Federal Ministry
Republic of Austria
Education, Science
and Research

Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

Federal Ministry
Republic of Austria
Labour and Economy

Austrian Research and Technology Report

2024

This report was commissioned by the Federal Ministry of Education, Science and Research (BMBWF), the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) and the Federal Ministry of Labour and Economy (BMAW). The report was compiled by a working group consisting of WPZ Research, the Centre for Social Innovation (ZSI) and Austrian Institute for SME Research with support from the Institute for Innovation and Technology (iit) at VDI/VDE Innovation + Technik GmbH and Technopolis.

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Imprint

Media owner (publisher):
Federal Ministry of Education, Science and Research, 1010 Vienna
Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, 1030 Vienna
Federal Ministry of Labour and Economy, 1010 Vienna

Design, layout and graphics: donaugrafik Schepelmann & Tettinger OG, 2440 Gramatneusiedl
Graphic Recording: VerVieVas GmbH, 1190 Vienna

Photo cover and front pages: © shutterstock/DLumen
The image shows neutrophil granulocytes under the electron microscope. Neutrophil granulocytes are a type of white blood cell. They are part of the human immune system and are used to fight microorganisms.

Printing: Ferdinand Berger & Söhne Ges.m.b.H., 3580 Horn

Accessible pdf: Barrierefrei PDF OG, 4614 Marchtrenk

Vienna, 2024

Preface

The Austrian Research and Technology Report 2024 provides an overview of federally funded research, technology and innovation (RTI) in Austria. In addition to presenting current research policy developments, the milestones achieved in the implementation of the RTI Strategy 2030, new research-relevant sub-strategies and the latest developments in the higher education sector, it also provides analyses of Austria's national and international RTI performance. These are based on recent data from international rankings, the full survey on the funding and performance of research and experimental development (R&D) 2021 and the global estimate 2024.

Austria is among the leading countries in the EU in terms of RTI indicators, R&D expenditure, ERC grants and scientific publications. Austria was able to increase the share of R&D employees in the total labour force, which exceeded 2% for the first time, compared to the previous year. In the global innovation rankings, Austria improved its position in the European Innovation Scoreboard by two places to rank 6 in 2023, and is now the leading "Strong Innovator". Austria is clearly in the vanguard in terms of patent applications in the field of quantum technologies and scientific publications in the field of quantum research. Graduates in STEM subjects are important future specialists in technology-based industries. A large proportion of STEM graduates thus promises sustainable positive prospects for future innovative capability. Austria ranks second in the EU-27 in terms of STEM graduates.

Success can also be measured at EU level: the third year of Horizon Europe shows that research institutions and active researchers based in Austria continue to embrace the European Framework Programme for Research and Innovation and are performing very well. The success rate is above the European average and the return flows to Austria have increased compared to Horizon 2020.

The EU Chips Act to create a framework for measures to strengthen the European semiconductor ecosystem is of great importance for Austria: Austria is one of the most flourishing microelectronics locations in Europe and ranks fourth in the EU in terms of value added, employment and patent activities in this area, and third in terms of private investment and research and development investment by business enterprises. In an EU comparison, Austria thus has the highest share of microelectronics production in total value added, total employment and R&D investments by business enterprises. This area of strength, which clearly demonstrates the interplay between research and production at the location, is therefore being prioritised by the Federal Government.

In challenging times, it is crucial to promote research and development and boost investment, thereby accelerating the transformation of the business location and making our society fit for the future. The Climate and Transformation Initiative is supporting the shift towards a sustainable, renewable energy-based and digitalised economy in all sectors. Initial interim

results and a high demand from business enterprises confirm the need for the measures implemented to date.

The Austrian Research and Technology Report 2024 focuses on excellence and innovation in life sciences and health. Excellent research and its successful utilisation are the basis for economic growth, competitiveness and prosperity and contribute to the creation of new jobs and the strengthening of the science, research and innovation location.

Life sciences are among the knowledge- and research-intensive sectors and the importance will continue growing in the future. According to the European Commission, biotechnology is one of the six "key enabling technologies". The events of recent years – above all the COVID-19 pandemic and the war in Ukraine – demonstrate how dependent the supply of strategically important goods is on geopolitical relationships, including in (parts of) the life sciences industry.

Innovation and growth in the life sciences sector as a whole is continuously strengthened not least by cooperation and networks of excellent research institutions. Austria's areas of strength include cancer research, precision medicine and medical products. The first results of personalised medical care have already found their way into clinical practice.

Austria's RTI policy has long recognised the strategic relevance of this topic and supports new knowledge, from basic research and applied research through to implementation in new products and services. Attractive framework conditions have been created through a broad research funding portfolio of excellence-promoting, technology-open and thematic research funding programmes as well as the research premium.

As part of the Excellence Initiative, co-operative top-level research projects were funded, areas of strength in basic research, such as the life sciences, were further expanded and their international visibility increased. The Future Austria Fund was also used to set specific priorities in this strategically important area. In addition, extensive investments have been made in research infrastructures and in teaching and research at higher education institutions, as well as in the expansion of central non-university research institutions that are excellent in an international context. The focus on life sciences is also continuing in applied research.

Public and private investment in research and development will increase beyond the life sciences sector in 2024. According to estimates by Statistics Austria, a strong increase in total expenditure on research and development of around 6.8% to a total of €16.6 billion is expected again in 2024. This means that R&D expenditure is expected to reach 3.34% of nominal gross domestic product (GDP). In the current geopolitical situation, this is an important sign of investment in the future, which acts as a long-term guarantee of competitiveness. This positive development can be attributed in part to the Federal Government's increase in R&D expenditure of around 10% compared to 2023. The entire public sector will spend an estimated total of €5.6 billion in 2024, which is around 34% of the total R&D funding.

Two thirds of R&D investments are made by companies in Austria and abroad. Austrian companies are expected to finance around half (€8.4 billion) of R&D expenditure in Austria in 2024, including the 2024 research premium, which the Federal Ministry of Finance estimates at around €1 billion. In addition, the predicted 16% (approx. €2.6 billion) in 2024 that will be

financed from abroad is mainly from foreign companies with subsidiaries performing R&D in Austria.

A core chapter of this report is devoted to the monitoring of the eleven central research and research funding institutions, which must be compiled annually in the Austrian Research and Technology Report in accordance with the Research Financing Act, and for the first time the report presents the development of selected indicators over the past five years. The three-year funding periods within the framework of the RTI Pacts enable multi-year funding security. This has created a stable and reliable framework for RTI actors.

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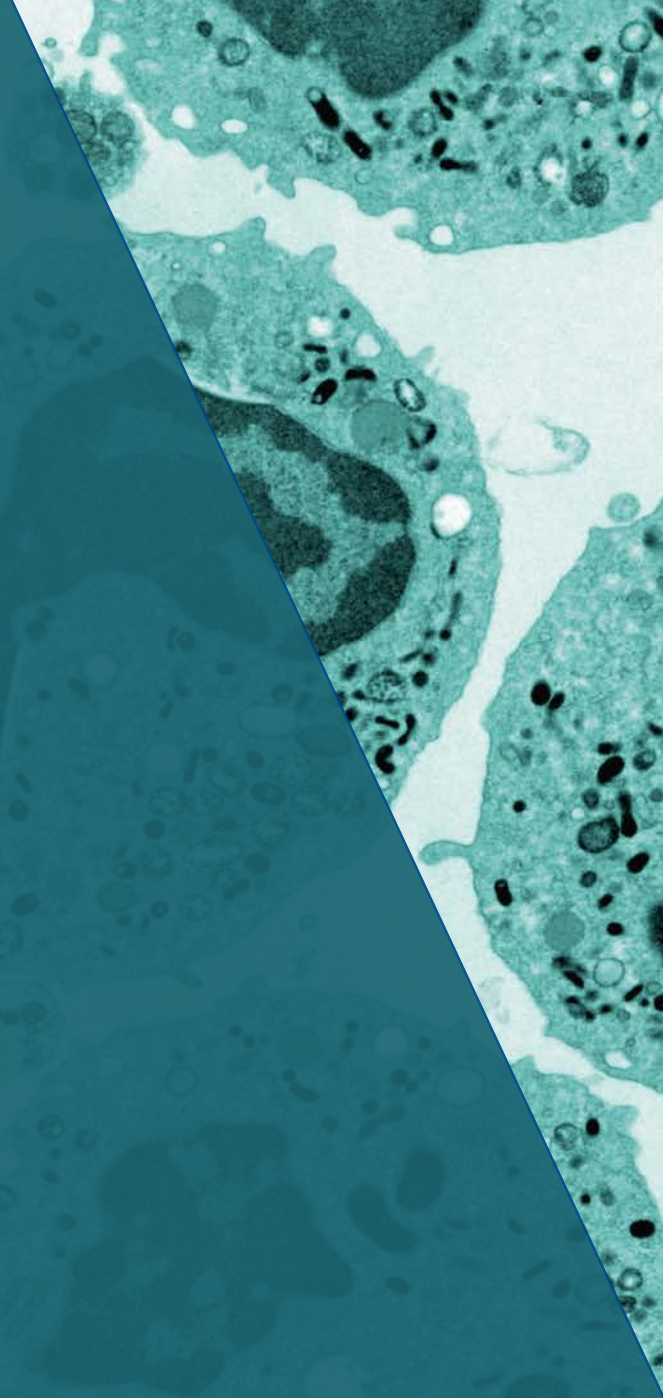


The Research and Technology Report 2024 is a report by the Federal Government on the status and needs of research, technology and innovation in Austria pursuant to Section 8 (2) of the Research Organisation Act (FOG).

Research intensity reaches a new record of 3.34% in 2024

According to Statistics Austria's global estimate, the expenditure on research and development (R&D) will amount to €16.64 billion in 2024. This means that the research intensity (percentage of gross domestic expenditure on R&D relative to gross domestic product (GDP)) will reach a record level of 3.34% (compared to 3.26% in 2023). In 2024, the largest share of R&D funding will again be provided by a strong business enterprise sector. Domestic companies will contribute €7.42 billion, which corresponds to 44.59% of total R&D funding. In addition, financing from foreign companies accounts for the largest share of R&D financed from abroad, the latter totalling €2.59 billion or 15.54%. According to the Federal Ministry of Finance, the research premium will account for an estimated €1 billion in 2024, which corresponds to 6.01% of total R&D funding. The Federal Government will contribute €4.62 billion in 2024, which corresponds to 27.76%. The share of R&D funding by the Federal Government in GDP will therefore increase by 5.68%, i. e. from 0.88% in 2023 to 0.93% in 2024. By increasing expenditure on R&D, the Federal Government demonstrates a strong commitment to sustainably strengthen Austria as a location for R&D and innovation.

