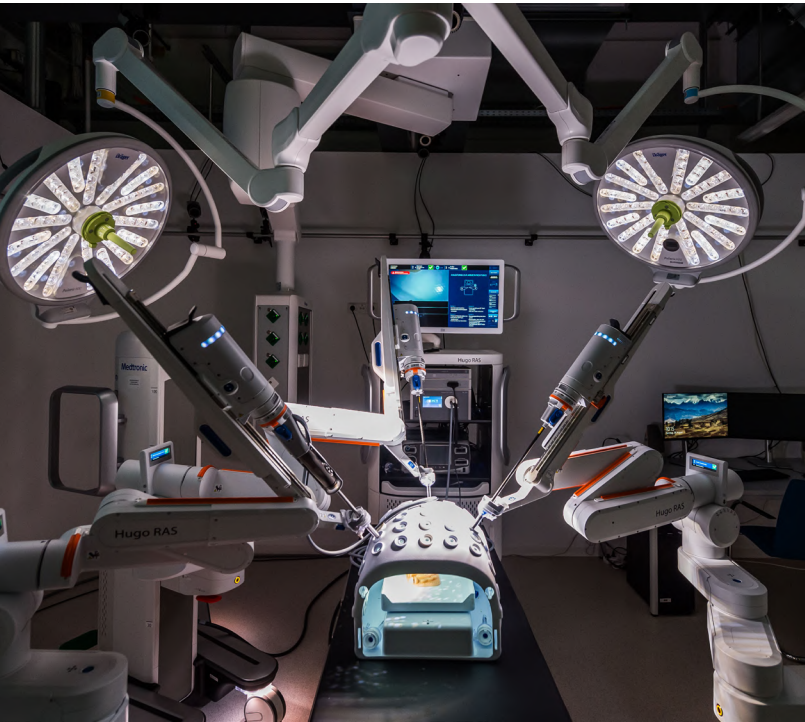
Brain stimulation with 3D ultrasound

The electrical activity of some 86 billion neurons is what gives the brain the ability to process sensory input, store information, make decisions and control bodily functions. As a consequence, conditions such as epilepsy, Parkinson’s disease, depression, addictions or the effects of strokes also depend on signal processing and the interaction of nerve cells. Fraunhofer researchers have developed a technology that uses ultrasound signals for targeted stimulation of certain areas of the brain. A special ultrasound system with 256 individually controllable transducers makes it possible to target and stimulate individual points deep inside the brain with sound signals. The innovative 3D sound technology developed by the Fraunhofer Institute for Biomedical Engineering IBMT could be used to treat these conditions in the future.



The 3D matrix ultrasound transducer for transcranial neurostimulation can stimulate specific points deep inside the brain with precision targeting.

Photo: Fraunhofer IBMT/  
Bernd Müller



Realistic surgical scenarios are being developed at LIROS for researching robot-assisted procedures.

Photo: Fraunhofer IMTE/Olaf Malzahn



Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

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A circular economy for additive plastic manufacturing

There is a growing need for a sustainable circular economy in the industrial production of plastic components. In the AKROPOLYS joint research project funded by the Hamburgische Investitions- und Förderbank (IFB), the Fraunhofer Research Institution for Additive Manufacturing Technologies IAPT is supporting the development of a circular economy that conserves resources for additively manufactured plastic components made of polyamide 12. Instead of disposing of unused powder residue from 3D printing, it is reprocessed into new raw materials and reused in production, conserving raw materials and reducing waste. The institute is investigating the comparability and quality of the parts produced in this way, while also developing a digital product passport that transparently documents the material origin, process steps and CO<sub>2</sub> footprint.

Certified AI

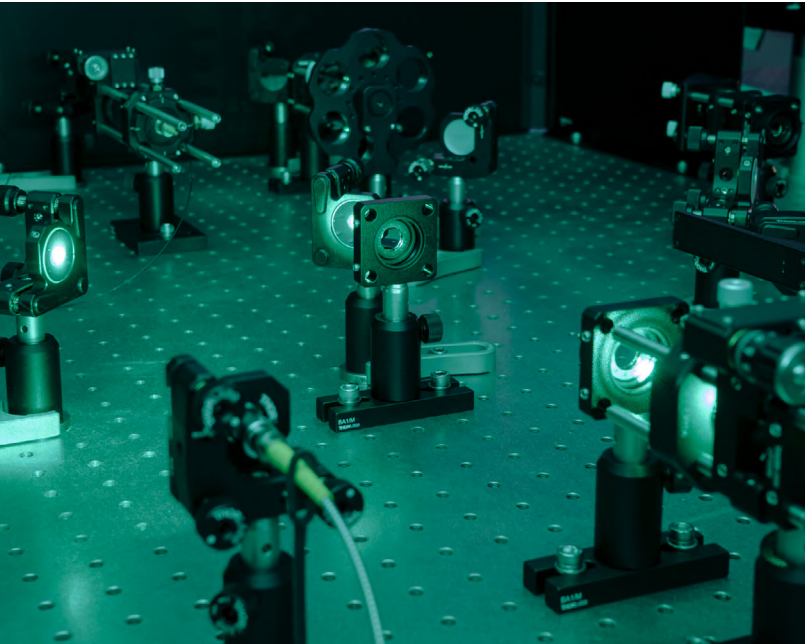
Artificial intelligence offers great potential for new applications and business models while also simplifying everyday life. The requirements for responsible use of these technologies are also increasing. AI systems process sensitive data and are increasingly making independent decisions that must be transparent, secure and consistent with European values. In collaboration with the German Federal Office for Information Security (BSI) and other partners, the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS is developing methods for testing and certifying AI systems. The goal is to ensure technical reliability, transparency and responsible handling of this technology. The Certified AI project establishes the basis for this and provides for systematic evaluation of the quality and trustworthiness of AI.

Quantum computer based on spin qubits in diamond

Quantum computers have the potential to solve computational problems that traditional computers can only handle with heavy simplification, through approximations or with extremely long computation times. Processing power depends on the central hardware component, the qubit. The SPINNING joint research project coordinated by the Fraunhofer Institute for Applied Solid State Physics IAF has developed and successfully demonstrated a compact, scalable quantum processor based on spin qubits in diamond. This compact processor, which can be integrated in hybrid computer architectures, operates at near-room temperature and requires significantly less cooling than established superconducting systems. This technology thus offers a robust, energy-efficient alternative to existing quantum computing platforms. In this project, universities, research institutions and industry partners worked on both the hardware and the necessary interfaces for traditional computer systems.



Masking plug printed from recycled PA12 from Lufthansa Technik tooling  
Photo: Lufthansa Technik



Optical laboratory setup in SPINNING project to demonstrate spin-photon-based quantum computing  
Photo: Fraunhofer IAF



Take urgent action to combat climate change and its impacts

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Putting CO<sub>2</sub> emissions from the cement industry to use

The cement industry ranks among the world's largest greenhouse gas emitters. Cement clinker production releases nearly one ton of CO<sub>2</sub> per ton of product. The CO<sub>2</sub>-Syn project is therefore investigating how these unavoidable process gases can be used as a raw material for the chemical industry. The focus of the project is an integrated power-to-chemicals approach where renewable electricity is used in electrolysis to convert CO<sub>2</sub> and H<sub>2</sub>O into synthesis gases. These can in turn be used in thermocatalytic processes to produce basic chemicals such as higher alcohols and olefins. The Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT plays a key role in this project in evaluating and further developing the process chain. The institute is testing innovative catalysts under realistic conditions, investigating how they can be integrated in a cement plant. The focus is on investigating the effects of contaminant from the cement plant process gas on the processes.

Simulations for climate-resilient buildings

Extreme weather events such as heavy rain, flooding and storms are causing increasing damage to buildings and infrastructure. In the ResCentric project, the Fraunhofer Institute for High-Speed Dynamics, Ernst-Mach-Institut, EMI is therefore developing the Climate resilience building calculator, a simulation program that can be used to systematically evaluate climate risks for buildings. The project focus includes administrative and office buildings, industrial buildings and single-family homes. The program calculates the anticipated damage, downtime and costs for various weather scenarios. Property owners, housing companies, insurance providers and municipalities can use this information to make targeted decisions about which structural preventive measures are worth the expense, such as protecting doors, windows, light wells

or underground garage entrances. Fraunhofer EMI identifies typical vulnerabilities, assesses the effectiveness of possible protective measures and provides decision tools for estimating the point when it pays to make investments in climate-resilient buildings.

Offshore production of clean hydrogen

The Offshore Clean Hydrogen Production for Multi-Use Purposes (Ocean-H2) project is investigating how to use renewable offshore energy to generate green hydrogen on a large scale directly at sea and to integrate it in European energy systems. In case studies in the Mediterranean, the North Sea and the Baltic Sea, technical concepts for offshore microgrids and hydrogen production are being developed and evaluated for performance, scalability and grid integration. The Fraunhofer Institute for Silicon Technology ISIT is contributing its expertise in DC power systems, control concepts and power electronic converters. The focus is on robust and efficient electrical energy systems for offshore applications that facilitate low-loss connection of renewable energy sources with electrolyzers. Efficiency and cost scenarios for various system architectures are analyzed based on the results. The goal of the project is to contribute to the decarbonization of energy-intensive sectors and to develop new options for a climate-friendly and reliable energy supply.

Innovative catalysts are tested under realistic conditions in a cement factory in the CO<sub>2</sub>-Syn project

Photo: Getty Images



Conceptual image for  
OCEAN-H2 project  
Image: AI-generated illustration  
created by Fraunhofer ISIT



Ensure sustainable consumption and production patterns

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Recycling lithium-ion batteries

The rising demand for batteries for applications such as battery electric vehicles results in a demand for raw materials such as lithium, cobalt and nickel. However, recovering these raw materials has a negative impact on the environment. Furthermore, only about one percent of the required lithium is produced in Europe, resulting in a heavy reliance on imports. A consortium is working on practical concepts for recovering lithium from batteries in the [MoLiBity](#) project. The Fraunhofer Institute for Ceramic Technologies and Systems IKTS is contributing to validation of the recycling process. The expertise of the project partners spans the fields of chemistry, materials science, process optimization, life cycle assessment and waste recycling.

Fungal mycelium as the basis for sustainable materials

[Fungal mycelium](#), the finely intermeshed root network of fungi, serves as a suitable renewable source of biodegradable, petroleum-free materials. At the Fraunhofer Institute for Applied Polymer Research IAP, mycelium from edible and tree fungi is combined with regional agricultural and forestry waste materials such as straw, wood chips or hemp fibers. This produces purely organic composite materials that grow under conditions requiring comparatively little energy, with geometry and properties that can be specifically adjusted. Depending on the formulation and process parameters, the material can be used to produce leather-like sheet materials, dimensionally stable insulation and packaging elements, soft textile padding or furniture. The mycelium-based materials are thermally insulating, moisture-regulating and potentially recyclable, thus opening up new possible applications in construction, packaging or as a cruelty-free complement to leather products.

From packaging waste to 3D-printed component

To put the growing volume of plastic waste to better use, the Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM is collaborating with Hochschule Bremen—City University of Applied Sciences (HSB) in processing post-consumer plastics from the yellow recycling bag for [3D printing](#) applications. The starting point is sorted polypropylene packaging waste that cleaning and processing convert to a high-purity recyclate. This recyclate becomes a usable material for additive manufacturing. The material is used to produce plastic strands that can be implemented directly as filament in 3D printing to make strong, durable components. The first components have already been successfully printed. The plan for the future is to further upgrade the recyclates, such as by combining them with glass fibers for use in more demanding applications.



Flexible mycelium materials in different thicknesses can be used as upholstery material, insulation board or alternatives to leather.  
Photo: Fraunhofer IAP / Jadwiga Galties



Prepared material for additive manufacturing: Post-consumer waste is processed into filaments for 3D printing.  
Photo: Fraunhofer IFAM



Make cities and human settlements inclusive, safe, resilient and sustainable

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Situational overview during the acute phase of disasters

Catastrophic flooding in Germany's Ahr Valley (July 2021) highlighted just how important it is to have a shared, up-to-date situational overview during the first hours and days following an incident. In the lokik (Lokales initiales Krisenmanagement, local initial crisis management) project, the Fraunhofer Institute for Communication, Information Processing and Ergonomics FKIE is collaborating with affected municipalities and safety and emergency response organizations to develop a tool that meets this specific need, enabling local emergency services to quickly gather and coordinate information on damage, needs for assistance and available resources during the acute phase of a crisis. The tool is based around an easy-to-use digital situation map that can be used by the crisis management team, emergency responders and the general public through ordinary devices. This brings together reports on hazardous situations, offers of help or requests for assistance and supports the prioritization of measures. The tool is supplemented by a robust communication solution that can be established locally and ensures that the system remains operational even if regular networks fail.