The R&D survey 2021 shows the distribution of funding and implementation in detail, and thus allows for comparisons over time. In terms of business expenditure, manufacturing dominates, accounting for 71.93% of the business enterprise sector in 2021. Within manufacturing, the medium-high technology sector dominates in terms of expenditure, although the share of the high-tech sector continues to increase. Among the federal states, Styria and Vienna dominate, together accounting for over 50% of R&D expenditure in 2021, with a strong upward trend in Upper Austria. The business enterprise sector has the largest share of scientific personnel overall (2021: 63.71%). The proportion of women has increased significantly, particularly in the higher education sector (2021: 39.30%).

Leading role in R&D expenditures, ERC grants and excellent scientific publications in the life sciences in the field of biochemistry, genetics and molecular biology

When looking at the RTI indicators "R&D expenditure", "ERC grants" and "Excellent scientific publications in the life sciences field of biochemistry, genetics and molecular biology", Austria is among the best ranked countries in an international comparison, i. e. in 3rd place for the first-mentioned indicators and 4th place for publications. The position in terms of R&D employees and the proportion of women in research has remained the same, despite a proportionate improvement in which Austria was able to increase its respective share compared to the previous year. For example, the proportion of R&D employees in the labour force has exceeded 2% for the first time. In the global innovation rankings, Austria was able to improve its position in the European Innovation Scoreboard (EIS) by two ranks to 6th place in 2023. Austria also managed to improve its position in venture capital investments by two ranks and now ranks 15th.

Austria at the forefront of quantum research and technologies

Austria is clearly in the vanguard in terms of patent applications in the field of quantum technologies and scientific publications in the field of quantum research, ranking in third and second place.

Top ranking in environmental sustainability

In terms of environmental sustainability, Austria was able to improve its position in the relevant indicators for the utilisation rate of recyclable materials and resource productivity, and once again achieved a top ranking in national expenditure on environmental protection, namely second place.

Austria has already raised €1 billion in Horizon Europe funding

Austria has performed extremely well in Horizon Europe. In the first three years of the programme, which was launched in 2021, a total funding of almost €1 billion was raised; this corresponds to 3.3% of the funds distributed by the European Commission. In the predecessor programme Horizon 2020, the corresponding figure for funding raised in Austria was 2.9%.

In a European comparison, Austrian stakeholders perform particularly well in the "European Research Council" (ERC) programme line, as well as within the "Global Challenges and European Industrial Competitiveness" pillar in the "Culture, creativity and inclusive society", "Digitalisation, industry, aerospace" and "Climate, energy and mobility" clusters. Measured in terms of funding received, the higher education sector was particularly successful in Horizon Europe at the end of 2023, with a share of 40% of the funding received by Austria, followed by the non-university research sector with a share of 28% and the business enterprise sector with a share of 25%. The remainder is split between other organisations.

The European Defence Fund (EDF) is presented for the first time in this report. Here, the Austrian success rate has risen from 34% (2021 call) to 61% (2022 call). A total of 26 EDF projects with Austrian consortium participation are currently ongoing from the 2021 and 2022 tender cycle.

Austria as an important player in the implementation of European RTI policy

With reference to the political agenda for the European Research Area (ERA), Austria is implementing specific priorities as part of the National Action Plan for the European Research Area. Due to current developments, this year the priorities "Knowledge Valorisation" and "Open Science" and the associated Austrian activities are presented in detail.

The implementation of the EU Chips Act is also reported. This is of great relevance, as Austria has the highest share of microelectronics production in total value added, total employment and research and development by business enterprises in the EU. The EU Chips Act is intended to strengthen security of supply and global competitiveness in chip development and production and to create a framework for measures to strengthen, resilience and increase the independence of the European semiconductor ecosystem. In Austria, a total of €2.8 billion will be released from public funds for investments in chip production by 2031 to trigger more than €7 billion in private investments.

Furthermore, the focus is on the implementation of the European Innovation Agenda, which was adopted in July 2022, as well as the measures taken in Austria; ultimately, the success of the European Innovation Agenda depends on the support and participation of the Member States. The choice of key areas at European level is currently proving favourable for Austria, as they reflect the strategic development lines of the Austrian innovation system.

The report also includes the Austrian initiatives for better use of the "Knowledge and Innovation Communities" (KIC) of the European Institute of Innovation and Technology (EIT), which closes the circle to the European Research Framework Programme Horizon Europe, being the central source of funding for the EIT and the KIC. The focus here is on those KIC which have established Co-Location Centres or a Regional Innovation Centre in Austria. These are the KIC EIT Manufacturing – added value in manufacturing; EIT Health – innovation for healthy living and active ageing; EIT Culture and Creativity – cultural and creative industries; and EIT RawMaterials – sustainable exploration, extraction, processing, utilisation and substitution.

Excellence and innovation in life sciences and health

Factors such as an ageing population, the increase in rare diseases, the risk of pandemic outbreaks, the rising number of cancer cases, the dependence on

supply chains in drug production and the high costs of research infrastructures, have led the European Commission to view life sciences as central and strategically relevant for the future of Europe. The aim of major European structural programmes, the research framework programme and the mission-oriented policy approach is therefore to support the life sciences sector in all its diversity, not least in order to strengthen Europe as a pharmaceutical and life sciences location in competition with the USA and China.

Austria's RTI and education policy comprehends the importance of the life sciences. In recent years, excellent research in the life sciences has been established in Austria. New knowledge, new products and services are generated constantly. This is supported by excellence-oriented, technology-open as well as thematic research funding programmes and also via the research premium. Major investments in research infrastructures bring additional locational advantages.

In this regard, the focus chapter of this year's Austrian Research and Technology Report addresses the regulatory framework and developments in Europe as a life sciences location. This is followed by a systemic view of the key academic and scientific players as well as the development of the business landscape in Austria. Various funding measures and initiatives at national and regional level, as well as Austria's participation in European partnerships in the life sciences, are also presented. The developments show that clinical research in particular has once again moved to the centre of attention of RTI policy, not least because an active, dynamic clinical research location and excellent clinical research expertise are essential for a high-quality, modern and efficient healthcare system, and for Austria as a dynamic pharmaceutical and medtech location.

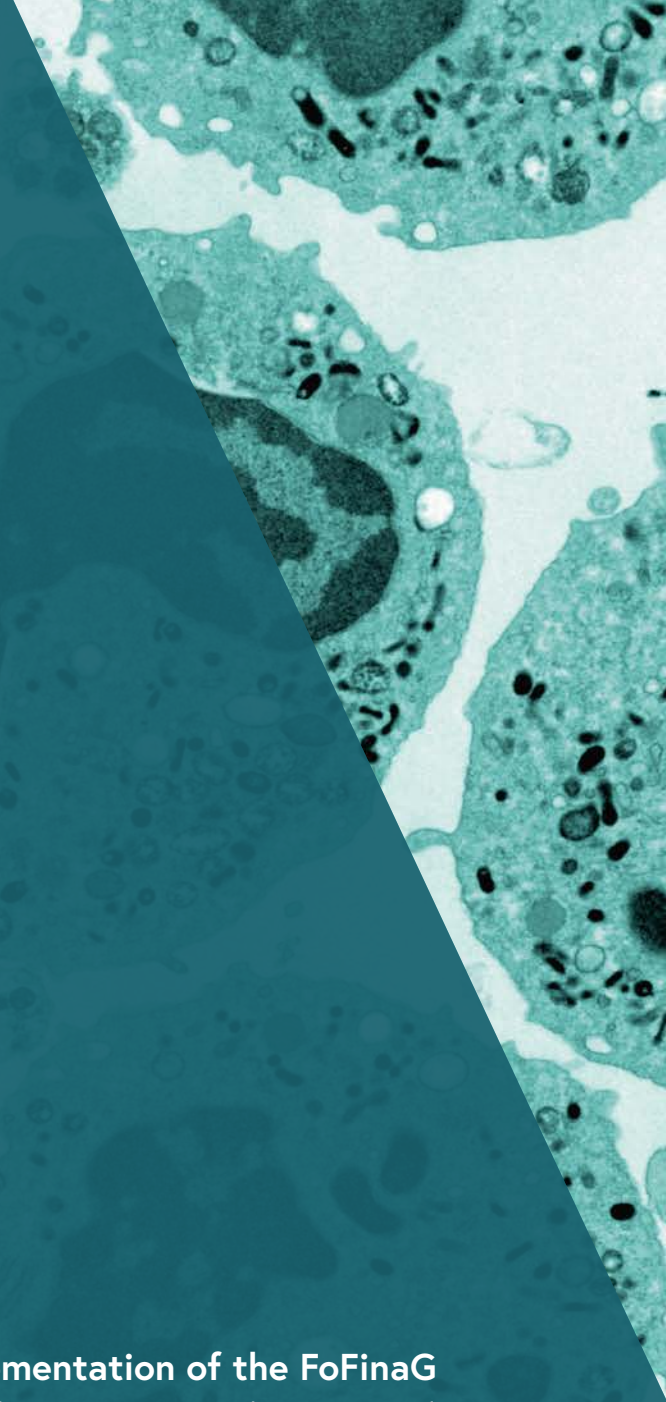
RTI evaluation culture and practice

For over 25 years, RTI policy in Austria has been characterised by a culture of evaluation focusing on quality and transparency. Programmes, and increasingly also institutions and instruments, are regularly analysed in terms of target achievement, impact and efficiency. The vast majority of evaluation reports are available to the public in the repository of the Austrian Platform for Research and Technology Policy Evaluation (fteval).

Monitoring in accordance with the Research Financing Act (FoFinaG)

Chapter 3 covers the monitoring of the central research and research funding institutions in accordance with Section 8 of the Research Financing Act, and for the first time also shows the development of selected indicators over the last five years. The monitoring covers eleven central institutions, six of which are research institutions and five research funding institutions. Eight indicators are mapped on the basis of the respective profile and the associated positioning in the innovation system.

1 Current developments



Chapter 1 focuses on current developments at governance level with regard to research, technology and innovation policy, as well as higher education policy in Austria. The Federal Government's RTI Strategy 2030 provides the overarching, national, strategic framework. Chapter 1.1 thus addresses the priority objectives of the RTI Strategy 2030 and their implementation through the RTI Pact and the Research Financing Act (FoFinaG). Chapter 1.2 briefly presents a series of predominantly new RTI sub-strategies and RTI initiatives defined at national level, before Chapter 1.3 looks at selected developments in the higher education system.

1.1 RTI Strategy 2030, RTI Pact and implementation of the FoFinaG

Implementation of the RTI Strategy 2030

Austria's and Europe's prosperity and growth are closely linked to research, technology and innovation (RTI). Research, technology and innovation contribute significantly to strengthening the location, and will continue to be a central basis for ensuring good coexistence in the face of the many global crises of our time.

The RTI Strategy 2030 provides a long-term framework. It is supported by the RTI Task Force, which has acted as the central coordination and steering body for RTI policy at federal level for over ten years.[1] The RTI Task Force is supported in its work in particular by two working groups, one of which supports the implementation of research and technology infrastructures and another which coordinates the implementation of EU missions in Austria. In addition, the RTI Task Force serves as the European Commission's point of contact for smart specialisation in Austria. Finally, one of the central tasks of the RTI Task Force is to monitor the implementation of the RTI Strategy. The external mid-term evaluation provided for in the RTI Strategy 2030 will be arranged for 2025.

The objectives of the RTI Strategy 2030 are operationalised by the respective RTI Pact. In accordance with the Research Financing Act (FoFinaG), the RTI Pact represents the link between the RTI Strategy 2030, RTI funding and the implementing institutions. Following the first RTI Pact for 2021–2023, the Federal Government adopted the second RTI Pact for the years 2024–2026 in December 2022. In 2023, performance and funding agreements for the years 2024–2026 were negotiated with all central institutions in accordance with the Research Financing Act on the basis of the RTI Pact 2024–2026. This makes the RTI Pact an integrative element in the Austrian RTI landscape that creates a stable and reliable framework for RTI actors.

The performance and funding agreements focus on the implementation of key sub-strategies and major initiatives in the RTI sector[2] to pursue the goals of the RTI Strategy 2030 in a well-coordinated manner, and implement the priorities of the RTI Pact 2024–2026.

Priorities of the Future Austria Fund

The Future Austria Fund (FZÖ), which is administered by the National Foundation for Research, Technology and Development, will continue to distribute a total of €140 million in 2024 to six beneficiary central institutions in accordance with the FoFinaG; these are the Austrian Research Promotion Agency (FFG), the Austrian Science Fund (FWF), the *Austria Wirtschaftsservice Gesellschaft* (aws), the Austrian Academy of Sciences (OeAW), the Christian Doppler Research Association (CDG) and the Ludwig Boltzmann Society (LBG). The FZÖ is used by the Federal Government to set strategic priorities and is intended to fund cutting-edge research in the fields of basic and applied research as well as technology development and innovation to complement the three-year RTI Pacts.

Derived from the RTI Strategy 2030 and based on the fields of action of the RTI Pact 2024–2026, the following priorities were decided for the 2024 funding allocation:

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1 The RTI Task Force is made up of representatives from the following ministries at a high administrative level and is chaired by the BKA: BMF (deputy chair), BMBWF, BMAW and BMK. As part of the implementation of the EC's Smart Specialisation approach, the RTI Task Force is also in close coordination with the BML and the office of the Austrian Conference on Spatial Planning. Central documents of the RTI Task Force and the working groups are available here: https://www.bundeskanzleramt.gv.at/themen/forschungskoordination_fti.html

2 For more detailed information, see Austrian Research and Technology Report 2023, p. 20ff.

Goal 1 – Catch up with the international leaders and strengthen Austria as an RTI destination:

- Expand research and technology infrastructure and ensure accessibility
- Utilise and develop Europe for Austria: Increase participation in EU missions, EU partnerships and lighthouses

Goal 2 – Focus on effectiveness and excellence:

- Promote excellent basic research
- Support research and its impact on the economy and society

Goal 3 – Focus on knowledge, talents and skills:

- Develop and promote human capital

FWIT Council

On 1 July 2023, the FWIT Council Establishment Act (FREG) came into full force with the FWIT Council Act (FWITRG) at its core. The new Research, Science, Innovation and Technology Development Council (*Forschungs, Wissenschafts-, Innovations- und Technologieentwicklungsrat*, FWIT Council) was established on this basis. The existing councils in the areas of research, technology development, science and innovation were merged, i.e. the Council for Research and Technology Development (FTE Council) in accordance with §§17 ff of the Research and Technology Promotion Act, Federal Law Gazette No. 434/1982 and the Austrian Science Council in accordance with §119 of the Universities Act 2002, Federal Law Gazette I No. 120/2002 and including the topics of the expired ERA Council Forum. The merger of existing councils in the RTI sector, which has been discussed for many years and agreed in the government programme, has thus been completed, taking into account the recommendations of the OECD,[3] and an important step towards new governance has been taken.

The FWIT Council has the following tasks in accordance with Section 2 (2) of the FWIT Council Act (FWITRG):

- Advising the Federal Government and individual members of the Federal Government on matters relating to Austrian and European science, research, technology and innovation policy, higher education institutions and the development and opening up of the arts;
- The submission of proposals for the RTI Pact in accordance with §2 of the Research Financing Act;
- The independent preparation of analyses and recommendations, in particular with regard to impact orientation to strengthen the Austrian science and RTI system, taking into account international standards;
- Supporting the Federal Chancellor, the Federal Minister of Education, Science and Research, the Federal Minister of Climate Action, Environment, Energy, Mobility, Innovation and Technology and the Federal Minister of Labour and Economy in analysing the implementation of the Federal Government's current research, technology and innovation strategy (RTI strategy) and in developing new RTI strategies, taking into account European and international standards;
- The preparation of a biennial activity report to the Federal Government, to be submitted to the National Council; and
- The support of the Foundation Board pursuant to §11 para. 1 no. 1 of the RTD National Foundation Act.

The members of the Council were appointed by the responsible Federal Ministers, the chairperson by the Federal Chancellor in agreement with the Vice Chancellor for a period of four years in accordance with Section 4 FWITRG. Care was taken to ensure a balance between scientific or scientific-artistic expertise and expertise in research-based or technology-developing companies.[4]

3 OECD Reviews of Innovation Policy, Austria 2018
4 https://www.bmbwf.gv.at/Ministerium/Presse/20231127b.html

Initial substantive work on national and European topics has already begun.

In addition, eight Supervisory Board members were nominated by the responsible Federal Ministers and the Federal Chancellor in accordance with Section 5 FWITRG.[5]

As stipulated in the FWITRG, the Supervisory Board advertised and appointed the management after obtaining an opinion from the Council. The new management has been in place since May, supported by an office.

1.2 RTI-relevant sub-strategies

With the RTI Strategy 2030, Austria is pursuing the goal of positioning itself internationally as a technology and innovation leader. Numerous sub-strategies launched in the RTI sector at federal level support this overarching goal, some of which are open to all topics and have a broad impact, while others are topic-specific and focus on selected stakeholder groups.

The most recent RTI-relevant sub-strategies and initiatives are therefore presented below under the umbrella of the RTI Strategy, and their objectives and current developments are briefly described. The RTI-relevant sub-strategies that are either currently of central importance or have only recently been initiated will be discussed in more detail. In addition, there are other national RTI-relevant sub-strategies that have been implemented or are in progress for some time, such as the Creative Industries Strategy *(Kreativwirtschaftsstrategie),* the IP Strategy *(IP-Strategie),* the Open Innovation Strategy, the Foreign Trade Strategy *(Außenwirtschaftsstrategie)* or the AI Strategy *(KI-Strategie).*

Excellence Initiative (excellent=austria)

The Excellence Initiative was initiated by the Federal Ministry of Education, Science and Research (BMBWF) to promote top-level research in combination with the promotion of young talent and cooperation:

- Promotion of outstanding basic research – open to all topics, according to the highest international standards and with room for unconventional approaches;
- Increased promotion of gender equality and diversity, creation of attractive career prospects for excellent early career researchers;
- Expansion of sustainable collaborations (national and international) to leverage synergies;
- Strengthening Austrian universities and non-university research institutions in global competition;
- Enhancing the international reputation of Austrian research institutions; and
- Strengthening the transfer of research results to industry and society.

The concept of the High Level Group (Chairpersons of the Austrian Science Council, the Austrian Council for RTD, the ERA Council Forum and the President of the FWF) envisages a term of ten years. The following funding programmes will be implemented by 2026:

- Clusters of Excellence (COE): bundling existing areas of strength;
- Emerging Fields (EF): Enabling new fields of research and topics with high innovation potential.

5 https://forwit.at/aufsichtsrat/

"excellent=austria" was launched with the first COE call for proposals at the end of 2021, with the first funding commitments announced in March 2023. The research teams have €135 million at their disposal for five years, 60% of which is funded by the FWF and 40% of which is provided by the participating research institutions. The COEs were designed by the High Level Group in such a way that, following a positive evaluation after five years, there is the possibility for an extension for a further five years. In the FWF funding agreement period 2024–2026, excellent=austria is to be continued with further approvals of COE applications that have already received excellent reviews (2024) and two rounds of EF approvals (2024 and 2026).

Science and democracy are part of our DNA

Since autumn 2022, the BMBWF has been working intensively on strengthening trust in science and democracy. The starting point was the Eurobarometer surveys from 2021, according to which interest in science in Austria is low in international comparison. The study on ambivalence and scepticism in Austria with regard to science and democracy (*Ursachenstudie zu Ambivalenzen und Skepsis in Österreich in Bezug auf Wissenschaft und Demokratie*) that was published in August 2023[6] provided important insights for identifying new measures and implementing them more intensively from 2024 as part of the long-term "DNAustria" campaign with the help of an information, awareness and activation campaign. The aim is to better communicate the importance of science and democracy in our everyday lives. In particular, this includes emphasising that science and research are the cornerstones of our democratic society, the building blocks of our country and the driving force behind our future development. Participation and trust, innovation and creativity should be strengthened through them.

Democracy and science are closely linked, and the image of the DNA double helix comes to mind. This gave rise to the name of the campaign: DNAustria. DNAustria takes the results of the study into account and now bundles all communicative activities that are intended to contribute to strengthening trust in democracy and science. The goals are:

- Making visible where and how science and democracy are lived every day;
- Find out what is currently being researched and where people are getting involved;
- Informing where there is still something to do, where each and every one of us can become active; and
- Showing what has already been achieved in both areas – but above all what is still planned for the future.