Comprehensive circular building renovation

A large fraction of all CO<sub>2</sub> emissions stem from the construction sector, especially from the operation of unrefurbished buildings. Fraunhofer flagship project BAU-DNS combines the expertise of seven Fraunhofer institutes under the leadership of the Fraunhofer Institute for Building Physics IBP to make building refurbishment faster, more efficient and less resource-intensive. The focus is on increasing productivity while maintaining stable costs, significantly reducing gray energy and using locally sourced and recycled materials. This is accomplished by setting up end-to-end digital process chains, from the automated building survey and digitalized

information model to the planning, manufacture and installation of prefabricated facade modules. This serial, modular approach to renovation facilitates industrial production, includes craftsmen and accounts for demolition and recycling right from the start. In future projects, it should be possible to directly access innovative materials and systems solutions from industry.

Creating people-centric, sustainable neighborhoods

The WeGenerate project is intended to incorporate the paradigm shift of building for the people to building with the people in European urban regeneration processes. In four very different neighborhoods in Italy, Portugal, Romania and Finland, solutions for social participation, climate protection, the energy transition and livable public spaces are being developed in collaboration with citizens, municipalities and local businesses. The solutions range from an energy community in a social neighborhood to social inclusion and a walkable, digitally supported city center. The project is coordinated by the Climate-Neutral Cities and Districts group of the Fraunhofer Institute for Solar Energy Systems ISE. The group manages the implementation of innovative solutions for the project and leads the WeGenerate Innovation Hub, which aggregates expertise in integrated planning and digital tools, social innovation and participatory actions and energy in the built environment as well as sustainable transportation. The result is transferable approaches for climate-resilient, socially equitable, attractive neighborhoods in Europe.



Where is what type of help most urgently needed? Coordinating emergency responders and helpers is especially important in the acute phase of a crisis. Photo: Fraunhofer FKIE



End hunger, achieve food security and improved nutrition and promote sustainable agriculture

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Solar-based heat and cooling generation

The INNOECOFOOD project funded by the EU promotes food security in rural areas in Africa by combining local aquaculture and insect production with renewable energy and modern processing methods. In ECOHUBS, fish, spirulina and insects are farmed, processed and marketed with low resource use to enable local value creation and to reduce transport distances and cooling requirements. The Fraunhofer Institute for Solar Energy Systems ISE is responsible for the planning and design of energy supply systems at the ECOHUBS sites in Kenya and Ghana. This includes solar-powered systems to generate heat for drying as well as cooling for preservation and transport. The project employs innovative air to water heat pumps using propane as a natural refrigerant, solar thermal plants and flake ice machines for direct solar operation without additional inverters or battery storage. The result is a primarily solar-based, energy-efficient cooling and drying infrastructure for locally produced food.

Global collaboration for climate-resilient cowpea

Cowpea is a central source of protein for more than 200 million people in sub-Saharan Africa and plays a key role in regional food security. At the same time, rising temperatures and increasing extreme weather events pose a threat to yield stability. In the Sustainable Cowpea Grain Yield by Boosting Photosynthetic Efficiency (SCOPE) international research project, Fraunhofer is collaborating with partners in Ghana and Nigeria to develop scientific approaches to increase cowpea resistance to heat stress and improve yield in harsh climates. Led by the Fraunhofer Institute for Molecular Biology and Applied Ecology IME, the project is targeting the optimization of biological and metabolic processes in the plants to more efficiently convert solar energy into growth and yield. The goal is to develop a more productive, climate-resilient cowpea that can better serve smallholder farmers in hot and dry regions in particular and that contributes to more robust and sustainable food systems.



Cowpea in the Fraunhofer IME greenhouse Photo: Fraunhofer IME



Protect, restore and promote sustainable use of terrestrial ecosystems and halt biodiversity loss

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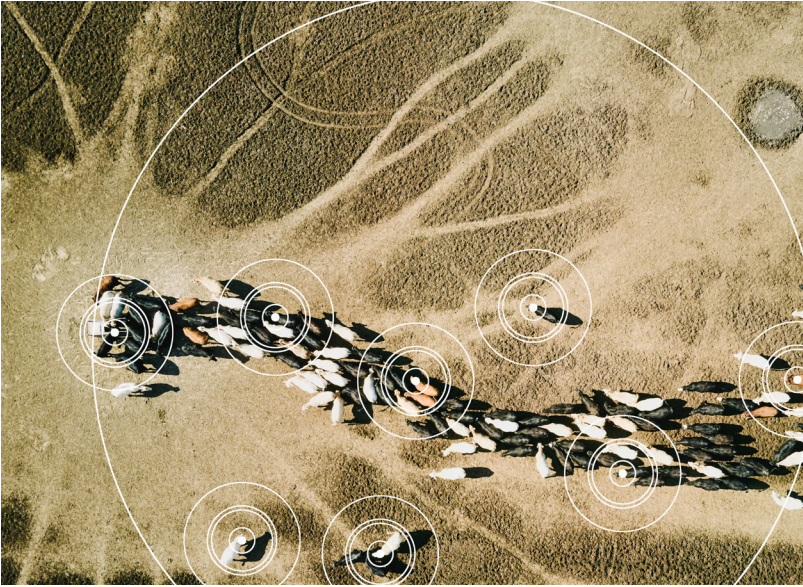


Protecting biodiversity with artificial intelligence

Drastic declines in biodiversity and climate change are increasingly destabilizing our ecosystems with unforeseeable consequences for humans and animals. To counter these developments and protect biodiversity, the Fraunhofer Institute for Integrated Circuits IIS has joined forces with the Leibniz Institute for Zoo and Wildlife Research (IZW) in the GAIA Initiative. They are jointly developing an early warning system to monitor wild animals and their living spaces. The initiative is centered around smart, lightweight tags equipped with cameras, sensors and integrated AI. Sensor-based AI algorithms analyze the data directly in the transmitter, reducing the amount of data to essential information. A satellite-based communication system ensures energy-efficient, real-time transmission of the information, even from remote areas. In the SyNaKI subproject (*Synergie natürlicher und Künstlicher Intelligenz im Schwarm*, synergy of natural and artificial intelligence in the swarm), a virtual swarm intelligence concept was developed that uses multiple animal transmitters working together in the swarm to enable more complex data analysis.

Digital monitoring for peatland protection

Peatlands only cover a small fraction of the Earth's surface, but they store roughly twice as much carbon as all its forests combined. Draining them releases vast quantities of CO<sub>2</sub>, exacerbating climate change. In the Valuation of Peatland Ecosystem Services (VALPEATS), the Fraunhofer Institute for Computer Graphics Research IGD is collaborating with the University of Greifswald and the Greifswald Mire Centre to develop a digital monitoring platform to record, analyze and monitor peatland condition over the long term. Sensors continuously monitor water levels and climate data, while drones equipped with multispectral cameras capture images of the vegetation. Artificial intelligence synthesizes this information in a detailed picture of the peatland. Fraunhofer IGD is coordinating the development of the data platform, developing apps for the fieldwork and deploying AI-based methods for vegetation classification and hydrological modeling. The platform helps planning offices prepare peatland rewetting measures, can be used as a basis for CO<sub>2</sub> credits and develops further opportunities for establishing paludiculture through smart agriculture (precision farming).



Peatlands are a highly efficient carbon dioxide storage system.  
Photos: Getty Images

Deploying state-of-the-art camera tags with sensor-based artificial intelligence and satellite-based IoT communication enables precise analysis and comprehensive documentation of wild animal behavior.



Conserve and sustainably use the oceans, seas and marine resources for sustainable development

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Sustainable solutions for fishing gear

Fishing gear is a major source of marine litter and microplastics worldwide. Lost nets, lines and fishing gear as well as abrasion of plastic components place a significant impact on marine ecosystems. The SEARCULAR EU project is developing solutions to reduce the input of plastics from the fishing industry in the oceans and to introduce circular economy practices across the entire value chain. Project focal points include recycled materials for bottom trawling nets, biodegradable demersal seine ropes and drifting fish aggregating devices as well as sustainable end-of-life management for fishing gear. The Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT is contributing to this project with life cycle assessments to compare the environmental impact of biodegradable solutions with conventional fishing gear. They employ an innovative approach developed at the institute that systematically accounts for plastic emissions in the environmental assessment.

Combating ocean litter with autonomous robots

More than 90 percent of the approximately 25 million tons of plastic waste in the oceans lies on the ocean floor. The European SeaClear2.0 project is developing a robotic solution that autonomously detects, classifies and collects ocean litter both on the surface and in deeper areas. The system combines autonomous aerial, surface and underwater vehicles and AI-powered sensors and grapple technology to recover waste from areas that are difficult to access. The Fraunhofer Center for Maritime Logistics and Services CML is responsible for technical coordination and system integration and is developing the SeaDragon autonomous underwater vehicle. This serves as a platform for sensors and for the collected underwater waste and docks autonomously with the SeaCat 2, another robotic vessel. There it unloads the collected waste for safe transport to shore while further collection of ocean waste continues uninterrupted.



Detecting, identifying and collecting ocean waste with autonomous robots  
Photo: Fraunhofer CML

SEARCULAR's primary goal: Reducing ocean waste and microplastics from the European fishing industry  
Photo: Stephan Kabasci

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Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Fraunhofer brings AI to schools

Fraunhofer brings artificial intelligence to schools. AI4Schools is an educational initiative of the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS and the Lamarr Institute for Machine Learning and Artificial Intelligence. The goal of the initiative is to provide a basic understanding of artificial intelligence, strengthen technological competence and foster a reflective and responsible approach to AI. AI4Schools brings together schools, ministries of education, companies, organizations and stakeholders in digital education to prepare the next generation for a world that is increasingly centered around technology.

Education via digital radio: RadioSchooling

The RadioSchooling project provides accessible education to children in secluded and infrastructure-weak areas of the world. Even without internet access, pupils can participate in classes and benefit from affordable and widely available educational content. Modern digital radio standards such as Digital Radio Mondiale (DRM) transmit not only high-quality audio but also text, images and interactive educational materials. The radio can thus be a teacher, library and textbook, all in one. Pupils can both follow live lessons and also call up content for self-study afterwards. Developed using technology from the Fraunhofer Institute for Integrated Circuits IIS, RadioSchooling shows how education can be promoted as the key to sustainable development and access to knowledge can be improved worldwide.



Build transparent, accountable and effective institutions through research and technology

AI-supported resilience of critical maritime infrastructure

Critical maritime infrastructure such as ports, offshore facilities and underwater cables and pipelines are subject to increasing threats ranging from the manipulation of navigation signals to combined physical and digital attacks. Stationary surveillance systems are limited in effectiveness in such situations, especially in temporary or remote locations. The KIRMES project is developing a mobile multisensor platform to help operators and security agencies detect, analyze and respond to threats at an early stage. The system relies on a flexible, modular sensor network based on three Cells on Wheels (CoW) and a research vessel equipped with radar, radio direction finding, AIS/ADS-B receivers and systems for detecting satellite signal interference. An artificial intelligence system analyzes this data in real time and detects anomalies that would be inconspicuous when viewed in isolation. The Fraunhofer Center for Maritime Logistics and Services CML integrates and further develops proven tools for this purpose. The results are presented in intuitive overviews tailored to individual customer requirements with the clarity they need to make rapid and informed decisions.



AI4Schools: In cooperation with NetCologne, Fraunhofer IAIS is offering free practical workshops for secondary schools in Cologne in the 2025/26 school year.  
Photo: Constantin Ehrchen / Netcologne

KIRMES deploys a mobile infrastructure for data collection with a sensor network comprising three Cells on Wheels and a research vessel. Photo: Fraunhofer CML

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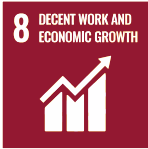
Ensure availability and sustainable management of water and sanitation for all

Water treatment with industrial processes in foam

What if industrial wastewater could be effectively cleaned in the process? The Fraunhofer Institute for Ceramic Technologies and Systems IKTS is developing a compact and energy-efficient system for photocatalytic treatment of process water and wastewater. The heart of the solution comprises specially coated foam ceramics that generate highly reactive radicals when exposed to UV light. This enables them to target and effectively break down even difficult pollutants such as pesticides, pharmaceutical residues or industrial chemicals. The objective is to remove pollutants directly at the source, forgoing the need for processing in treatment facilities. This technology thus contributes to the protection of water resources and promotes more sustainable industrial processes.

AI for clean drinking water: IQ-Water

Surface waters play an important role in the drinking water supply in Germany but are under increasing pressure due to climate change and environmental pollution. The IQ-Water project combines molecular biology methods with artificial intelligence to monitor and reliably forecast biodiversity and water quality in drinking water reservoirs. The Fraunhofer Institute for Optronics, System Technologies and Image Exploitation IOSB is developing AI-based analysis and early-warning systems for detecting changes such as the presence of toxin-producing algae or pathogens at an early stage. IQ-Water thus helps to sustainably protect water resources and ensure drinking water quality over the long term.



Promoting decent work and economic prosperity through innovation and skills development

Global Upskill—transformation through lifelong learning

The Global Upskill initiative addresses a key challenge in the working world: How can employees continuously develop new skills to keep up with changes in technology, the environment and society? In the context of a shortage of skilled workers, digitalization and sustainability issues, the project aims to rethink continuing vocational education and training and achieve further practical developments. The project focuses on: building learning cultures within organizations that promote innovation, systematically developing sustainability skills via the Green Skills Compass, AI-powered analysis of skills development with the EcoTalentNavigator (EcoNa) and the Learning Toolbox for innovative teaching and learning models that integrate AR, VR and AI technologies in new professional development strategies. The goal is to more closely align learning to individual requirements and to establish new flexible offerings for lifelong learning. As a part of these efforts, the Fraunhofer Institute for Industrial Engineering IAO and the appose company are collaborating in Global Upskill to identify and highlight future skill requirements at an early stage. This is done by systematically analyzing and evaluating technological and social trends with machine learning algorithms. The results not only reveal which skills will be needed in the future but also where workforces harbor untapped potential. This results in skills pathways that help companies in the targeted planning of continuing education and to strategically prepare their workforces for changes in the working world.



Ceramic stack system with multifunctional ceramic foam and LED array for efficient photocatalytic treatment of industrial process water and wastewater. Photo: Fraunhofer IKTS

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Achieve gender equality and empower all women and girls

AI-powered support for women during menopause

The PETRA project is developing an AI-powered app to support women during perimenopause. This is the transition phase before the last menstruation (menopause) until a year later, during which hormonal changes can trigger symptoms that can be severe, such as sleep disturbances, hot flashes or difficulty concentrating. The goal is to improve women's health literacy and to support affected women by providing personalized information and recommendations to help improve their symptoms. In addition to the Fraunhofer Institute for Experimental Software Engineering IESE as consortium leader, four partners are participating in the project: the digital health startup FEMNA, the junior professorship for health and e-health at Ruhr University Bochum, the social research center of the Faculty of Social Sciences at Dortmund Technical University and the Berlin Institute of Health at Charité. The project for gender-equitable medicine is being funded by the German Federal Ministry of Research, Technology and Space (BMFTR) with approximately two million euros over a project period of three years. PETRA helps close a gap in care and provides an improvement in the quality of life of women in the long term.



Reduce inequality within and among countries

Equitable, affordable and sustainable housing

The European HouseInc research project investigates housing inequalities and explores how to foster affordable and sustainable housing options for all. The project focuses on marginalized and vulnerable groups that are particularly affected by housing inequality, especially those in and from Eastern Europe, with diversity aspects such as gender playing a critical role. HouseInc is investigating the economic, social and ecological drivers of housing inequality and their interaction with energy and transportation poverty, health, employment opportunities and access to infrastructure. Based on this, the interdisciplinary project team will develop policy recommendations for local, regional and national policymakers. The goal is to foster the adoption of effective and innovative measures to address current housing inequality in Europe and to help promote an equitable and sustainable transformation of the housing sector.



Developing policy recommendations to foster the adoption of measures to address the current housing inequality in Europe  
Photo: Getty Images

The PETRA project is developing an AI-powered app to provide personalized information to affected women, helping to improve their symptoms.  
Photo: Getty Images

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End poverty in all its forms everywhere

Sustainable use of agrivoltaics

The INSPIRED—APV project combines agricultural production and solar power generation on the same land. Agrivoltaics (APV) can help stabilize crop yields even under extreme weather conditions, reduce water loss and provide a local source of renewable energy. The use of electricity from APV systems is especially important for smallholder farmers. This enables farmers to reduce post-harvest losses through cold storage, operate water pumps, irrigate fields and secure additional sources of income through solar-as-a-service programs. The project is being implemented by the Fraunhofer Institute for Solar Energy Systems ISE in Namibia, in collaboration with local smallholder farmers, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Namibia and the Namibian Ministry of Agriculture, Water and Land Reform (MAWLR). Training sessions, workshops and demonstration systems help establish local technical expertise and establish the basis for long-term use of the systems. The customer and grant authority is GIZ, commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The project is supported within the framework of the Fund for the Promotion of Innovation in Agriculture and Food (i4Ag) in partnership with GIZ Namibia’s Farming for Resilience (F4R) and APV programs. The result is a scalable approach that has been proven in practice to strengthen ecological resilience, develop economic opportunities and provide sustainable support for social development.



Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

As a natural consequence of its institutional identity, the Fraunhofer-Gesellschaft contributes significantly to SDG 17 by establishing connections between science, industry, government and society. Fraunhofer’s funding model enables the establishment of stable, long-term partnerships using competitively obtained industry and government funding and the direct funding of applied research projects. SDG 17 acts as an interdisciplinary goal that makes implementation of the other Sustainable Development Goals at all possible. And this is right where Fraunhofer comes in. Global collaboration, participation in German national and European research programs, strategic alliances with companies and internal research groups nurture networks where knowledge can be shared, technologies developed and sustainable solutions scaled up. The Fraunhofer-Gesellschaft thus fosters precisely those international research and innovation partnerships called for in SDG 17. Fraunhofer therefore not only contributes to the individual SDGs but also establishes a key prerequisite for their implementation: through technology transfer, strong partnerships and institutional reliability.



INSPIRED—APV combines agricultural production and solar power generation on the same land

Photo: Fraunhofer ISE



# Environmental responsibility



**Our commitment to sustainability**

We target resource-efficient, resilient research that combines scientific excellence with environmental responsibility. Our goal is to establish sustainable solutions both through our research and through our activities as an organization.

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# Adaptation to climate change

## Materiality for Fraunhofer

Through its infrastructure, research activities and responsibility to society, the Fraunhofer-Gesellschaft is directly confronted by the effects of climate change. Extreme weather events can compromise the availability of buildings and IT infrastructure, especially in areas that are at risk for flooding and necessitate climate-resilient building and refurbishing measures as well as a resilient energy supply. As part of our research activities, we develop innovative solutions for climate adaptation, including strategies for conserving or using electric energy and heat, as well as approaches to improving the climate resilience of businesses, municipalities and institutions. Our solutions address critical infrastructure, planning reliability and risk mitigation and apply to different sectors and regions around the world.

The organization-wide risk and materiality analysis identified and evaluated climate impacts for all Fraunhofer locations. Significant risks were systematically classified as **climate-related physical risks** or **climate-related transition risks**:

### Physical risks:

- increasing heat (heat stress and heat waves)
- heavy rain and flooding
- storm events
- land subsidence
- water stress

### Transition risks:

- more stringent regulatory requirements (such as energy efficiency standards)
- rising CO<sub>2</sub> costs

Depending on the building location and properties, these risks can result in compromised usability of infrastructure, limitations in operating capacity, temporary site outages or increased maintenance and adaptation needs. Acute extreme events have an especially large short-term impact, while chronic changes such as increasing heat waves or shifting precipitation patterns become relevant in the medium and long term. Transition risks result especially from regulatory changes and increasing demands from funding agencies and customers in terms of climate protection and resilience. This can result in the need to make adjustments to processes, investments and strategic orientation.

In order to evaluate the degree of exposure and sensitivity of assets and business operations, adjustment measures are currently being specifically identified and strategically integrated to strengthen organizational resilience. No systematic climate-specific scenario analysis is currently being conducted. However, its introduction is under consideration as part of the continuing development of climate risk management. An initial analysis of climate resilience shows that the organization's strategy and business model are currently only partially resilient to climate-related risks. Structural and organizational weaknesses were identified in individual areas. This results in a need for adjustments in the medium term as regards site development, strategic orientation and relevant management and support processes.

A formalized adjustment or transition plan has yet to be established. This will be implemented in stages through analyses and pilot projects. Pilot institutes are identifying climate-related hazards and are performing building analyses to assess the resilience of the building infrastructure. Suitable risk mitigation and adaptation measures will be derived from this and integrated in key management processes and transformation concepts in the long term. This analysis is currently subject to uncertainties, especially since not all locations have been fully accounted for and because of uncertainties with regard to future climate trends. Overall, it can be anticipated that the organization is potentially capable of adapting its strategy and business model to climate change. Organizational resilience will therefore be developed in stages. The Fraunhofer Climate Strategy, which is explained in more detail in the following section, establishes the overall framework for climate protection and climate adaptation.



Fraunhofer INT was also directly affected by the catastrophic flooding in the Ahr Valley in 2021.  
Photo: Fraunhofer INT

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# Climate protection and energy

### Materiality for Fraunhofer

The Fraunhofer-Gesellschaft is especially heavily involved in climate protection as a result of its research and social responsibility. With its development of innovative technologies in the areas of renewable energy, energy efficiency and CO<sub>2</sub> reduction, Fraunhofer contributes significantly to the transformation to a climate-neutral economy. At the same time, operation of the research infrastructure does generate greenhouse gas emissions, especially through energy-intensive processes, the use of greenhouse gases and procurements. This results in both environmental impact and regulatory and economic risks, such as due to rising CO<sub>2</sub> costs and increasing requirements from customers and funding agencies.

Energy consumption is a major source of the Fraunhofer-Gesellschaft's emissions and also constitutes a significant cost and management factor. Risks arise especially from price volatility, supply security and increasing regulatory requirements. At the same time, investments in energy efficiency and renewable energy provide an opportunity to reduce emissions and costs, strengthen the resilience of research operations and ensure competitiveness as an innovation partner.

The Fraunhofer-Gesellschaft's environmental responsibility centers first and foremost on climate-friendly research processes and sustainable infrastructure design. In its climate strategy, adopted in 2020, the Fraunhofer-Gesellschaft pledged to significantly reduce its absolute greenhouse gas (GHG) emissions.

Using 2019 as the baseline year, the emissions<sup>1</sup> reported in accordance with the Greenhouse Gas (GHG) Protocol are to be reduced

by at least 55 percent by 2030. Furthermore, Fraunhofer aims to achieve net zero greenhouse gas emissions in its scientific operations by no later than 2045.

To achieve these goals, measures have been systematically implemented and managed in all three scopes and along six key action areas since late 2020:

- Buildings and infrastructure
- Energy
- Transportation
- Material flows
- Communication and participation
- Organization and strategy

### Greenhouse gas emissions by scope

| Emissions category                       | Unit                                                                               | 2023 | 2024 | 2025 <sup>2</sup> | Method / scope of application                                                                                                                                                                                                               |
|------------------------------------------|------------------------------------------------------------------------------------|------|------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Scope 1                                  | thousands of metric tons of CO <sub>2</sub> e                                      | 39   | 39   | 39                | Direct emissions (e.g., natural gas, fuel oil, vehicle fleet)                                                                                                                                                                               |
| Scope 2 (market-based)                   | thousands of metric tons of CO <sub>2</sub> e                                      | 25   | 26   | 28                | Electric energy procurement using certificates of origin (framework agreement), remaining electric energy quantities via third parties / landlords with residual mix and (district) heating/cooling with supplier-specific emission factor. |
| Scope 2 (location-based)                 | thousands of metric tons of CO <sub>2</sub> e                                      | 113  | 107  | 107               | Average emission factor of the electricity mix                                                                                                                                                                                              |
| Scope 3 (overall)                        | thousands of metric tons of CO <sub>2</sub> e                                      | 63   | 67   | 67                | Main categories: 3.2 (building construction only), 3.3, 3.5, 3.6, 3.7                                                                                                                                                                       |
| Total emissions Scope 1–3 (market-based) | thousands of metric tons of CO <sub>2</sub> e                                      | 127  | 132  | 134               | Consolidated GHG balance in accordance with GHG Protocol                                                                                                                                                                                    |
| Emission intensity                       | thousands of metric tons of CO <sub>2</sub> e / million euros of contract research | 42.5 | 42.1 | 42.5              | Contract research comprises Fraunhofer's core activity.                                                                                                                                                                                     |

Operational implementation is decentralized at the institutes, while the central Climate Management department is responsible for strategic management, monitoring and further development of the portfolio of measures. Officers for climate neutrality and sustainability (BfKN) have been appointed at the institutes for this purpose. A central climate fund with an annual budget of approximately 2.5 million euros is available to initiate and scale up climate protection measures.

### Greenhouse gas emissions and management

The GHG inventory balance of the Fraunhofer-Gesellschaft comprises emissions from Scope 1, Scope 2 and (to the extent possible) Scope 3. The relevant data is collected annually using standardized data collection processes at the Fraunhofer-Gesellschaft headquarters and at the institutes.