Key initiatives of the BMBWF include Sparkling Science (Sparkling Science 2.0 since 2021), the children's and youth universities supported since 2004 and the Science Ambassadors programme.[7]

STEM action plan and STEM regions

The BMBWF action plan "*MI(N)Tmachen*" for more STEM specialists in Austria was presented in June 2023. In line with the RTI Strategy 2030, the aim is to achieve a 20% increase in the proportion of graduates in STEM subjects and a 5% increase in the proportion of women graduates in technical subjects by 2030 in order to sustainably counter the shortage of skilled labour.

The action plan addresses the entire education chain from kindergarten to university graduation in eight action lines. It bundles existing STEM initiatives of the BMBWF as well as new measures, promotes their implementation and strengthens their interaction. The intention of the measures is to get more of tomorrow's skilled workers onto a STEM education path and to support the full development of their potential right

6 See Starkbaum et al. (2023).

7 More information on DNAustria and the individual initiatives and offers can be found at https://dnaustria.at/

through to a successful STEM degree, because in order to tackle the major challenges currently facing society, such as digitalisation, climate change and the energy transition, we need sound skills in mathematics, IT, natural sciences and technology.

In implementation of Action Line 1 of the STEM Action Plan, the BMBWF, together with its cooperation partners the Federation of Austrian Industries, the MINTality Foundation and the OeAD, awarded the STEM regions quality label for the first time on 11 December 2023. 14 STEM networks that met the tender criteria for the quality label were honoured. Around 380 stakeholders are currently involved in the 14 Austrian STEM regions – including 161 kindergartens and schools, 88 companies, 15 higher education institutions and over 100 other partners from public or private institutions. The STEM regions are helping to ensure that children and young people in particular have more opportunities to experience and understand maths, IT, science and technology in their everyday environment as early as possible through joint projects – be it through exciting experiments, interactive workshops or practical projects.

Since 2008, the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) has also been supporting the topic of STEM through the structural promotion of young talent in the natural sciences and technology in order to get young people interested in the Austrian research landscape. The calls for proposals for "*Talente regional*" projects aim to promote multi-actor networks in order to bring the world of research and business together with children and young people in close proximity. As part of the *Talente regional* funding programmes, children and young people are encouraged to engage with RTI in the fields of science and technology over a longer period of time. Children and young people deal with exciting topics, research, experiment and get to know activities, organisations and job profiles in RTI. Since 2009, the Austrian Research Promotion Agency (FFG) has been handling the calls for proposals. Since then, almost 200 regional projects have been funded, jointly implemented by research institutions, higher education institutions, educational institutions and companies. In autumn 2024, another *Talente regional* call for proposals will be launched, with almost €3.0 million.

The STEM Girls Challenge[8] was launched in 2021 as a joint initiative of the Federal Ministry of Labour and Economy (BMAW), the Federal Chancellery (Section III: Women's Affairs and Gender Equality) and the Federation of Austrian Industries. As part of an Austria-wide ideas competition for girls and young women between the ages of 3 and 19, the aim is to raise their interest in maths, IT, science and technology in order to introduce them to exciting career opportunities in the technical field. Related qualifications will be in high demand on the labour market in the coming years. The third round of the STEM Girls Challenge started in autumn 2023.

A total of 14 projects were selected in the 2021 call for funding for the empowerment of girls and women in education, work and society with a focus on STEM and financial skills.[9] In the projects running from October 2021 to December 2022, girls and women of all ages are generally given access to STEM subjects and STEM training with the aim of supporting their empowerment process. Girls and young women are to be empowered in their freedom of choice and given a diverse educational and professional image beyond gender stereotypes. Three selected financial education projects are designed to teach women and girls about the impact of career decisions on their (future) financial livelihood and independent economic security throughout their lives and show them different options

8 https://www.mintgirlschallenge.at

9 https://www.bundeskanzleramt.gv.at/service/foerderungen-des-bundeskanzleramtes/frauenprojektfoerderungen/foerderaufruf_mint_finanzkompetenzen.html

for action. This will enable women and girls to make informed financial decisions and further strengthen their economic independence.

Climate and Transformation Initiative

With the Climate and Transformation Initiative, the Federal Government, under the leadership of BMK and BMAW, aims to support the Austrian industry in its transformation to a sustainable economy, based on renewable energies and digitalisation in all sectors.

A budget totalling €6.0 billion (of which €5.4 billion from the BMK and €600 million from the BMAW) will be made available to companies for this support until 2030.

The BMK supports Austrian industry with these three tracks:

- Track 1: Transformation of industry: research and technology development funding totalling €280 million for 2023–2027 in the Climate and Energy Fund, location and investment funding as part of the Environmental Funding Act totalling €2.975 billion from 2023–2030 (€175 million in 2023, €400 million annually thereafter), mainly for reduction of CO_2 emissions in industrial production processes.
- Track 2: Support for additional energy efficiency measures: €190 million per year – total: €1.52 billion.
- Track 3: Continuation of environmental funding in Austria until 2026 – total: €600 million.

The research and technology development funding under Track 1 "Transformation of industry" is described in detail below. In Track 1, the BMK supports Austrian industrial companies in making their production processes climate-neutral. On the one hand, this strengthens value creation in Austria and, on the other hand, leads to greater independence from fossil fuel imports. In order to bring industry onto the ambitious zero-emissions pathway by 2040, innovative, commercially available technologies for lower energy consumption and the complete replacement of fossil fuels and raw materials in industrial production are needed by 2030. Showcase projects will be used to demonstrate that climate-neutral industrial production is possible with innovations made in Austria.

The BMK has launched a cross-policy and cross-instrument initiative to transform the industry, which includes both research and investment funding.

- RTI Initiative for the transformation of industry: €280 million for 2023–2027 in the Climate and Energy Fund.
- Industry transformation investment initiative as part of the Environmental Promotion Act ("*Umweltförderungsgesetz*"), totalling €2.975 billion from 2023–2030 (€175 million in 2023, €400 million annually thereafter).

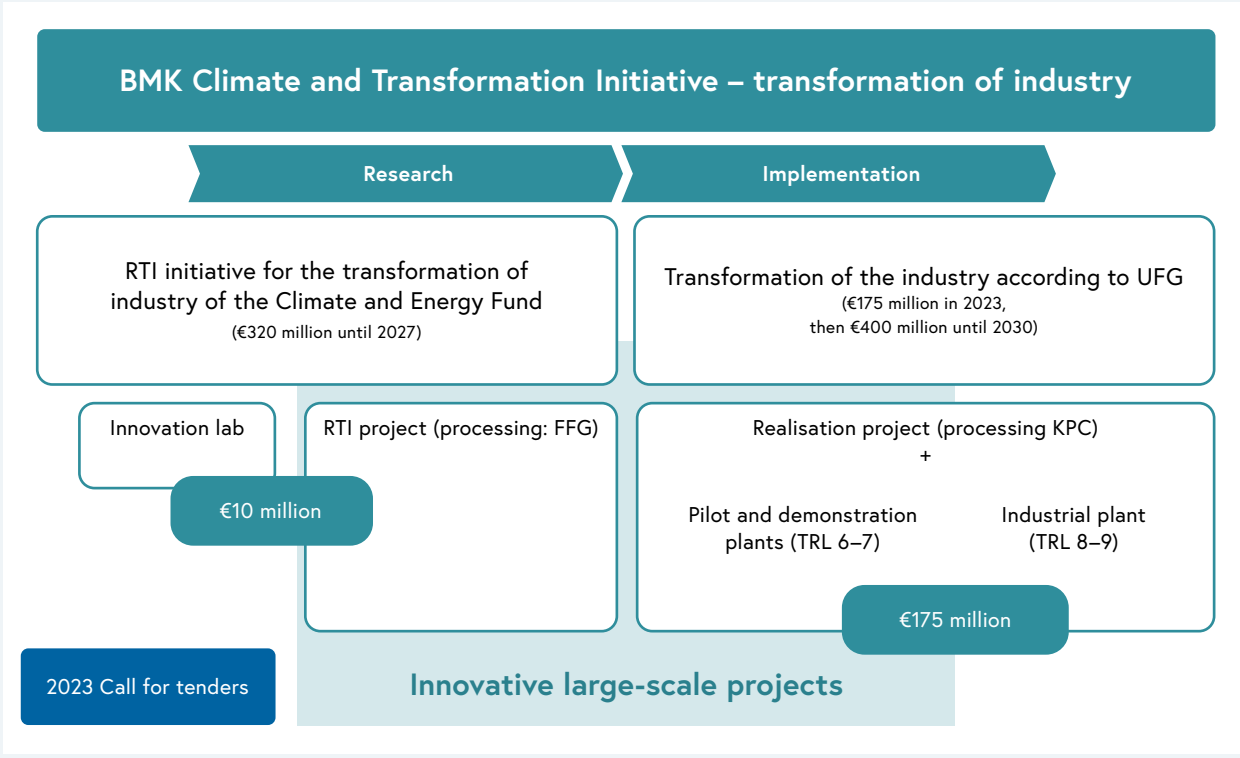
The RTI initiative for the transformation of industry comprises five complementary modules:

1. Establishment of an innovation laboratory that acts as a national contact point and international gateway for research and innovation in the field of industrial decarbonisation in Austria (already ongoing in 2024);
2. Stand-alone R&D projects (from 2024, TRL 4–8): Support necessary innovation steps in electrification/energy efficiency measures, energy source change, CCU and circular economy, on the other hand also explicitly enable sector-specific innovation projects;
3. Integrated, highly innovative RTI demonstration projects; RTI project networks for the development and testing of pilot and demonstration plants. The project network provides the basis for the next scale-up steps towards large-scale application with corresponding submission volumes (TRL 4–8);
4. Innovative large-scale projects (TRL 5–8); individual RTI projects to support the large-scale implementation of pilot and demonstration plants funded under environmental funding (see above); and
5. Promotion of skills and competences.

The first call for proposals was opened in May 2023 (see Figure 1.1). An innovation laboratory (Module 1) and innovative large-scale projects (Module 4) were put out to tender via the FFG. Module 4 was linked to the investment tender for pilot and demonstration plants and industrial plants by KPC.

Nine major projects totalling €157.7 million were funded as part of the first call for proposals for the "Transformation of Industry under the Environmental Support Act" (*Transformation der Industrie nach Umweltförderungsgesetz*). The aim is to save 2.4 million tonnes of climate-damaging CO_2 emissions each year.

Figure 1-1: Illustration of the BMK Climate and Transformation Initiative for the transformation of industry (Track 1)



Source: BMK.

The BMAW provides €600 million for the period 2023–2026 to support via three tracks along the added value chain. These are:

Track 1: Research and technology development funding (FFG)

- Promotion of technology-open, application-orientated research – generally open to all industries, but with a specific focus on the automotive, semiconductor and life sciences sectors
- Industry-Science Co-operations
- Implementation is primarily carried out by the FFG (basic programmes):
  - Transformative R&D&I projects and manufacturing transition
  - Frontrunner

Track 2: Qualification measures (FFG)

- A qualification initiative intends to offer retraining measures on and off the job, low-threshold qualification programmes/training and further education.
- Implementation is primarily carried out by the FFG:
  - Skills vouchers
  - Qualification projects (as individual or consortium projects)
  - Further Training LABs (innovation lab)

Track 3: Location and investment promotion (aws)

- Translation of research and development work into production and practice (pilot and demonstration projects, etc.)
- Support for innovative/sustainable production processes
- Implementation is primarily carried out by aws
  - Financing of transformative demonstration and pilot plants
  - Investment financing up to first industrial deployment (first commercial utilisation)

In 2023, the first tenders financed by funds from the Transformation Initiative were launched. An initial interim assessment (as of April 2024) shows that the funding programmes have been very well received:

- In the area of research funding, 167 projects with a funding volume of €108.5 million have been approved by the FFG to date.
- In the area of qualification measures, "skills vouchers" have been available for application since March 2023. The call for applications was closed on 5 January 2024 due to the budget being exhausted. In total, the FFG has approved over 2,500 skills vouchers for more than 1,200 companies in the amount of €6.2 million. A further call for proposals for skills vouchers was launched on 15 April 2024. From December 2023 to 5 April 2024, the call for proposals for qualification projects was launched with a budget of around €4.5 million. In addition, a new part of the initiative was launched on 15 April 2024 with a call for tenders for a further training LAB "Automotive".
- In the area of location and investment promotion, 46 TWIN Transition funding applications have been received for review by the AWS since November 2023. Three projects with a total grant volume of around €27 million have been approved so far. 33 applications with an application volume of €160 million and total costs of €650 million are currently undergoing detailed review; 10 projects could not be supported. The relaunch of the KMU. DIGITAL funding programme with the new "KMU. DIGITAL & GREEN" funding line (with a focus on the TWIN transition) will take place in the second quarter of 2024.

Austrian Research Infrastructure Action Plan 2030

The Austrian Research Infrastructure Action Plan 2030 (*Forschungsinfrastruktur-Aktionsplan 2030*) was developed across all ministries as part of the RTI Research Infrastructure Working Group to support the RTI Strategy 2030 and published in February 2023. It focuses on on the expansion of national research infrastructure and participation in European and international large-scale research infrastructure by 2030. The guiding principle of the Action Plan is the coordinated procurement and cooperative use of research infrastructure at national, European and international level. The research infrastructure database serves as a central instrument for monitoring the Research Infrastructure Action Plan 2030. The activities within the framework of the action plan will be continuously implemented until 2030.

Significant developments and changes compared to the previous year:

- Implementation of a research infrastructure tender (2023): FFG, EFRE
- Further technical development of the Austrian research infrastructure database

- FFG: Annual evaluation of the utilisation of previously funded research infrastructures
- Development of funding instruments for application-orientated testing and trial infrastructures (technology infrastructures) complementary to the research infrastructure

The BMBWF's research infrastructure database is the central instrument for supporting the Austrian Research Infrastructure Action Plan 2030. The international jury of the European Public Administration Award – EPSA 2023–24 nominated the public research infrastructure database as one of the best and most innovative projects in Europe. After winning the Austrian Public Administration Award 2021, the publicly accessible research infrastructure database received the European Good Practice Award in the category "Innovation in Public Administration" on 21 March 2024.

Public Procurement Promoting Innovation

The procurement of innovative solutions is intended to stimulate efficiency and modernisation in the public sector and at the same time strengthen value creation in Austria.

Public Procurement Promoting Innovation (PPPI) is firmly established in Austria's RTI policy as a demand-side instrument for promoting innovation, and is anchored in both the RTI Strategy 2030 and the RTI Pact 2024–2026. The PPPI Action Plan adopted by the Council of Ministers in September 2012 serves as the strategic framework for the PPPI initiative, the implementation of which has since been consistently pursued by the jointly responsible ministries BMAW and BMK.

A core element of the implementation of the PPPI Action Plan is the establishment and operation of a PPPI Service Centre, which has been based at *Bundesbeschaffung GmbH* (BBG) since autumn 2013 and has now been acting as a pioneer for innovation in public procurement for ten years. The PPPI Service Centre has been operating since April 2019 on the basis of a public-public cooperation between the BMAW, BMK and BBG, which was extended in 2023 for a further five years until 2028. The strategic priorities for the period up to 2028 are needs, innovations and technologies in the areas of sustainability and digitalisation. The support services of the PPPI Service Centre will focus on those public clients that have great potential for PPPI or can set an example for other organisations.

Other milestones in 2023 included the 60th PPPI challenge and the implementation of a PPPI call, which recognised the best innovations for climate-neutral cities and municipalities. In addition, international exchange was further intensified in the spirit of mutual learning, particularly with Germany and Portugal. In May 2023, a special PPPI prize was awarded during the Austrian Public Administration Prize award for the third time after 2019 and 2021.

Hydrogen Strategy for Austria

The Hydrogen Strategy initiated under the auspices of the BMK pursues a number of objectives:

- Use of climate-neutral hydrogen: Extensive substitution of fossil fuel with climate-neutral hydrogen in energy-intensive industry by 2030;
- Capacity expansion: development of 1 GW of electrolysis capacity by 2030;
- Market development: creation of a support framework for the production of renewable hydrogen;
- Development of a 100% renewable energy system: establishment of hydrogen production through electrolysis as an integral part of the energy system;
- International co-operation and hydrogen partnerships: development of international partnerships in the field of climate-neutral hydrogen; and
- Research and development: strengthening Austria as a centre of business and technology through hydrogen technologies.

The Hydrogen Strategy is being implemented in eight different fields of action along the entire hydrogen value chain, from production and infrastructure to demand and from research to market launch.

The production of renewable hydrogen is subsidised by investment grants for the construction of electrolysis plants for renewable hydrogen, by project funding as part of the IPCEI (Important Projects of Common European Interest) process and by the introduction of a renewable gas quota.

The demand for renewable hydrogen in sectors that are difficult to decarbonise, such as energy-intensive industry, will be stimulated by the new "Transformation of Industry" programme, for which €2.975 billion will be available until 2030. However, the continuation of regular environmental funding totalling €150 million per year until 2026 also provides funding for electrolyser projects.

In the area of infrastructure, the responsible ministries are working on the development of a suitable European and Austrian hydrogen infrastructure. In addition to the publication of an integrated Austrian network infrastructure plan (NIP), the BMK is in close dialogue with European partners on the development of European "hydrogen corridors".

The strategy also includes the targeted further development of hydrogen technologies in the mobility sector, particularly for lorries and buses. This is where the EBIN (Emission-free buses and infrastructure) and ENIN (Emission-free commercial vehicles and infrastructure) funding programmes come into play.

Research funding is seen as an integral part of developments in the field of hydrogen. Innovation-driven approaches should help to achieve technological breakthroughs and thus bring about the energy transition faster, more efficiently and in a targeted manner.

The establishment of the HyPA hydrogen partnership serves as a central element for involving all relevant stakeholders in the implementation of the strategy.

The latest developments include:

- Publication of an integrated network infrastructure plan
- Start of H2 IPCEI projects with R&D phase
- New initiative to transform industry: RTI initiative and submission under the Environmental Funding Act (UFG)
- Key topic hydrogen from 2024 in the RTI focus on the energy transition
- Creation of a national partnership for hydrogen: Hydrogen Partnership Austria (HyPA)

As part of the expansion programme 2024/25 of the University of Applied Sciences (FH), *FH Technikum Wien* has received funding approval for the development of a Bachelor's degree programme in "Hydrogen Technology (DUAL)". From the 2024/25 academic year, this should establish an application-oriented degree programme in the field of hydrogen technology, which will provide graduates with knowledge along the entire value chain from production, transport and storage to energy conversion plants.

RTI Roadmap Geothermal Energy

For the BMK's RTI Roadmap Geothermal Energy, strategic fields of research, technology and innovation were developed with stakeholders from science, research, industry and administration with the aim of identifying and utilising geothermal potential.

This RTI roadmap outlines measures that are to be put out to tender in the new Energy Research Programme 2024–2026. These proposed measures relate to the three areas of near-surface geothermal energy, deep geothermal energy and underground storage. A total of 21 research and innovation goals were developed for this purpose.

These include the thermal utilisation of urban areas and heat under existing buildings, high-performance efficient drilling techniques and reduction of drilling costs (also in cities), energy networks for heating and cooling applications, underground

management in urban areas, improvement of access to geoscientific data (also from previous explorations) and increasing the probability of success and shortening the development period.

Other proposed measures relate to the system integration of deep geothermal energy and efficient combined heat and power generation, pilot projects for petrothermal energy production, improvement of reservoir characterisation under various geological conditions, efficient low-temperature heat storage, large-volume high-temperature heat storage and the subsequent use of existing cavities such as old mining facilities, tunnels and galleries as cavern storage facilities.

The RTI Roadmap Geothermal Energy was developed in several rounds of consultation with geothermal energy stakeholders and administration in 2021–2022 and published in 2022. Parts of it will be put out to tender for funding in 2024.

Austrian Safety Pin

The Austrian Safety Pin (*Sicherheitsklammer*) of the Federal Ministry of Finance (BMF) is the national coordination framework for the funding and implementation of the Austrian Security Research Programme (KIRAS and Kybernet-Pass/K-PASS) as well as defence research (FORTE) at federal level. The central aim of the Safety Pin is to acquire the knowledge and technologies through research funding to ensure that Austria and its population remain secure in the future.