<sup>1</sup> Fraunhofer's GHG inventory and climate targets as of December 31, 2025, do not contain a full record of the relevant GHG emissions defined under scope 3.1 and 3.2. This is due primarily to the complexity of the data collection process.

<sup>2</sup> The data for 2025 is subject to uncertainty because energy consumption data was still incomplete as of the reporting date.

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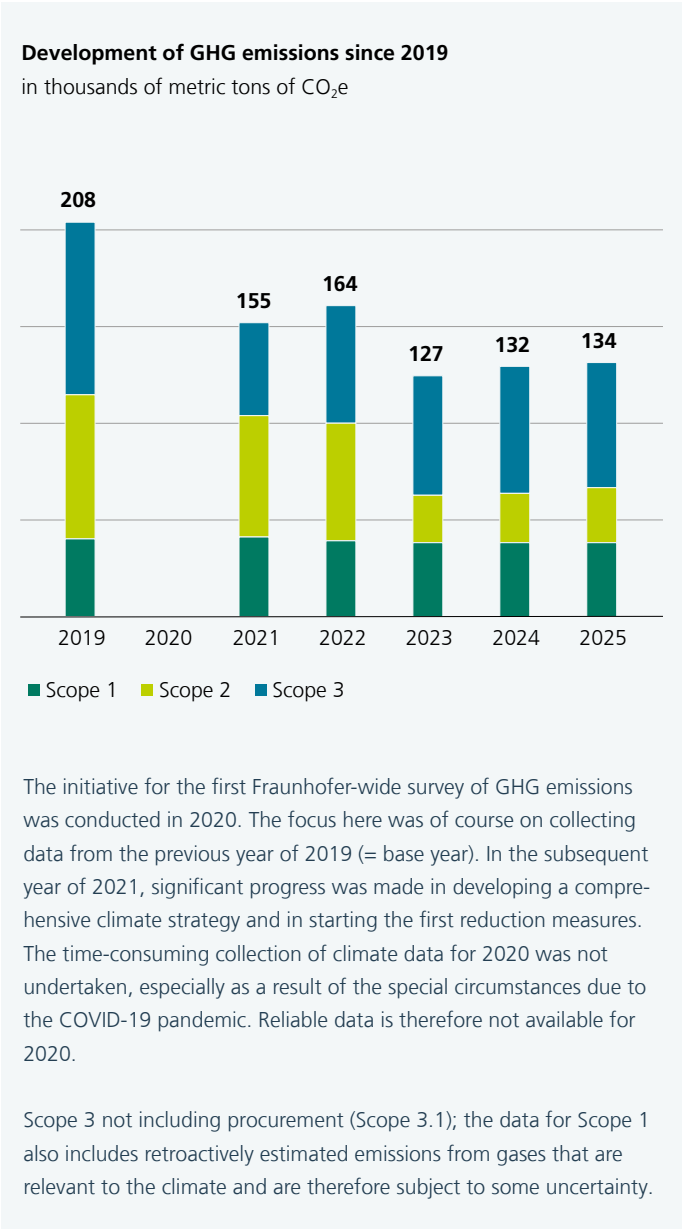
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GHG emissions result primarily from the following:

- energy consumption (especially electricity, gas and district heating)
- transportation (commuting and business travel, especially air travel)
- process gases related to climate change
- construction of new facilities

The data listed here forms the basis for climate strategy management and are being continuously further developed, especially as regards accounting for Scope 3 emissions and improving data quality.

An overall decreasing trend in GHG emissions has been achieved since the base year of 2019. A significant decrease can be seen in 2020 and 2021. This can be largely attributed to changes in working and travel conditions in the wake of the COVID-19 pandemic. A reduction in business travel and the increased use of digital channels has resulted in a significant decline in Scope 3 emissions over this period. Starting from 2022, these levels increased again moderately as research and business operations returned to normal, but they still remain below the level of the base year. Determining factors here include effects such as the continued promotion of remote work and active support for the use of climate-friendly modes of transportation. A further reduction can be observed starting in 2023, especially for Scope 2 emissions. This trend can be attributed primarily to the transition to electricity from renewable energy sources as part of central green power procurement. The first energy efficiency measures are also helping to reduce energy-related emissions. Further reductions are anticipated over the medium to long term, especially in Scope 1 and 2, since measures already initiated in the building and energy areas will then begin to take effect, with delays in some cases.



**Buildings and infrastructure**

Following the entry into force of the building energy guideline adopted in the summer of 2024, the executive board is ensuring that all new or refurbished buildings comply with the climate strategy. The guideline contains binding requirements for measures including phasing out fossil fuel-based heating systems, the use of photovoltaic systems and the performance of life-cycle assessments.

Transformation concepts have been developed for the systematic transformation of existing buildings, defining location-specific measures for renewable energy supply and refurbishment. The goal is to optimize the properties in accordance with Fraunhofer's climate goals and efficient use of resources. The guidelines that have been tested at pilot institutes ensure that these location-specific, implementable solutions for Fraunhofer properties are developed and quality-assured. Complete concepts were available for five locations by late 2025. Further institutes are currently in the elaboration or preparation phase.

**Energy**

Improving energy efficiency is a key lever for achieving the Fraunhofer-Gesellschaft's climate targets. In 2023, four regional energy efficiency and climate action networks were launched as a step in this direction.

The Fraunhofer-wide implementation of energy management systems started at the same time in accordance with ISO 50001 ensures that energy efficiency is also professionally implemented in the organization in accordance with ISO standards.

The first review in May 2025 showed clear signs of progress: The implementation of around 100 measures is expected to reduce annual energy consumption by approximately 6.4 gigawatt-hours (GWh). This is equivalent to roughly 27 percent of the overall target of 23.5 GWh per annum and is expected to cut preventable CO<sub>2</sub> emissions, expressed in CO<sub>2</sub> equivalents (CO<sub>2</sub>e), by

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approximately 2,250 tons per year. A total of just under €7 million was invested in these measures, with an average payback period of around 6.3 years. The measures implemented focus primarily on optimizing ventilation and cooling systems, expanding photovoltaic (PV) systems and modernizing lighting, compressed air and heat supply systems. The Fraunhofer energy efficiency and climate action networks and, with them, the 43 participating institutes, have been part of Germany's nationwide Initiative for Energy Efficiency and Climate Action Networks since 2025.

In 2025, the Fraunhofer-Gesellschaft's total energy consumption amounted to 433 GWh<sup>2</sup>, with electricity accounting for the largest share. In 2025, Fraunhofer used 250 GWh of grid-supplied (not self-generated) electricity, mainly to operate data centers and research facilities such as clean rooms, electrolyzers and melting furnaces. A further 93 GWh was attributable to natural gas consumption, 88 GWh to the use of district heating (steam) and cooling, 2.2 GWh to heating oil and 0.8 GWh to the use of wood chips for heating. The slight increase in energy consumption compared to 2024 (+3 GWh) is explained by increased heating demand caused by the weather conditions in 2025.

Since the green energy resolution came into effect in 2023, all electricity procured under the Fraunhofer framework agreement has come from renewable sources (based on canceled guarantees of origin in accordance with section 42 of the German Energy Industry Act (EnWG)). Renewable energy can therefore be assumed to account for at least 52 percent of Fraunhofer's total energy consumption.

The green energy resolution covers approximately 90 percent of grid-based electric power consumption. Additional renewable

energy comes from the use of wood chips for heating, on-site electric power generation (photovoltaics) and from renewable contributions used in producing the procured district heating. There is currently no fully reliable and consistent data available for on-site electric power generation or the share of renewable energy in district heating. These items have therefore not yet been included in the reported fraction of renewable energy. On-site electric power generation is becoming more significant as the use of photovoltaics continues to expand. The objective is to systematically track this in the future and to fully integrate it in the energy and greenhouse gas balance.

The number of Fraunhofer-owned photovoltaic (PV) systems increased to 60 in 2025, with 10 additional systems connected to the grid during the year. As of December 31, 2025, Fraunhofer had installed 3.7 megawatts peak (MWp) of solar power generation capacity for its own use, generating around 3.3 GWh of renewable electricity per year.

Energy consumption is recorded centrally and is analyzed based on energy carrier. The data is collected on an institutional basis and is consolidated on the overall organizational level. The database is continuously being updated to improve transparency and comparability across locations. Since 2025, the procurement of electric power has increasingly been handled via central portfolio management in order to reduce price risks, increase supply security and strategically manage the fraction of renewable energy.

Fraunhofer also successfully concluded its first power purchase agreement (PPA). The Fraunhofer Research Institution for Battery Cell Production FFB concluded a solar PPA with the utility company Stadtwerke Münster with effect from November 1, 2025. According to this agreement, 6.36 GWh of regional green electricity will be delivered to Fraunhofer FFB every year via a direct connection for use in operating the research fab FFB PreFab.

Energy consumption by energy carrier

| Figure                               | Unit | 2023 | 2024 | 2025 | Method / scope of application                           |
|--------------------------------------|------|------|------|------|---------------------------------------------------------|
| Overall energy consumption           | GWh  | 427  | 430  | 433  | Sum of all energy carriers                              |
| Electric energy consumption          | GWh  | 253  | 254  | 250  | Grid power without self-generated power (supplier data) |
| Gas                                  | GWh  | 91   | 93   | 93   | Piped gas (supplier data)                               |
| Oil                                  | GWh  | 1.8  | 1.8  | 2.2  | Fueling/refueling amounts (invoices / institute data)   |
| Heat/steam <sup>2</sup>              | GWh  | 73   | 75   | 82   | Purchased local/district heating, piped steam           |
| Cooling                              | GWh  | 5    | 4.8  | 4.8  | Purchased local/district cooling                        |
| Wood chips and other energy carriers | GWh  | 3.2  | 1.4  | 1.4  |                                                         |
| Minimum fraction of renewable energy | %    | 53   | 53   | 52   | Including green electricity and wood chips              |

1 This is a forecast value. Since not all the consumption data for 2025 was available at the time the report was prepared (coverage = 89.4 percent), a trend analysis based on available meter readings and comparisons with the previous year's consumption was issued for each energy source. These analyses were then used to forecast the total energy consumption.

2 Values are strictly consumption values with no adjustment for weather conditions.

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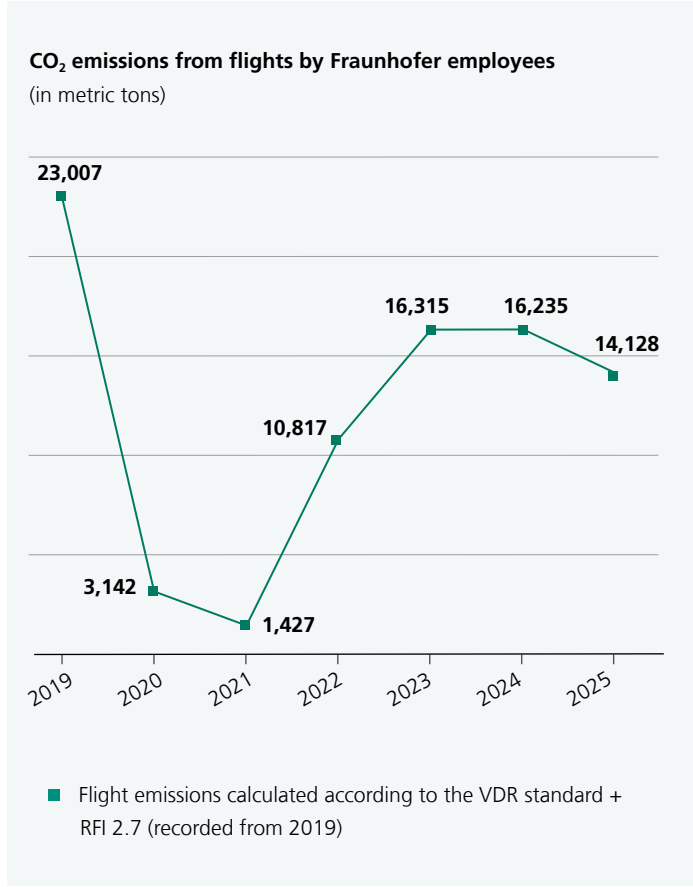
Energy efficiency in data centers represents a key factor in reducing overall energy consumption. The server infrastructure of the Fraunhofer-Gesellschaft is decentralized and includes many smaller data centers. A total of 198 data centers with an annual energy consumption of approximately 37 GWh were recorded under the reporting requirements of the German Energy Efficiency Act (Energieeffizienzgesetz, EnEeG). This accounts for roughly 9 percent of total energy consumption. These are classified as significant energy users (SEUs) in the energy management system in accordance with ISO 50001 and have been systematically analyzed for efficiency potential. The goal is to continuously reduce energy consumption through technical and organizational measures in accordance with the requirements of the EnEeG and internal efficiency targets. The results have been communicated transparently throughout the organization. A key area for potential savings is the temperature in server rooms. Many server rooms at our locations are unnecessarily cooled to approx. 18 °C, while efficient operation is possible even at roughly 25 °C. An energy savings of 4–5 percent can be achieved for every degree of temperature increase. In addition to revising relevant guidelines, a new climate fund project is intended to provide targeted support for the implementation of specific efficiency measures.