The Safety Pin follows the principle of comprehensive security and consists of three coordinated research funding programmes:

1. The Austrian Security Research Programme KIRAS

   The primary goal of KIRAS is to increase the security of citizens on both an objective and subjective level through close cooperation between authorities and the relevant stakeholders from research, society and industry. Key areas of application include equipment for blue light organisations, technologies for border protection and the protection of critical infrastructures. KIRAS is regarded as a pioneer in civil security research and is still a trailblazer for the European security research programme (currently Cluster 3, Civil Security for Society, Horizon Europe).
2. The Defence Research Programme FORTE

   FORTE was launched in 2018 and supports national research projects with a purely military focus, such as drone defence, NBC protection and command and control systems. FORTE also serves as a national testing mechanism for the participation of Austrian stakeholders in the new EU defence research programme EDF.
3. Cybersecurity Research Cybernet Pass (K-PASS)

   K-PASS is the latest programme of the Safety Pin (start October 2023). Its content focuses on digital and cyber security research such as protection for ICT systems as critical infrastructures, combating cybercrime & digital forensics or the user as part of the digital dimension (data security, cyber stalking, cyber bullying, etc.). K-PASS also offers the opportunity to serve as a platform for the Austrian share of possible future Joint Actions (JA) of the European Cybersecurity Competence Centre and Network (ECCC).

KIRAS, FORTE and K-PASS (primarily) support Austrian companies and research institutions to create market-oriented research results for security users (police, fire brigade, rescue services, ÖBH, regional governments, local governments, but also e.g. BRZ, AGES, *Verbund* or Vienna Airport).

Since 2023, an annual budget of €19 million has been available for security and defence research within the Austrian Safety Pin.

Defence Research Strategy of the Federal Ministry of Defence 2032+

In a world characterised by asymmetric threats, cyber-attacks and new security policy dynamics, national security is facing major challenges. A newly developed Defence Research Strategy of the Federal Ministry of Defence (BMLV) makes an active contribution to supporting the preservation of national security by advancing the military science and technological research and development of the BMLV and the Austrian Armed Forces (ÖBH) and also contributes to strengthening national resilience. Defence research proactively enhances the ability to be adequately prepared for challenges arising from the global security environment and new technological developments.

The BMLV's Defence Research Strategy defines the specific objectives, fields of action and thematic R&D orientation, and its implementation lays the essential foundations for the long-term development of national defence capabilities. This positions the BMLV/ÖBH not only in the national RTI context and in shaping the national defence industrial base, but also for European capability development as a reliable and competitive partner for research and development.

In particular, the following four objectives of the BMLV 2032+ Defence Research Strategy are considered to be of high relevance to the state as a whole for future cooperation beyond departmental boundaries:

- Further develop the national research community: Develop and promote an agile innovation ecosystem in the area of the BMLV/ÖBH, research and industry to ensure both the rapid translation of research results into operational capabilities and to strengthen the defence industrial base in Austria.
- Establish defence research as a national task: In addition to military national defence, defence research should also encompass the areas of intellectual, civil and economic national defence. Accordingly, relevant ministries should be invited to develop a joint research agenda.
- Maintain and further expand national, European and international cooperation/partnerships: The BMLV will continue to actively participate in research collaborations and strengthen its defence policy relationships with like-minded nations and organisations. The successful participation in funded national and European defence research projects (e.g. FORTE, European Defence Fund (EDF)) is to be further expanded and the results made available for innovative use by the BMLV/ÖBH.
- Making national defence sustainable: The BMLV/ÖBH is committed to sustainability and environmental responsibility in the defence sector. The climate goals of the BMLV/ÖBH are taken into account in the survey of research requirements and in the assessment of all projects as a cross-cutting priority. Environmentally friendly technologies are integrated, the CO_2 footprint of the armed forces is reduced and resources are managed responsibly, provided that this does not impair the operational readiness of the Austrian Armed Forces.

Austrian Military Space Strategy

Austria has a long tradition of space activities, and Austrian research institutes and universities have been conducting active space research since the 1950s. The use of space technologies and services has become indispensable in modern societies.

This dependency is also strong in the military sector, and the space domain has become indispensable for the Austrian Armed Forces, as missions and operations, e.g. in the course of international crisis and conflict management, are dependent on space infrastructure and services.

The BMLV reacted to these developments and adopted the Austrian Military Space Strategy (ÖMWS 2035+) in November 2023. The implementation of the strategy will be managed by the newly established Space Capability Board (SCB). According to the ÖMWS 2035+, the ÖBH will make a significant change in strategy. In future, it will not only utilise existing space systems and

services, but also operate its own space infrastructures, strengthened by cooperation agreements.

The ÖMWS emphasises the great importance of cooperation with national and international partners, in particular the promotion of the exchange of information, experience and technologies. The Federal Ministry of Defence is already a recognised partner in the space sector with research activities and participation in the ESA and EDA and is actively involved in several projects. In addition to the EDF at European level, various national research funding programmes (e.g. KIRAS, FORTE or ASAP) are also available to enable national research institutes and companies to start developing space capabilities. Close partnerships with space nations, research institutions and industry are intended to further develop the necessary capabilities for the Austrian Armed Forces and utilise synergies in a targeted manner. In 2023, a new Strategic Research and Development Field (SFEB) "Space Technology" was established in the BMLV for this purpose, which will support the needs-based capability development with targeted research and development measures. The research and development measures of this SFEB will rely heavily on national, international and European research and development programmes due to the high level of dynamism and will subsequently also strengthen the competitiveness of Austria as a business location.

1.3 Current developments in the higher education sector

Particularly in a time characterised by transformation, higher education institutions are taking on an increasingly important role, not only through their function in education and training and as important providers of basic and applied research, but also in their function as drivers of innovation and communicators. The performance of higher education institutions is thus increasingly becoming a location and competitive factor between countries, which means that governance and its strategic objectives are of central importance.

The European Universities alliances, in which Austria participates very successfully with 16 higher education institutions,[10] play an important role in the European Education Area and the European Research Area by improving the quality of higher education and strengthening the connection to the research and innovation landscape in Europe through the promotion of scientific excellence.

As far as the further development of universities of applied sciences is concerned, a total of 1,050 new federally funded university of applied sciences study places in the STEM fields with a focus on digitalisation and sustainability will be created in three expansion steps of 350 study places each in accordance with the planning specifications of the UAS development and financing plan 2023/24–2025/26. This expansion of the UAS sector will also make a significant contribution to achieving the objectives of the RTI Strategy 2030.[11]

In addition to the current RTI sub-strategies, selected developments in the higher education sector are briefly described below.

Quantum physics

Research in the field of new quantum technologies has now become a major global mainstream topic in which (highly developed) countries in particular are investing heavily. Austria is a globally visible and recognised pioneer in this field, as considerable funding, provided in particular by the BMBWF, has flowed into basic research into quantum technologies in recent decades. This has only recently become visible through the Quantum Austria funding initiative with a total budget of €107 million. The Quantum Austria funding initiative is financed by the Recovery and Resilience Facility (RRF as part of the EU's NextGeneration programme) and was recognised by the European Commission as a best-practice example for the use of RRF funds.

At present, the second quantum revolution[12] is still in its relative infancy. A number of problems and their solutions are still to be found in the field of basic research. In the long term, however, research findings should lead to new products and innovative technologies as well as services to generate economic and social added value. These include novel measuring instruments and techniques with unprecedented accuracy and complexity (quantum metrology), tap-proof communication channels (quantum communication) or an immensely increased computing potential for special problems in IT (quantum computing) with far-reaching impact for a variety of scientific disciplines and fields of application, such as medicine, pharmacy, materials physics, bioinformatics and engineering. In addition, promising innovation potential (e.g. in the field of hybrid computing) is to be tapped by linking quantum information processing

10 Status: May 2024.
11 https://www.bmbwf.gv.at/Themen/HS-Uni/Hochschulgovernance/Steuerungsinstrumente/FH-Entwicklungsplan.html
12 The term "second quantum revolution" refers to the technological progress in being able to work with quantum phenomena such as entanglement and the like, e.g. processing quantum information with entanglement in special states of matter.

technologies to conventional high-performance computing infrastructures.

With the expansion programme 2024/25, the University of Applied Sciences *Technikum Wien* received funding approval for 20 federally funded study places for the establishment of a Master's degree programme in Quantum Engineering. This new degree programme is intended to meet the demand in the labour market for a corresponding engineering education, as there is a shift in the job profile from researcher to engineer in the field of quantum technologies. The shortage of skilled labour is currently an obstacle to the further development of new products and the use of corresponding innovative technologies.

In Austria, successful research in the field of quantum physics, quantum technology and quantum information processing is primarily carried out at the University of Vienna, the University of Innsbruck, the Vienna University of Technology and the JKU Linz and, since 2003, at the Institute for Quantum Optics and Quantum Information (IQOQI) of the Austrian Academy of Sciences, based in Vienna and Innsbruck, which is dedicated to research in experimental and theoretical quantum information processing as well as basic research in the field of quantum technologies. In addition, the non-university research institutions ISTA and the AIT are proving to be extremely successful internationally in this field.

To promote excellence in basic research in particular, the Excellence Initiative[13] was launched in Austria by the BMBWF. As part of this initiative, the Cluster of Excellence Quantum Science Austria was established at the University of Innsbruck. In March 2023, Quantum Science Austria was endowed with funding totalling €35 million for the next five years; €21 million of this will come from the FWF, and €14 million from the participating research institutions.

Universities and the teaching of digital skills/University projects in the context of digital transformation

A total of €50 million in funding was awarded in 2020 for 34 projects selected in a review process as part of the Austria-wide higher education structural funding call "Digital and social transformation in higher education"[14] organised by the BMBWF. Funding was provided for forward-looking cooperation projects that aim to have a structural impact on the university system within their duration until 2024.

In the area of digitalisation of teaching, for example, projects on MOOCs (Massive Open Online Courses) and OER (Open Education Resources), such as the national platform iMooX.at or the OER Hub – a search engine for open educational resources from the Austrian higher education sector – as well as joint and cross-university courses in computer science were initiated with the help of MOOCs. The "DigiFit4AI" project took a broader approach, attempting to put into practice competence models for basic digital education that are tailored to the target group. In addition, initial experience was gained with 360-degree scenarios and the piloting of virtual reality applications in university teaching.[15]

In the area of digitalisation of research, both interdisciplinary and department-specific projects were funded, with cross-institutional cooperation and networking between university actors and relevant stakeholders being crucial to the success of the project, namely, to achieve innovative solutions and sustainable progress in digital and social transformation based on research at universities. For example, a "Research Data-

13 See chapter 1.2.

14 https://www.bmbwf.gv.at/Themen/HS-Uni/Aktuelles/Ausschreibung--Digitale-und-soziale-Transformation-in-der-Hochschulbildung-.html

15 For more information on the projects, see https://www.zfhe.at/index.php/zfhe/issue/view/78

Cooperative Research Services" cluster was initiated in Austria with the aim of coordinating the various research information, research data management systems and digital technologies/infrastructures that have existed to date. The FAIR Data Austria project also supported the professionalisation of data stewards in Austria and created national standards and interfaces for the transfer of research information. With regard to the impact of digitalisation in individual subject areas, the integration of digital humanities into the humanities, for example, was widely discussed. How infrastructures for digital art can be used in teaching and research at universities was also the subject of one project. As a result, the Archive of Digital Art (ADA) was expanded for research and teaching at Austrian universities and innovative documentation options for new media art with VR and mixed reality experiences are to be made possible in the future.[16]

The third area comprised the financing of forward-looking projects in the area of digitalisation of administration. For example, an open source IT modular system for digital administration in higher education was developed for the central administrative processes of universities. The aim was to analyse the operation of IT systems with regard to procedural, legal and technical issues and to create source codes and manuals in the spirit of an open source culture and make these available as a shared service across universities. Similarly, the "Austrian University Toolkit" project pursued the goal of efficiently supporting administrative university processes by developing a modular IT toolkit comprising all applications and systems. Other projects were dedicated to the topic of the "Student Life Cycle". These included, for example, the development of an interactive platform that supports access to artistic professions and study programmes for school pupils, young adults and career changers; or the "Mobile First for Students" project, which makes it easier for students to interact with the higher education institutions via an app. In addition to specific projects on digitalisation in specialist areas such as neuroscience, a cross-university "Digital University Hub" (DUH) was also created – with the aim of acting as an information, cooperation and service platform across all universities and thus effectively supporting networking for digital and social transformation in the Austrian higher education system. The guidelines for this were drawn up by the central partner universities, Graz University of Technology, the University of Vienna and the University of Graz.[17]

Careers in research in the context of the European Research Area

Within the ERA Policy Agenda 2022–2024, two sets of measures focus on the careers of researchers within the European Research Area and on improving the framework conditions for them, namely:

- ERA Action 3 "Reform the assessment system for research, researchers and institutions": The aim is to expand and diversify the existing schemes used to assess researchers and research performance. The Coalition for Advancing Research Assessment (CoARA) was established in December 2021 to realise this goal. In July 2022, it published the Agreement on Reforming Research Assessment, which has so far been signed by 688 higher education and research institutions worldwide (as of February 2024).[18] The agreement consists of ten points, which essentially address the following aspects:[19]
  1. Recognising the diversity of research contributions and research career paths in

16 For more information on the projects, see https://www.zfhe.at/index.php/zfhe/issue/view/82
17 For more information on the projects, see https://www.zfhe.at/index.php/zfhe/issue/view/84
18 https://coara.eu/agreement/signatories/
19 https://european-research-area.ec.europa.eu/eu-report/priority-area-1-deepening-truly-functioning-internal-market-knowledge

accordance with the needs and nature of the research;
2. Basing research assessment primarily on qualitative assessment, in which peer review plays a central role, supported by the responsible use of quantitative indicators;
3. Refraining from the inappropriate use of journal and publication-based metrics in research assessment, in particular the inappropriate use of the Journal Impact Factor (JIF) and the h-index; and
4. Refraining from using rankings of research institutions in research evaluation.

In Austria, the following institutions have signed the agreement:

- Medical University of Graz
- University for Continuing Education Krems
- Ludwig Boltzmann Society
- CeMM Research Centre for Molecular Medicine of the Austrian Academy of Sciences
- Christian Doppler Research Association
- Austrian Academy of Sciences
- University of Graz
- Institute of Science and Technology Austria
- FH St. Pölten
- FH Kufstein Tyrol
- Austrian Science Fund FWF
- Austrian Conference of Private Universities

- ERA Action 4 "Promote attractive research careers, talent circulation and mobility": The aim of this action is to strengthen careers in research within the ERA and increase their attractiveness. It comprises three pillars and was implemented in close cooperation between the European Commission and the COIMBRA Group.[20]

1. Council Recommendation "on a European framework to attract and retain research, innovation and entrepreneurial talents in Europe": The Council Recommendation, which was adopted in December 2023, includes a definition of the term "researcher" as well as considerations regarding the recruitment and working conditions of researchers. In addition, topics such as interdisciplinarity and intersectionality are addressed, which should make it easier for researchers to be professionally active outside the research sector. The annex to the recommendation also includes an update of the Charter and Code catalogue from 2005;
2. Exchange on best practice and mutual learning;
3. Establishment and further development of support structures for researchers: EURAXESS, RESAVER, HRS4R, ResearchComp, Research and Innovation Career Observatory, ERA Talent Platform.

The activities at EU level also have an impact at national level. As part of the Higher Education Conference, a working group was set up with representatives of all stakeholders in the Austrian higher education landscape, whose task was to develop recommendations on permeable and sustainable career models in the Austrian higher education and research area, taking into account the development of the European Research Area. The results of this working group, which are aimed at the entire Austrian higher education area, were presented on 11 April 2024.

To promote the implementation of the EU level measures at national level and in particular to facilitate the exchange between the Member States, a "Mutual Learning Exercise" is being carried out, in which Austria is also participating.

20 https://european-research-area.ec.europa.eu/policy-agenda-2022-2024/deepening-truly-functioning-internal-market-knowledge

Good Scientific Practice

Higher education institutions play a central role in communicating science and democracy, which is why addressing the Standards of Good Scientific Practice (GSP) is essential for strengthening trust in science.

On the basis of current, evidence-based studies,[21] the BMBWF has set itself the goal of creating adequate framework conditions for the science system. The amendment to Federal Law Gazette I No. 93/2021 and the GSP in Section 51(2)(33) of the Universities Act (UG) introduced a definition that reads: "Good scientific practice means complying with the legal regulations, ethical standards and the current state of knowledge of the respective subject within the framework of the tasks and objectives of the respective institution". In addition, ensuring good scientific practice and academic integrity was anchored in the guiding principles in accordance with Section 2 UG. A regulation in accordance with § 116a UG on the subject of "ghostwriting", which provides a definition and formulates administrative penalties, was included.

In the future, GSP will remain a central topic in university governance, especially in view of developments in AI and new technologies, and standards for dealing with GSP are therefore to be defined and implemented. Austrian universities should also set up central contact points for GSP and thus bundle resources and expertise, as well as use synergies. The development of relevant procedural guidelines and standards for handling AI databases and software to support teaching and study programmes are further important goals. Information and transparency standards must be introduced as well as training programmes for staff and courses on GSP. In addition, standards of Good Scientific Practice must be integrated into the university's internal quality management system and special attention must be paid to the supervision of academic work.

Overall, all these measures are intended to raise awareness of good academic practice and thus responsible academic communication among students and lecturers, based on standards that ensure quality assurance throughout the higher education system.

21 See Zucha and Droll (2021), Zucha and Engleder (2022), and Poier et al. (2023).

2 Facts, figures and trends in research, technology and innovation

Chapter 2.1 starts with a look at the development of the funding and performance of R&D in Austria, including the global estimate for 2024 from Statistics Austria. Chapter 2.2 looks at Austria's position in an international comparison with regard to RTI indicators as well as science and digitalisation indicators. This includes an international comparison of Austria's innovative capability and its position in terms of environmental sustainability and resilience. Chapter 2.3 then focuses on Austrian and European research, technology and innovation policy. Chapter 2.4 presents the key topic chosen for this report, "Excellence and innovation in life sciences and health". Based on the location and framework conditions in Austria and Europe (chapters 2.4.1, 2.4.2), including a systemic view of the life sciences player landscape in Austria (chapter 2.4.3), the various funding measures and programmes as well as structures (chapters 2.4.4, 2.4.5, 2.4.6) are presented. Chapter 2.4.7 focuses on strengthening clinical research, a priority of RTI and higher education policy since the coronavirus pandemic at the latest. Chapter 2.5 rounds off the chapter with current developments in RTI evaluation policy and practice (Chapter 2.5.1) and insights into selected recent evaluation studies.

2.1
Funding and performance of R&D in Austria

R&D expenditure

- The research intensity (R&D expenditure as a proportion of GDP) will achieve a new all time high of 3.34% in 2024 according to a global estimate by Statistics Austria.
- The largest share of R&D expenditure in 2024 will again be borne by domestic companies (44.59%), followed by the Federal Government (27.76%) and foreign companies (15.54%).
- Within the business enterprise sector, medium-high technology industries continue to dominate, but the share of high technology is increasing.

According to Statistics Austria's global estimate, R&D expenditure as a proportion of GDP (= research intensity) will reach its highest level to date in 2024 at 3.34%. Funding will be allocated as follows: 27.76% to the Federal Government, 6.01% to the research premium, 4.22% to the regional governments, 44.59% to the business enterprise sector (i. e. domestic companies), 15.54% to abroad (i. e. foreign companies plus funding from the EU and foreign organisations) and 1.89% to others (consisting of the higher education sector and the private non-profit sector). In comparison, the research intensity reached 3.26% in 2023.

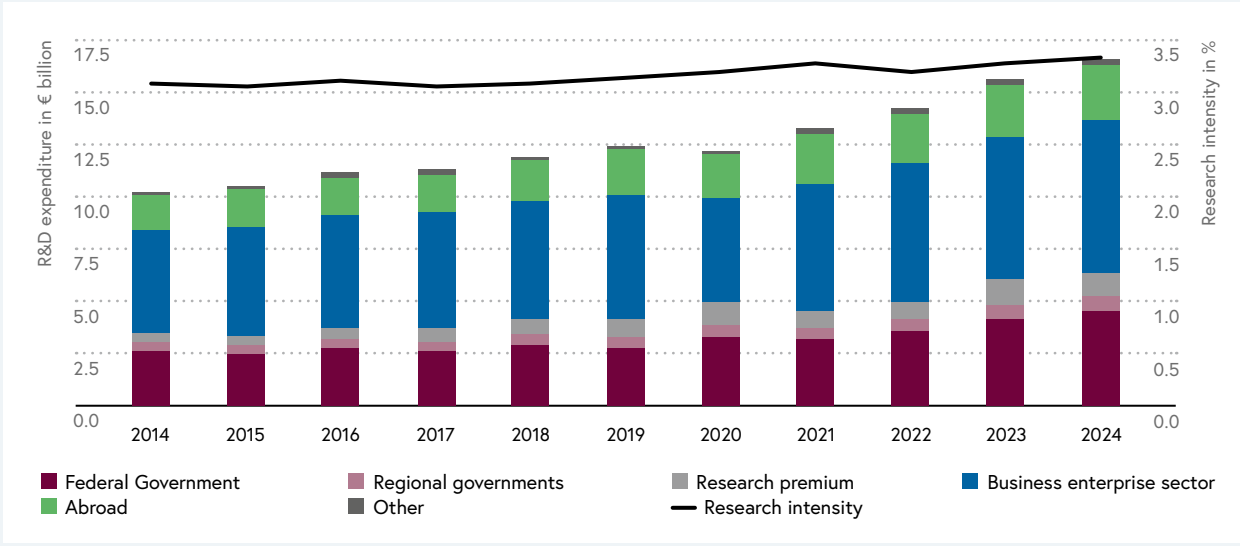
The R&D survey 2021 displays the distribution of funding and performance in detail and allows comparisons over time. In terms of business expenditure, manufacturing dominates, accounting for 71.93% of the business sector in 2021. Within manufacturing, the medium-high technology sector dominates in terms of expenditure, although the share of the high-tech sector continues to increase. Among the federal states, Styria and Vienna dominate, together accounting for over 50% of R&D expenditure in 2021, with a strong upward trend in Upper Austria. The business enterprise sector has the largest share of scientific personnel overall (2021: 63.71%), but also the lowest proportion of women (2021: 16.80%), which is why the proportion of women remains relatively low overall (2021: 24.95%) despite a significant increase in the higher education sector (2021: 39.30%).