Climate-friendly transportation

Emissions from transportation are systematically recorded and included as part of Scope 3 emissions. Measures especially target emission prevention, offsetting and reduction.

Business travel and employees' commutes to work account for roughly 20 percent of the Fraunhofer-Gesellschaft's emissions. Within the limits of its capabilities, the organization is implementing targeted measures to promote climate-friendly alternatives. The institutes primarily provide electric or hybrid vehicles for any necessary car travel. The organization no longer purchases cars powered solely by internal combustion engines. Air travel should be avoided to the extent possible; business travel within Germany should generally be by train. The slight downward trend in emissions from

air travel accelerated in 2025. At 14,128 t CO<sub>2</sub>e, emissions last year were significantly lower (13 percent) than in 2024. For air travel that remains unavoidable, the Fraunhofer-Gesellschaft has been investing since 2020 in high-quality CO<sub>2</sub> offset measures equivalent to the annual emissions generated. This represents a contribution to climate protection and the UN Sustainable Development Goals outside the organization and beyond the reduction measures.



With more than 550 charging stations as of December 31, 2025, the Fraunhofer-Gesellschaft operates a charging infrastructure for electric passenger cars that is unique in the public sector. The system, which was developed through the publicly funded joint research project LamA (Laden am Arbeitsplatz, charging at work), provides charging for organization, employee and customer vehicles at affordable prices and in compliance with all applicable legal requirements. Since the conclusion of project funding in late 2023, LamA has continued this initiative at its own expense with the goal of further expanding the charging infrastructure and significantly promoting climate-friendly commuting. Many institutes have also expanded their bicycle infrastructure. Nearly all institutes offer employee discount tickets or subsidies for the Deutschland-Ticket for rail travel to their employees. The Climate Management department also conducts a Fraunhofer-wide commuting survey every two years in order to implement further effective measures for commuting.

Material flows: climate-relevant gases from research processes

In addition to energy-related emissions, particular importance is attached to greenhouse gas emissions from the use of climate-relevant process gases in certain research fields, especially in microelectronics and clean room technology. These gases, most of which are fluorine and nitrogen compounds, can in some cases have high global warming potential and therefore require close attention. An organization-wide procedure for recording and evaluating these emissions is currently being developed as part of the Fraunhofer climate strategy. This will progressively quantify them and identify ways to reduce them. Initial pilot measurements have already been taken.

Emissions from process gases are thus gradually being integrated in the greenhouse gas balance. The objective is to develop a reliable monitoring system and to identify suitable measures for reducing emissions.

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**Communication and participation**

Communication and participation are key elements in implementing the climate strategy. The goal is to foster knowledge of climate protection and energy efficiency measures throughout the organization and to support their implementation in the institutes. The BfKN and the energy teams in particular are supported with targeted training, opportunities for exchanging knowledge and networking in developing expertise and implementing emission reduction measures. Over 100 employees have been trained under ISO 50001 as part of the implementation of certified energy management systems. In addition to this, regularly communicated best practices from the institutes help to shed light on successful initiatives and provide ideas for implementing further climate protection measures within the organization.

**Outlook**

The Fraunhofer-Gesellschaft is pursuing long-term emission reduction targets as part of its climate strategy with the goal of achieving greenhouse gas neutrality in its scientific operations by 2045. In order to further operationalize this goal, location-specific reduction pathways are currently being specified, measures are being prioritized and scaled and data and monitoring structures are being further developed. Further development is being implemented in stages and is compliant with applicable standards, external requirements and best practice in climate management. A particular focus is on further reducing energy-related emissions, including Scope 3 emissions and developing solutions for emissions that are difficult to avoid.

The **Fraunhofer Sustainability Week** has been an established organization-wide platform for exchange and raising awareness since 2020. Three times each year, a series of one-hour events featuring internal and external speakers is held each morning for an entire week. A total of several hundred employees regularly participate in these events, exchanging views on current climate, energy and sustainability issues and discussing ideas for research and organizational development.

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# Resources and circular systems

## Materiality for Fraunhofer

Resource flows play a central role both in our own infrastructure and in research and procurement. New construction and refurbishment projects are in compliance with sustainable standards and certifications. Large quantities of waste are also sometimes generated by research, material testing and laboratory processes. Sustainable management of this waste is mandatory due to statutory requirements and rising disposal costs. Fraunhofer sees opportunities for innovation in these challenges. With technological recycling and circular economy solutions, the institute supports industrial partners in improving resource efficiency and in reducing waste and emissions. Circular systems reduce the use of raw materials, lower costs and improve the environmental footprint in the construction, operations and research fields.

Higher-level goals for the circular economy are currently being formulated and will be further developed as part of the strategic sustainability process. The heterogeneous research landscape makes the central management of resource and waste streams difficult.

## Resource flows

Public procurement law in particular determines how sustainability criteria may be integrated into the procurement process. Supported by the right to define specifications (i.e., procurement autonomy) and the German Circular Economy Act (Kreislaufwirtschaftsgesetz, KrWG), public procurement law requires the public sector to use the instruments provided—with due regard to the principle of proportionality—in a targeted manner in the procurement process in order to help address current social and environmental challenges. Fraunhofer has set itself the goal of embedding effective due

diligence responsibilities in the procurement process, thereby establishing sustainable purchasing practices. For the Fraunhofer-Gesellschaft, this means having procurement management in place with strategies, processes and systems that are designed to ensure that the environmental and human rights risks listed below are actively and systematically managed along the supply chain. The Sustainable Purchasing guideline and related training courses are available to support those making purchases.

An internal **Fraunhofer circular exchange platform** has also been established to extend the useful life of devices and technical equipment, reduce new purchases and use resources more efficiently. On this platform, institutes can pass on or lend used equipment within the organization, thus helping to promote a more circular approach to resource use in everyday research work.

The Fraunhofer-Gesellschaft’s construction and refurbishment strategy includes sustainable construction. The focus is on the life-cycle approach, where the use of resources and the operation and demolition of buildings should be balanced in the sense of climate protection and cost-effectiveness. Work is therefore currently in progress on a new guideline for resource-efficient construction. Furthermore, all major construction projects that were first addressed in 2021 or 2022 are required to have BNB silver certification under the Assessment System for Sustainable Building (BNB). This certification ensures that ecological, economic and sociocultural criteria for planning are accounted for and are

documented on completion of the building. For research buildings with laboratories, technical areas, offices and conference areas, this requires measures including the following: accounting for the entire life cycle of the building, increased use of ecological and recyclable materials, flexible floor plans for changing usage requirements and high energy efficiency standards for building operation.

Existing locations are being increasingly further developed through energy-efficient refurbishment and the reuse of existing structures in order to conserve gray energy. Thus far, one building has been certified with BNB silver and another with BNB gold.

## Resource outflows

Waste management is a key element of sustainability management. All Fraunhofer institutes have appointed qualified waste management officers who are responsible for the proper collection, documentation and disposal of various types of waste. Their tasks include compiling waste disposal records in legally compliant waste registers and documenting their completed and planned activities in the form of annual reports.

## Waste generation by waste type, 2023–2025

| Waste        | Unit | 2023                | 2024  | 2025  |
|--------------|------|---------------------|-------|-------|
| Nonhazardous | t    | 6,387               | 5,451 | 6,799 |
| Hazardous    | t    | 761                 | 746   | 947   |
| Radioactive  | MBq  | 48,420 <sup>1</sup> | 773   | 1,979 |

<sup>1</sup> Most of the activity is from the disposal of six radioactive sources of 7.4 GBq each.



Data collection for hazardous waste is based on disposal records and institute-specific surveys and is supplemented with estimates as necessary to ensure a consistent overall picture. The data for non-hazardous waste is based in part on estimates that the institutes calculate using factors such as collection intervals, container sizes and fill levels. Some of the waste generated is sent to various recycling processes, while other material flows are sent to landfill or disposed of by other methods. We are committed to continuously increasing the fraction of materials that are recycled.

The quantities of hazardous waste generated are subject to yearly fluctuations. A significant reason for this is project-based research, since much hazardous waste is generated in specific scientific experiments and is therefore difficult to plan for or control. Furthermore, waste that is generated infrequently or in small quantities is often collected over longer periods of time for more efficient transport and disposal processes. Another factor is the occasional disposal of radioactive sources. Further fluctuations in waste volumes result from irregular construction and demolition measures. Radioactive waste is collected and disposed of in accordance with statutory requirements. Reporting is based on the activities reported in accordance with the German Radiation Protection Ordinance.

**Circular economy example:**

A framework agreement has been in place with certified IT refurbisher AfB gGmbH (*Arbeit für Menschen mit Behinderung*, work for people with disabilities) since 2025. This enables refurbishment or recycling of equipment that the Fraunhofer-Gesellschaft no longer needs, increasing the proportion of reused IT equipment.

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# Social responsibility



**Our commitment to sustainability**

Fraunhofer's success is rooted in our employees' knowledge of and enthusiasm for applied research. At Fraunhofer, we are establishing a value-oriented work environment for the innovations of the future, where everyone can contribute and realize their full potential. We take responsibility, not only for our employees but for everyone in our value chain.

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# Own workforce: working conditions

## Materiality for Fraunhofer

Working conditions are subject to regulatory, strategic and societal requirements and have a direct impact on employees. Fraunhofer ensures binding standards for wages, health and safety as well as transparent, fair compensation structures in accordance with occupational safety and health regulations and the German Collective Bargaining Agreement for the Public Service (Tarifvertrag für den öffentlichen Dienst, TVöD). Internal strategies for implementing the goals of the Pact for Research and Innovation position Fraunhofer as an attractive employer. Exit surveys identify specific areas for action to improve working conditions and the overall HR development concept. For a science organization, fixed-term contracts enable the transfer of knowledge and technology to industry, science and the self-employed while also increasing flexibility with regard to new and innovative topics.

## Organization

The Fraunhofer-Gesellschaft distinguishes between five groups of employees: research, technical and administrative staff (RTA staff) and students and trainees. Third parties also work for Fraunhofer under service or consulting contracts. Fraunhofer's top management consists of the members of the executive board and the institute directors. All employees covered by collective bargaining agreements are subject to the relevant collective bargaining agreements in addition to the works council and central works council agreements.

As at December 31, 2025, Fraunhofer had 30,898 employees. This represents a 3.1 percent decrease in headcount (979 individuals) since the previous year. The number of research, technical and administrative (RTA) staff dropped by 1.4 percent (341 individuals). 2025 also saw the number of research staff decrease by 304 or 2.3 percent year on year. Based on the new classification of student employees (see note to the chart), the number of students was down 8.6 percent (611 students) on the previous year.

As of December 31, 2025, 548 individuals were undergoing vocational training at Fraunhofer. This represents a decrease of 27 trainees (4.7 percent) compared with the previous year. The biggest absolute decline was noted in vocational training programs leading to a recognized chamber qualification (19 individuals or 3.8 percent). However, the biggest decline by percentage was recorded in the cooperative study programs that did not lead to a recognized chamber qualification. As of December 31, 2025, 57 people were employed in these programs, down 9 (13.6 percent) from the previous year.

**Note on chart:** Since mid-2024, Fraunhofer has been gradually converting employment contracts for students not involved in scientific work into student employee contracts under the German Collective Bargaining Agreement for the Public Service (Tarifvertrag für den öffentlichen Dienst, TVöD). They were originally classified as RTA staff. However, they have now been recategorized as students with retroactive effect from the end of 2024 in order to provide consistent time series for RTA staff and students. The figures originally reported for 2024 are presented in gray and in parentheses (255 student employees counted as RTA staff, now classified as students).

Fraunhofer employees  
(number at year-end)



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For Fraunhofer, attractive working conditions mean that employees are systematically included in the decision process. Both the Fraunhofer-Gesellschaft statutes and the general section of the statutes of the Fraunhofer institutes (*Allgemeiner Teil der Satzung der Fraunhofer-Institute, ATSI*) specify governance, internal structures, responsibilities and the central decision-making processes of Fraunhofer. The executive board, the institute directors and the administrative directors and heads of administration bear operational responsibility for this inclusion in accordance with the obligations defined in the statutes. This responsibility includes the following:

- **involvement of employees:** appropriate, role-based rights to information and co-determination rights
- **transparent communication:** information and discussion of significant plans
- **fulfillment of duty with respect to employees welfare:** protection of employee health, safety and well-being

Fraunhofer is pursuing a highly participatory approach to involving all employees. This approach involves the design and implementation of programs and processes with goals that include improving working conditions for employees. Both employees and their institutional representatives are systematically included in this process, encompassing the central works council, local works councils, the local representative of employees with severe disabilities, the equal rights officer and the equal opportunities officers. This is accomplished by means including participatory methods such as topic-specific networks (so-called communities), Fraunhofer-wide surveys like the Fraunhofer-Check and the Meet the Executive Board dialogue format, as well as through ongoing collaboration with institutionalized representative bodies. In the *Meet the Executive Board* initiative, members of the executive board regularly engage with employees across the organizational hierarchy and across institutes to discuss overall strategic issues. The Fraunhofer-Check

is a Fraunhofer-wide survey of all employees. The purpose of this survey is to garner ideas for the further development of the organization through systematic employee feedback and to evaluate the effectiveness of the measures taken. The survey was first conducted in May of 2025. Focal topics were identified in the results and were incorporated in a follow-up process for further action. A repeat survey is set to take place in no more than two years.

Fraunhofer also employs transparent and effective communication channels such as the Fraunhofer-wide town hall meeting, the intranet, informational emails and the Executive Board Newsletter to keep employees up-to-date on relevant topics in a timely manner. The established top-down communication paths also ensure that critical information is passed from the executive board to the institutes in a structured and transparent manner via institute management and the administrative directors.

In addition to the responsibilities of the 82 local works councils, the central works council (GBR) represents the interests of employees in accordance with the German Works Constitution Act (Betriebsverfassungsgesetz, BetrVG) (section 47 and following) for issues that go beyond organizations or business units.

Employee rights and human rights

Fraunhofer’s actions and engagement are fundamentally based on compliance with the provisions of applicable labor laws and a commitment to justice and security in society. The protection of employees’ rights therefore plays an important role on both national and international levels. Fraunhofer is first subject to statutory regulations (such as BetrVG and the German Occupational Health and Safety Act (Arbeitsschutzgesetz, ArbSchG)) and the provisions of the TVöD. In addition to this, it has adopted its own guidelines and (comprehensive) works council agreements to protect its employees.

Furthermore, the Fraunhofer-Gesellschaft is also committed to complying with all legal requirements affecting human rights,

including the German Supply Chain Act (Lieferkettensorgfaltspflichtengesetz, LkSG). Our business practices are oriented with internationally recognized frameworks such as the UN Guiding Principles on Business and Human Rights (UNGPs), the ILO core labor standards and the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct. Fraunhofer is also actively engaged in ensuring a respectful, fair and non-discriminatory work environment. This commitment stems from Fraunhofer’s Declaration of Principles for the Respect of Human Rights, its endorsement of the Universal Declaration of Human Rights and its own internal and external codes of conduct.

Employees have access to established reporting channels for statutory violations, human rights violations or other negative incidents. These channels include the complaints office in accordance with the General Act on Equal Treatment (Allgemeines Gleichbehandlungsgesetz, AGG) and the Fraunhofer whistleblowing system. They also have the option of filing complaints with the (central) works council or directly contacting the human rights officer. All reporting offices are subject to strict confidentiality. This is governed by both the respective central works council agreement and the applicable statutory provisions. Negative incidents and grievances can also be addressed during regular meetings between local works councils or the central works council and the employer. All employees have access to the described reporting offices via the organization-wide intranet.

Occupational health and safety

Fraunhofer is committed to establishing a safe and healthy work environment and to complying with all applicable statutory requirements governing occupational safety. Fraunhofer therefore conducts actions including regular inspections at its institutes. These have the weight of internal audits. The approach to this is adapted to applied research, based on certifiable management systems. Regular occupational safety instruction is also mandatory for all employees. In the reporting year of 2025, 70 workplace accidents subject to reporting were recorded, resulting in a total of 1,300 lost

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workdays. This yields an accident rate of 3.43 per 1,000 full-time equivalent employees. There have been no fatal workplace accidents at the Fraunhofer-Gesellschaft to date.

Social security for employees is provided through the statutory social security systems for situations such as unemployment, workplace accidents, acquired disabilities, parental leave or retirement. Work-related accidents are also covered by the applicable employers' liability insurance association. Fraunhofer also offers a company retirement plan partially funded by employers with the pension institution of the German federal government and states (Versorgungsanstalt des Bundes und der Länder, VBL). Furthermore, the institutes and headquarters regularly conduct psychological risk assessments at the workplace to systematically identify and address psychological stressors in accordance with Section 5 of the ArbSchG.

Training and professional development

The Fraunhofer-Gesellschaft pursues a comprehensive approach to learning, training and career development, supporting employees at every stage of their professional careers. Continuing education, the acquisition of new skills and individual development planning serve as the basis from which employees can realize their full potential and successfully meet future challenges.

The transfer of talent, an essential aspect of the Fraunhofer-Gesellschaft's activities is a key characteristic of the *Career at Fraunhofer* approach. This is based on a comprehensive HR development strategy that supports employees' individual development planning. The mandatory employee development meeting forms a core element of this strategy. Career planning is aligned with the Fraunhofer development and career paths (both internal and traditional career paths in business, science or self-employment). It is supported by a broad range of HR development initiatives that include many different learning methods, coaching sessions and consulting services.

A key element in training is the SAP Learning Management System (LMS) that serves as a standardized learning platform. In addition to 30,664 instances of access to mandatory e-learning courses, voluntary e-learning courses were accessed 23,790 times through the LMS in 2025. The full registration and approval process for continuing education programs is now conducted in the LMS, promoting complete digitalization of the Fraunhofer Training Program. The digital personnel dossier also provides a transparent overview of all information related to hiring, development opportunities and career paths, thus forming the career trajectories of all employees.

Promoting the development of junior scientists is also a top priority for the Fraunhofer-Gesellschaft. The goal is to establish a reliable framework for individual training and career development. The *A Doctorate at Fraunhofer* code of conduct, which established quality standards for doctoral supervision on January 1, 2020 has been followed by the implementation of various measures in 2025 to maintain and further improve the quality of doctoral supervision at the institutes. These include the Good Supervision Practices in Various Doctoral Phases guideline, which was developed and rolled out in collaboration with a working group composed of representatives from the institutes. It provides an orientation framework and ideas for structuring supervision at Fraunhofer and supports doctoral program coordinators (i.e., staff members who manage doctoral supervision at the strategic and/or operational level) in establishing appropriate conditions for supervisors at the institutes. A supplemental e-learning program was developed and rolled out that provides tailored learning paths for various target groups (doctoral candidates, supervisors, managers, managers with parallel supervisory responsibility and doctoral program coordinators). Each path includes target-group specific information on obtaining a doctorate at Fraunhofer. Biannual networking events support doctoral program coordinators in their daily work, while a training program does the same for supervisors. The code of conduct is implemented in a qualification agreement with doctoral candidate employees. 1,438 employees were doctoral candidates as of December 31, 2025, 28 percent of whom were women.

The effectiveness of the measures, which are part of the overall HR development strategy, is evaluated by measures including a systematic exit survey of departing employees. In 2025, 40 percent (2024: 43 percent) of departing employees indicated that they had received adequate support in career planning. The recommendation rate for Fraunhofer as an employer was 51 percent (2024: 53 percent).

Establishing attractive working conditions is one of the key focal points of the New Work@Fraunhofer program. This includes promoting independent work, new methods for more productive collaboration and options for flexible working hours and locations. The results are positive: Over 85 percent of the institutes are already actively establishing their own specific work frameworks. The number of members in the Fraunhofer New Work Community for sharing practical experience and knowledge increased to roughly 260 people from approximately 70 institutes. A total of more than 1,000 interested participants from the institutes took part in the 37 drop-in sessions, co-creation events and deep-dive sessions that were offered. The survey results from the Fraunhofer-Check are also positive. For example, *Flexibility in working hours and location* scored an average of 4.6 out of 5 points.



# Equal treatment and fair opportunities

### Materiality for Fraunhofer

Diversity in the workforce is an innovation engine for the Fraunhofer-Gesellschaft, because heterogeneous teams excel in creativity and problem-solving skills. It also has a positive impact on employer attractiveness and employee satisfaction and thus on competitiveness. However, for diversity to work, it is essential to ensure that all employees have equal opportunities. A lack of equal treatment poses significant risks, not least for staff recruitment and retention. Fraunhofer is therefore very serious about calls for progress in diversity and inclusion, including those from funding agencies and the public. This topic is also included in the [Pact for Research and Innovation](#), which establishes clear objectives for promoting diversity and fair opportunities.

### Diversity and inclusion

14.9 percent of Fraunhofer's workforce comes from outside Germany (previous year: 14.8 percent). Despite a decrease in absolute numbers (2025: 2,207; 2024: 2,251), the fraction of international students increased further and was approximately 34 percent in 2025 (2024: 32 percent; 2023: 30 percent). Student employees from India continue to form the largest group among international students (34 percent). However, this number has also declined in absolute terms in comparison with the previous year. An absolute increase took place mainly among students from Egypt, Iran and Vietnam. In contrast, the number of scientific staff from outside Germany has decreased by 44, including 11 from Asia and 26 from Europe.

As of December 31, 2025, the proportion of employees with severe disabilities or equivalent status stood at 2.94 percent.

As of the same date, there were 701 employees with severe disabilities or equivalent status in the RTA category (+22) along with 16 trainees (+4).

At Fraunhofer, diversity, equal opportunities and the creation of inclusive conditions are an indispensable cornerstone of the corporate culture. The goal is to establish a work environment where all employees can contribute their talents regardless of gender, age, disability or nationality. With this background, the Diversity Funding Program has been addressing issues such as balancing work and family life, inclusion, equal opportunities and intercultural collaboration for over a decade. Since the start of the program, a total of 330 applications from institutes have been funded at a total cost of 3 million euros. The institute-specific measures approved for 2026 include training on dealing with sexual harassment at the workplace, the women's network, innovative measures to improve accessibility for people with disabilities and the establishment of the Bridging Cultures Program for employees with immigrant backgrounds. Another key focus in the area of diversity was raising awareness of unconscious bias. The de-biasing approach was also continued in 2025. The purpose of this program is to raise awareness among employees and managers regarding unconscious biases through e-learning and targeted training courses, teaching strategies for reducing them and thus enabling the workforce to make fair decisions.

Accessibility is an important part of promoting inclusion. At Fraunhofer, inclusion means that people with and without disabilities can work together and conduct research on equal terms. This goes beyond integration, involving the identification of areas for action and the development of specific measures that facilitate inclusion and promote community. After the executive board

adopted the Fraunhofer accessibility policy in 2023, the focus in 2025 was on its implementation. This included two key measures, the analysis project on accessibility and the first round of the inclusion support program. In the context of the analysis project, systems, tools and buildings were investigated in order to systematically identify physical, technical and communication barriers and to develop measures to remove them. The accessibility steering committee was established to effectively coordinate the relevant steps for implementation and to strengthen collaboration between departments and the executive board level. The measures this group elaborates are to be incorporated in detailed planning and implementation starting in 2026.

In contrast, the inclusion support program focuses on raising awareness and providing expertise for establishing an inclusive environment. In its first round, the program already helped ten institutes develop approaches for adapting their processes and structures. Responsible personnel at the institutes received corresponding training in disability awareness workshops and coaching sessions. The results obtained in 2025 form the basis for further development of the program. A second round is planned for an additional ten institutes in the winter of 2026/2027.

Fraunhofer has also been collaborating with other science organizations since 2023 as part of the Alliance of Science Organisations in Germany's inclusion initiative to develop strategic measures for promoting inclusion. The initiative has demonstrated that there is a significant need within the participating organizations for structured dialogue and networking on issues of disabilities and inclusion in science. It was therefore decided in 2025 to continue the initiative as a network and to establish a shared knowledge base on key issues related to disabilities and inclusion in the



scientific system. Starting in 2026, regular network meetings are to be conducted to explore selected topics in more detail.

Equal opportunities

Equal opportunities in the workplace is an important corporate goal of the Fraunhofer-Gesellschaft. Strict compliance with all currently applicable laws and regulations concerning equal treatment and equal opportunities in the workplace is an essential prerequisite and part of our activities in promoting equal opportunities. This also includes the implementation guidelines of the Implementation Agreement on Gender Equality (Ausführungsvereinbarung Gleichstellung, AV-Glei), which define the framework for promoting gender equality.

In 2022, the EU Commission for public institutions, research institutions and universities headquartered in the EU or in countries linked to Horizon Europe introduced the Gender Equality Plan (GEP) as a new funding criterion. The Commission thus shows that it considers the promotion of equal opportunities in the workplace in research and innovation to be a central priority. The Fraunhofer-Gesellschaft expressly welcomes this. The GEP is aligned with the Fraunhofer-Gesellschaft's overall strategy and is updated annually. The 2025 update to the GEP includes an assessment of the current gender distribution at Fraunhofer as well as an overview of goals, programs and measures for promoting equal opportunities in the workplace.

To supplement this, specific measures to prevent and eliminate discrimination were established in 2025, including the objective, transparent and clear definition of workplace requirements. At Fraunhofer, this is further supported by the specification of central and decentralized responsibilities, training for specific target groups in unconscious bias, the equal opportunities support program, the diversity funding program, the Fraunhofer accessibility policy and the inclusion support program. An action guideline for countering sexual discrimination, violence and harassment was also developed in 2025. This is intended to provide tools for prevention

and intervention in cases of sexual harassment. The goal of these initiatives is to reduce or prevent discrimination and exclusion and to establish inclusive conditions. The established reporting systems (see page 49) also play an important role for reporting and eliminating discrimination.

The Fraunhofer-Gesellschaft has been implementing a systematic overall concept since 2013 to promote equal opportunities for women and men, including measures for recruitment and career development, monitoring and cultural development. A milestone was achieved in 2024 when, for the first time, 50 percent of new institute management appointments were women. This represents a significant step toward gender equality.

The Fraunhofer-Gesellschaft is actively committed to gender equality. Women make up 36.3 percent of the workforce across all employee groups.

For the following analysis, the RTA employee group is divided into research staff and non-research staff. As of December 31, 2025, women accounted for 52 percent of non-research staff, while 24.4 percent of research staff were women. The breakdown by level is as follows:

| Employee groups     | Women  | Total  | Percentage of women |
|---------------------|--------|--------|---------------------|
| RTA staff           | 8,845  | 23,834 | 37.1%               |
| University students | 2,183  | 6,516  | 33.5%               |
| Trainees            | 186    | 548    | 33.9%               |
| Total               | 11,214 | 30,898 | 36.3%               |

| Non-scientific employees<br>(science support, administration, infrastructure)<br>as of December 31, 2025 |       |        |                     | Scientific employees<br>(pay group 13 upwards with scientific responsibilities)<br>as of December 31, 2025 |        |                     |
|----------------------------------------------------------------------------------------------------------|-------|--------|---------------------|------------------------------------------------------------------------------------------------------------|--------|---------------------|
|                                                                                                          | Women | Total  | Proportion of women | Women                                                                                                      | Total  | Proportion of women |
| Level 1                                                                                                  | 5     | 11     | 45.5%               | 18                                                                                                         | 107    | 16.8%               |
| Level 2                                                                                                  | 399   | 865    | 46.1%               | 468                                                                                                        | 2,528  | 18.5%               |
| Level 3                                                                                                  | 5,308 | 10,100 | 52.6%               | 2,647                                                                                                      | 10,223 | 25.9%               |
| Total                                                                                                    | 5,712 | 10,976 | 52.0%               | 3,133                                                                                                      | 12,858 | 24.4%               |

Note on the tables

- Level 1: employees at management level 1  
(institute directors and directors at headquarters)
- Level 2: employees at management levels 2–5  
(managers below institute management level)
- Level 3: employees without management responsibilities  
(individuals without management responsibilities)

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The proportion of female research scientists at Level 1 in 2025 is 16.8 percent (previous year: 16.8 percent). The proportion of female research scientists at Level 2 is 18.5 percent (previous year: 18.2 percent). The proportion of female research scientists at Level 3 is 25.9 percent (previous year: 26.1 percent).

The Fraunhofer-Gesellschaft is implementing targeted programs and structurally embedded measures to increase the percentage of women in the workforce and in management positions and thus to reach the targets agreed. The equal opportunities support program plays a key role here. This program aids institutes in developing specific strategies and facilitates knowledge transfer through workshops, best practices and dialogue. The program now includes 53 institutes and the heads of the central offices of two Fraunhofer groups. Example topics in the 2025 workshop include measures to promote equal opportunities, heighten awareness of intersectionality and combat discrimination.

The Fraunhofer-wide framework agreement with pme Familien-service was extended for an additional year in October 2025 to further support equal opportunities and balancing work and family life. The services offered by pme Familienservice include emergency child care, home care / eldercare and life coaching. In 2025, there were 13 requests for childcare and 80 for homecare and eldercare and especially a total of 182 requests for life coaching sessions.

In addition to the applicable statutory provisions, the Fraunhofer-Gesellschaft highly values a proper balance between work and family life. Both internal surveys and external rankings confirm that the Fraunhofer-Gesellschaft is strong here. The internal *Fraunhofer Family Logo* quality seal was developed in 2018 to highlight achievements and to establish a uniform standard. The seal recognizes institutes that provide especially good conditions for balancing work and family life. The certification process looks at a range of aspects including information and communication, flexible working options, institute-specific care services and the conditions relating to parental leave and reintegration. Since 2019,

the Family Logo seal has been awarded to a total of 24 institutes. These institutes were recertified in 2025. The purpose is to evaluate the institute-specific conditions for balancing work and family life in a joint dialogue between institute management or the head of administration and the equal opportunities officer and to discuss potential areas for further improvement. The results of these meetings will be analyzed in the spring of 2026.



The internal Fraunhofer Family Logo quality seal recognizes Fraunhofer institutes that provide especially good conditions for balancing work and family life  
© Fraunhofer

Fraunhofer uses TALENTA for career development. This funding program established in 2013 was converted to a permanent career development initiative in 2023. It has already supported over 965 female research scientists in their professional development. This program forms a central pillar in promoting equal opportunities in research and management. 68 female research scientists began their funding period in 2025. 30 of these were in TALENTA start, 30 in TALENTA speed up and 8 in TALENTA excellence.

Fraunhofer communicates its internal guidelines for working conditions, accessibility, fair opportunities and diversity via the intranet, the monthly newsletter and in department-wide and Fraunhofer-wide events. These measures underscore the Fraunhofer-Gesellschaft’s commitment to an inclusive and non-discriminatory culture in the workplace.



# Workers in the value chain

## Materiality for Fraunhofer

As an internationally engaged research organization, the Fraunhofer-Gesellschaft is well aware of its societal responsibility, also and especially with regard to workers in the value chain. Inadequate due diligence in this context increases the likelihood of human rights violations, which could in turn result in failure to meet the expectations and requirements of funding agencies and industry partners. This also involves legal, financial and reputation-specific risks that can ultimately lead to delays in projects. In contrast, responsible procurement offers opportunities to improve human rights conditions along the value chain and also to improve quality and collaboration. This in turn strengthens the integrity and credibility of the Fraunhofer-Gesellschaft, especially in an international research context.

The institutes of the Fraunhofer-Gesellschaft conduct research in many different fields. The requisite materials and components are manufactured by workers from many different countries and industries along the entire value chain. Because of project-specific procurements in small quantities and the provisions of public procurement law, there is no fixed pool of suppliers but rather a highly diversified and dynamic supplier base. This complicates the identification of potentially affected groups. Direct suppliers have a very low risk profile because approximately 88 percent of them are based in Germany. There can therefore tend to be comparatively higher risks in stages further upstream in the value chain, where a lack of transparency regarding upstream suppliers and frequent changes in suppliers limit the possibility of direct influence. The focus here is therefore on risk-based prevention and the mitigation of negative impacts through indirect influence by establishing clear obligations for suppliers.

## Policies

The Fraunhofer-Gesellschaft is unequivocally committed to upholding human rights. This also includes protecting the rights of workers in the value chain. Based on our joining the UN Global Compact, this commitment is embedded in the Declaration of Principles for the Respect of Human Rights that has been signed by all members of the executive board. The specified human rights strategy explicitly refers to all human rights (and environmental standards) protected under the German Supply Chain Act, LkSG.

Especially high priority is assigned to serious risks such as forced labor and child labor on implementation. To address risks associated with human rights violations in the supply chain, the Fraunhofer-Gesellschaft obligates its suppliers to comply with the Fraunhofer sustainability standards for suppliers. These are included as a standard part of tender documents and thus become a binding part of the contract. The Declaration of Principles and the sustainability standards are available in German and English on the intranet and the organization website and are communicated both internally and externally in training sessions.

## Measures

As part of the implementation of the LkSG, the Fraunhofer-Gesellschaft has introduced a series of measures to address the legally imposed due diligence requirements with the goal of minimizing human rights risks in the value chain. A key tool here is the annual risk analysis of direct suppliers, supplemented with ad-hoc risk analyses of indirect suppliers as needed. The Supply Chain Management Strategy department, which is reporting directly to the executive board, again conducted the scheduled risk analysis in 2024/2025 in collaboration with a specialized external service provider. A very small number of direct suppliers posing a specific

## Topics addressed in the Fraunhofer-Gesellschaft declaration of principles on human rights:

- child labor
- forced labor
- slavery
- occupational health and safety
- freedom of association
- equal treatment and non-discrimination
- fair wages
- health effects due to water, soil or air pollution
- unlawful seizure of land
- use of force by security forces
- other especially serious infringements of protected legal rights

risk was identified (31 out of 31,279 suppliers or 0.1 percent), for which appropriate preventive measures were implemented. No violations were identified in the risk analysis in 2025. This can also be attributed to the high proportion of domestic suppliers (88 percent). Standardized remedial procedures will be implemented in the event of any human rights violations.

Human rights concerns are also accounted for during supplier selection. Including the sustainability standards in tenders ensures compliance with minimum human rights standards. Supplier compliance with the sustainability standards can be verified through contractually agreed effective monitoring mechanisms such as the right to information and audits. Detected violations must be reported and addressed. Suppliers who meet exclusion criteria under public procurement law such as due to a final and binding finding of a violation of the LkSG are excluded from the

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procurement process. Bidders are therefore required to submit a self-declaration stating that no grounds for exclusion exist. The Sustainable Procurement guideline was developed and implemented in order to further ensure sustainable procurement beyond the statutory requirements (such as orientation with certifications). This is to be revised and updated in accordance with new developments in 2026.

Potential violations can be reported by affected parties or third parties either directly by email, by mail or through the Fraunhofer whistleblowing system (BKMS® System), which is freely accessible on the website in German and English. Concerns can be submitted anonymously on request and are handled confidentially, maintaining rights to privacy and data protection. The associated processing steps are described transparently. The sustainability standards also specify that Fraunhofer-Gesellschaft suppliers must actively inform their employees and business partners of these reporting channels and must ensure that they have unimpeded access to them without fear of reprisal. No incidents were reported via complaint mechanisms in 2025.

We conduct regular training sessions on this topic to raise awareness of human rights issues in the value chain in our own workforce and to support the implementation of measures across all work processes. This training is mandatory for employees in relevant business units and is optional for all other employees. The human rights officer reviews the implementation and effectiveness of all measures in the risk management system based on a checklist as part of the annual effectiveness analysis. These measures are also subject to continuous further development.

Goals and metrics

Long-term goals with specific deadlines and measurable metrics are currently under development. Because of the unique supplier structure of the Fraunhofer-Gesellschaft, risk analyses conducted over recent years have identified only minor risks for direct suppliers. In this context, Fraunhofer is seeking to further professionalize its supplier risk management using a dedicated tool.

- Corporate culture
- Corruption and bribery
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# Responsible corporate governance



## Our commitment to sustainability

Adherence to the principles of business practices that are responsible and in compliance with statutory requirements is embedded in the Fraunhofer-Gesellschaft's identity. This is based on a values-driven and robust organizational structure. This commitment is clearly set forth in the objectives of the Fraunhofer framework strategy, as an essential partner of industry, as a developer of groundbreaking technological innovations and as an institution of excellence.

Sustainability considerations are integrated into corporate governance in order to strengthen the effectiveness and resilience of the organization and ensure it responds appropriately to regulatory, technological and societal change.

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Corporate culture

Materiality for Fraunhofer

An organizational culture based on integrity and values is a key prerequisite for excellence in science, compliance with regulations and sustainable impact. As a recipient of public funds and as an organization with a high public profile, Fraunhofer relies heavily on trust. Corporate culture has a direct impact on governance structures, the quality of decision-making, risk awareness and reputation and is therefore an essential part of effective business management.

The Fraunhofer-Gesellschaft therefore strives to achieve innovation and excellence not only in its research but also in its corporate culture. Our goal is to establish a culture of respectful interaction characterized by integrity—both internally and externally—and to create a working environment that fosters trust, cooperation and personal growth. The executive board places great value on addressing problems and setbacks openly and on fostering a constructive culture of accountability in which errors are seen as opportunities for improvement and further development. This includes seeking support in uncertain situations in order to make informed decisions.

The code of conduct was developed and was also revised during the reporting year in order to achieve these goals, to strengthen the Fraunhofer spirit, to solidify the trust of customers and partners and to account for the continuously evolving national and international legal framework. As a practical instrument, this code provides orientation for all employees regarding internal policies and statutory requirements. It defines the core values and principles that guide the actions of all employees, the executive board and the senate and it provides a framework for ethical and responsible conduct. It also stresses the importance of trust, respect and fairness in everyday scientific and organizational work.

The internal code of conduct combines statutory and internal requirements and facilitates their implementation, especially in complex decision-making situations. The external code of conduct further addresses the principles according to which Fraunhofer shapes and further develops its own corporate culture. It sets forth rules for regulatory compliance and social responsibility, especially with regard to human rights, principles of scientific ethics, environmental and resource protection and sustainable business practices. It also promotes awareness of the responsible use of public funds, transparency in political advocacy and of a diverse, inclusive and respectful work culture as a guideline of equal importance to both managers and employees.

The Fraunhofer-Gesellschaft subjects its own business processes and organizational units to ongoing risk analyses for the systematic prevention of compliance risks. This process especially identifies those functions and processes that are considered to be particularly vulnerable to these risks. The risk assessment is regularly reviewed and further developed to enable the implementation of effective measures within the framework of the Fraunhofer-Gesellschaft’s decentralized CMS.

The secure Fraunhofer electronic whistleblower system (BKMS® System) permits employees to report instances of unlawful conduct or violations of the code of conduct or other internal regulations of which they have become aware in connection with or in the context of their professional activities. They can do this while maintaining their anonymity and without fear of personal disadvantages or repercussions under labor law (see page 59).

Corruption and bribery

Materiality for Fraunhofer

The Fraunhofer-Gesellschaft has an anti-corruption program that is embedded in the CMS. As a recipient of public funds, the Fraunhofer-Gesellschaft is subject to comprehensive statutory provisions regarding the prevention of corruption and bears a special responsibility to ensure integrity, transparency and conscientious use of resources. Furthermore, as a signatory to the UN Global Compact and in accordance with the United Nations Convention against Corruption, Fraunhofer is committed to maintaining high standards in the fight against corruption and bribery. The goal is to effectively mitigate risks, whether legal, financial or reputational in nature and to strengthen the trust of funding parties, partners and the public.

The Fraunhofer-Gesellschaft is unconditionally committed to integrity, transparency and statutory compliance as the foundation of responsible business management. Preventing corruption is a key element of Fraunhofer’s governance and plays an important role in protecting its reputation and ensuring its long-term success. The executive board ensures the provision of clear regulations for corruption prevention, the implementation of preventive measures and the resolute investigation of any identified violations.

The Fraunhofer-Gesellschaft’s corruption prevention measures are based on recognized national and international standards for compliance management systems. Especially the risk analysis, clear responsibilities, training programs, monitoring processes and internal reporting structures form a binding framework on which to structure the compliance program for corruption prevention. In addition to the requirements of auditing standard IDW PS 980 for auditing compliance management systems, issued by the Institute of Public Auditors in Germany (Institut der Wirtschaftsprüfer, IDW), the Fraunhofer-Gesellschaft accounts for key provisions of DIN ISO standard 37001:2016 (Anti-bribery management systems).

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The relevant corruption prevention measures are communicated to employees through guidelines, internal communication channels, communication from management and training programs. These especially include the e-learning modules on compliance and corruption prevention provided in the LMS.

The results of key investigations and trends in corruption and bribery risks are reported to the executive board and the senate in an annual activity report on corruption prevention. There are no confirmed cases of corruption, convictions or fines for the reporting period.

Political engagement

Materiality for Fraunhofer

Through its contributions to policy debates, the Fraunhofer-Gesellschaft plays an active role in the science-based discourse on research and innovation policy. This political engagement promotes transdisciplinary collaboration, ensures the representation of scientific and policy interests and facilitates the development of new cooperative efforts as well as the securing of additional funding. Furthermore, the transfer of scientific findings and science policy recommendations to political decision-making processes can impact the framework conditions for research and development. As part of its advocacy activities, Fraunhofer adheres to the provisions of the German Lobbying Register Act (Lobbyregistergesetz, LobbyRG), which ensures transparency and promotes compliance in political activities. Overall, this engagement is essential for promoting strategic initiatives, securing funding and strengthening Fraunhofer’s innovative abilities in the long term.

The Fraunhofer-Gesellschaft has disclosed its activities in political consulting and advocacy in accordance with the requirements of the amended German Lobbying Register Act as part of its annual update for the 2024 fiscal year. In 2025, the Fraunhofer-Gesellschaft also assumed the role of speaker for the Alliance of Science Organisations in Germany, a voluntary association of leading science and research organizations in Germany, thus assuming lead responsibility for representing Alliance policy interests. Advocacy-related costs increased significantly compared to the previous year as a result of the formation of a new government. This effect was to be expected given the unchanged high compliance rate of the data collection process introduced in the previous year. Fraunhofer welcomes the transparency goals of the LobbyRG and is working on the alliance level to establish a joint process whereby member organizations can efficiently and comparably fulfill statutory compliance requirements.

The president, the members of the executive board and the institute directors of the Fraunhofer-Gesellschaft represent Fraunhofer’s positions on various high-level advisory committees, such as the German Federal Chancellor’s Strategy Group and the German Council of Experts on Climate Change (see page 59). Together with selected institute directors, the Fraunhofer executive board also paid introductory visits to the most important ministries and to key decision-makers in the German Bundestag. In-depth talks were held with the working groups for education and research of various parliamentary groups, as well as with individual members of parliament. Fraunhofer twice represented the Alliance of Science Organisations in Germany on the Committee for Research,

|                                                                                                                                               |                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Authorized representatives responsible for monitoring lobbying activities                                                                     | <b>President and executive board members of the Fraunhofer-Gesellschaft</b>                                                                                                                                                                              |
| Financial donations or donations in kind to government                                                                                        | <b>None (0)</b>                                                                                                                                                                                                                                          |
| Political financial contributions                                                                                                             | <b>None (0)</b>                                                                                                                                                                                                                                          |
| Disclosure of the most important issues that are the subject of lobbying and the most important positions of the organization on these issues | <b>Research and innovation policy,</b> including the High-Tech Agenda for Germany, continued support for lightweight construction, <u>construction and approval procedures for research infrastructure</u> (all topics are listed in the registry entry) |
| The organization is listed in the EU Transparency Register or in an equivalent transparency register of a Member State:                       | <b>Yes, EU Transparency Register:</b> register ID number 35124436517-75 and lobby register of the German Bundestag: register ID number: <u>R001203</u>                                                                                                   |

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Technology, Space and Technology Impact Assessment, first to address general issues facing the Alliance and subsequently with a specific focus on reducing bureaucracy in research and science.

The Fraunhofer-Gesellschaft was also actively involved in the policy debate on key interdisciplinary topics in digital and innovation policy in 2025, including consultations on Germany's National Data Center Strategy, Germany's Implementation Act for the EU AI Act and in online consultation on the startup strategy of the German federal government. In multiple position papers and expert discussions, Fraunhofer also developed specific recommendations for action in further developing the research data ecosystem, the implementation initiative for the Freedom of Innovation Act, the government draft of the Living Laboratories Act and future questions about the High-Tech Agenda for Germany.

Example advisory committee

The German Council of Experts on Climate Change is a scientific committee established by the German federal government that plays a key role in monitoring German climate policy and implementing the German Federal Climate Change Act (Klimaschutzgesetz, KSG). The council members act independently and are bound solely by the mandate set forth in the German Federal Climate Change Act.

The Fraunhofer-Gesellschaft has also been contributing its expertise since the Expert Council was established in 2020. Barbara Schlomann of the Fraunhofer Institute for Systems and Innovation Research ISI serves as its chair. Tanja Kneiske, head of the Competence Center for User-Centered AI Methods at the Fraunhofer Research Institution for Energy Infrastructures and Geotechnologies IEG, is also a member of the council. Fraunhofer was already represented in the first term of the Council from 2020 to 2025 by Hans-Martin Henning, long-time Director of the Fraunhofer Institute for Solar Energy Systems ISE and Chair of the Expert Council at the time, as well as Barbara Schlomann.

Whistleblower protection

Materiality for Fraunhofer

An effective whistleblowing system is a central part of the prevention, detection and handling of violations. It contributes significantly to ensuring integrity, early risk detection and institutional credibility. Whistleblower protection is mandated by law and is an integral part of Fraunhofer's CMS.

Reports of potential violations of laws or regulations can be submitted via the secure electronic whistleblowing system (BKMS® System). Reports (internal and external) can be submitted anonymously and are treated confidentially and in accordance with the need-to-know principle. The internal reporting office is organizationally embedded in the central Compliance department. Submitted reports are reviewed in a structured process and independent investigative functions ensure an objective evaluation. An explicit prohibition against discrimination protects whistleblowers from retaliation. The procedures are in compliance with the requirements of the German Whistleblower Protection Act (Hinweisgeber-schutzgesetz, HinSchG) and pertinent European regulations. The effectiveness of the system is reviewed on a regular basis.

There is also a reporting office for the, AGG (see page 49) and a comprehensive ombudsperson network (see page 20).





The **European Sustainability Reporting Standards** (ESRS) were used as a content **guideline**. However, this sustainability statement makes no claim to completeness in the sense of ESRS-compliant reporting.

| ESRS standard                                | Disclosure requirements                                                                                               | Reference (section; subsection; page)                                                                              |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| ESRS 2<br>General disclosures                | BP-1: Basis for preparation of the sustainability statement                                                           | General; Basis for report; p. 6                                                                                    |
|                                              | GOV-1: The role of the administrative, management and supervisory bodies in relation to sustainability                | General; Governance; pp. 6–7                                                                                       |
|                                              | GOV-2: Integration of sustainability-related performance in incentive schemes                                         | General; Governance; p. 6                                                                                          |
|                                              | GOV-4: Risk management and internal controls over sustainability reporting                                            | General; Governance; pp. 6–7                                                                                       |
|                                              | SBM-1: Strategy, business model and value chain                                                                       | General; Strategy; pp. 7–9                                                                                         |
|                                              | SBM-2: Interests and views of stakeholders                                                                            | General; Strategy; pp. 7–9                                                                                         |
|                                              | SBM-3: Interaction of material impacts risks and opportunities with strategy and business model and financial effects | General; Impact, risks and opportunities; p. 10                                                                    |
|                                              | IRO-1: Description of the process to identify and assess material impacts, risks and opportunities                    | General; Impact, risks and opportunities; p. 10<br>All subsections: 14, 20, 22, 39, 40, 45, 48, 51, 54, 57, 58, 59 |
|                                              | IRO-2: Disclosure requirements in ESRS covered by the undertaking’s sustainability statement                          | General; Impact, risks and opportunities; p. 10<br>All subsections: 14, 20, 22, 39, 40, 45, 48, 51, 54, 57, 58, 59 |
| <b>Environment (E)</b>                       |                                                                                                                       |                                                                                                                    |
| ESRS E1<br>Climate change                    | E1-1: Transition plan for climate change mitigation                                                                   | Environmental responsibility; Adaptation to climate change, climate protection and energy; pp. 39-44               |
|                                              | E1-2: Identification of climate-related risks and scenario analysis                                                   | Environmental responsibility; Adaptation to climate change; p. 39                                                  |
|                                              | E1-3: Resilience in relation to climate change                                                                        | Environmental responsibility; Adaptation to climate change; p. 39                                                  |
|                                              | E1-4: Policies related to climate change mitigation and adaptation                                                    | Environmental responsibility; Adaptation to climate change, climate protection and energy; pp. 39-44               |
|                                              | E1-5: Actions and resources in relation to climate change mitigation and adaptation                                   | Environmental responsibility; Adaptation to climate change, climate protection and energy; pp. 39-44               |
|                                              | E1-6: Targets related to climate change                                                                               | Environmental responsibility; Adaptation to climate change, climate protection and energy; pp. 39-44               |
|                                              | E1-7: Energy consumption and mix                                                                                      | Environmental responsibility; Climate protection and energy; pp. 41-43                                             |
|                                              | E1-8: Gross Scope 1, 2 and 3 GHG emissions                                                                            | Environmental responsibility; Climate protection and energy; pp. 40-41                                             |
| ESRS E5<br>Resource use and circular economy | E5-1: Policies related to resource use and circular economy                                                           | Environmental responsibility; Resources and circular systems; pp. 45-46                                            |
|                                              | E5-2: Actions and resources related to resource use and circular economy                                              | Environmental responsibility; Resources and circular systems; pp. 45-46                                            |
|                                              | E5-3: Targets related to resource use and circular economy                                                            | Environmental responsibility; Resources and circular systems; pp. 45-46                                            |
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# Editorial notes

**Editorial team**  
Christian Höcker (responsible)  
Stephanie Ruschig  
Anja Gilch

**Editorial address**  
Fraunhofer-Gesellschaft  
Hansastraße 27 c  
80686 Munich  
Germany  
nachhaltigkeit@zv.fraunhofer.de

Layout: Silke K. Schneider

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