2.1.1 Global estimate 2024

According to the global estimate published by Statistics Austria in April, R&D expenditure will total €16.64 billion in 2024, while GDP in 2024 is estimated at €498.97 billion. The share of R&D expenditure in GDP, the research intensity, will reach 3.34%. In comparison, the research intensity in the previous year was 3.26%, corresponding to €15.58 billion of total R&D expenditure. The research intensity in 2024 will therefore reach a new record level, with the business enterprise sector in particular contributing to the increase. Funding from the business enterprise sector as a proportion of GDP will rise from 1.40% (€6.69 billion) in 2023 to 1.49% (€7.42 billion), which is even higher than the overall research intensity in percentage points. At the same time, the share of the research premium in GDP – a tax credit for R&D expenditure by business enterprises amounting to 14% – will fall from 0.27% (€1.28 billion) to 0.20% (€1.0 billion); the "abroad" category, which mainly includes funding from foreign companies (as well as the EU and international organisations), will stagnate. The share of the business enterprise sector, which by definition only includes domestic companies, is estimated to reach 1.49% in R&D funding in 2024, the highest level since 2021 (when it was 1.51%). At 0.93%, funding by the Federal Government will reach its highest share of GDP since 2005. Compared to the previous year, the Federal Government will increase R&D expenditure as a share of GDP by 0.05 percentage points in 2024; the share of GDP will therefore increase by 5.68%, i. e. from 0.88% in 2023 to 0.93% in 2024.

Figure 2-1 shows the development since 2014 and provides an initial rough overview of the individual funding categories. The increase in the research intensity can be clearly seen, reaching its highest value to date in 2023 at 3.26%. It is slightly higher than the previous highest value in 2021, which was also 3.26% (rounded). Austria has therefore not only been one of the countries that have consistently exceeded the EU's

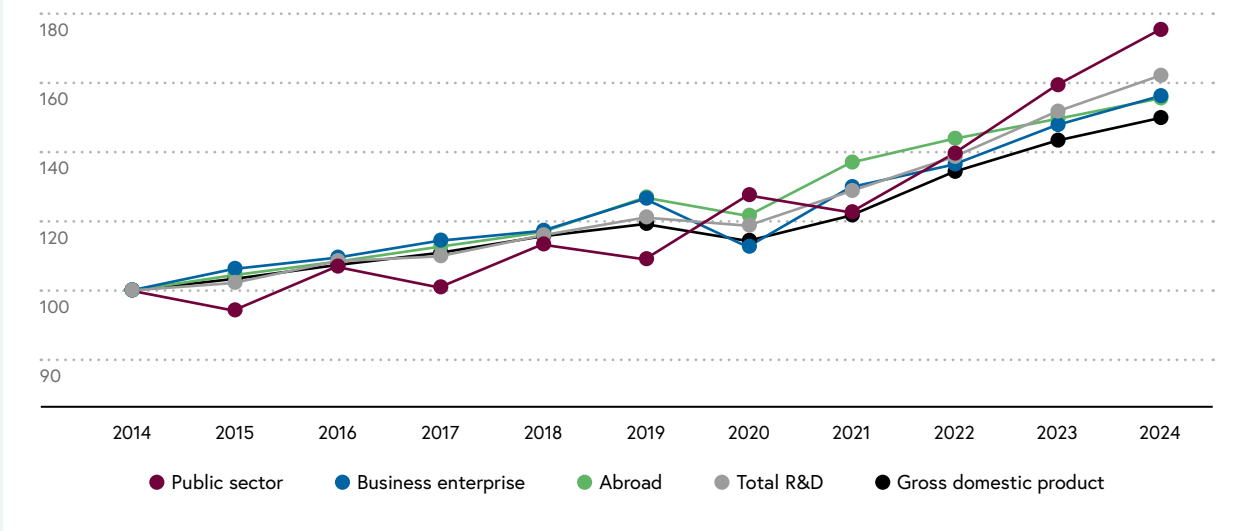
Figure 2-1: Development of R&D funding and research intensity in Austria, 2014–2024



Note: The category "Other" combines the two categories "Other public funding" (incl. higher education sector) and "Private non-profit sector".

Source: Statistics Austria, global estimate from 24 April 2024, illustration: WPZ Research.

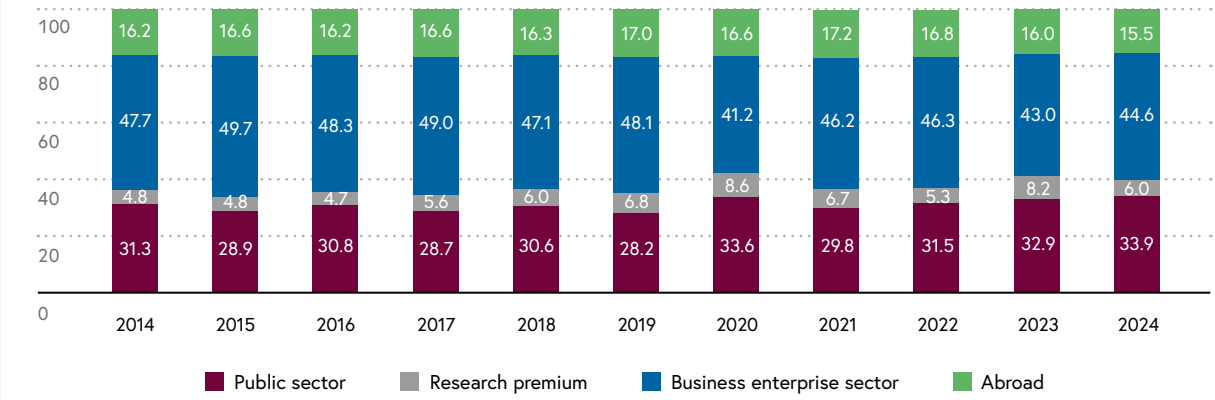
Figure 2-2: Development of R&D funding, 2014–2024 (index, 2014=100)



Note: The category "Public sector" contains the categories "Federal Government", "Regional governments" and "Other" (= "Other public funding" incl. higher education sector + "private non-profit sector"), the category "Business enterprise" contains the categories "Business enterprise sector" and "Research premium".

Source: Statistics Austria, global estimate of 24 April 2024; calculation and presentation: WPZ Research.

Figure 2-3: Shares of R&D funding by sources of funds (in %), 2014–2024



Note: The category "Public sector" includes the categories "Federal Government", "Regional governments" and "Other" (= "Other public funding" incl. higher education sector + "private non-profit sector").

Source: Statistics Austria, global estimate of 24 April 2024; calculation and presentation: WPZ Research.

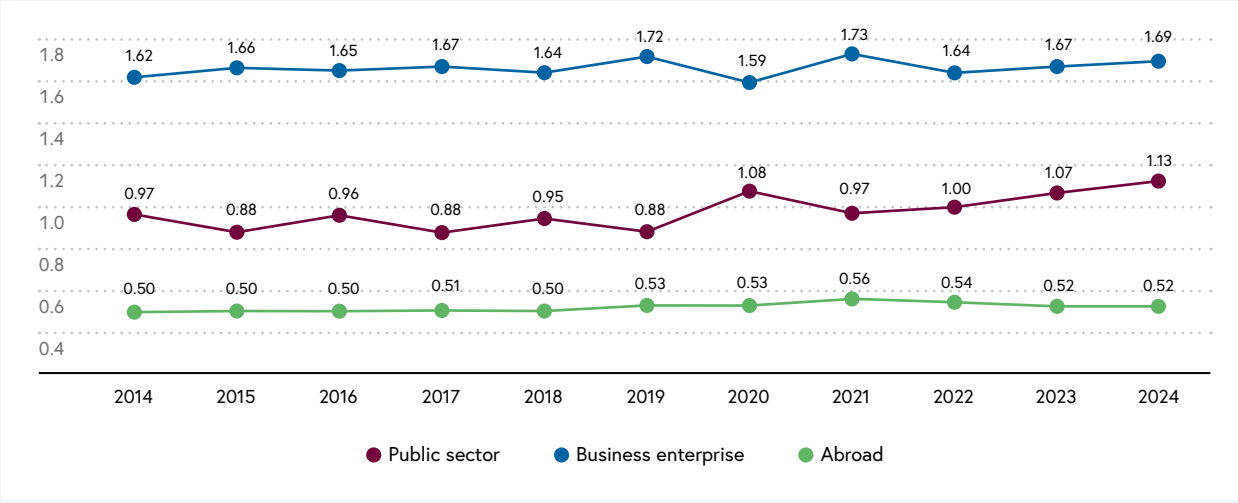
target of a research intensity of at least 3% since 2014, but has, as can be seen in the chart, had consistently higher research intensities in the crisis-ridden 2020s than in the 2010s. The bars show the nominal funding for R&D, distributed across six categories.

Figure 2-2 displays the relative development of funding by relating it to the individual sectors as a percentage of the base year 2014. Here as well, the data are not price-adjusted, but rather show which funding has changed more than others.[22] In contrast to Figure 2-1, the research premium is not shown separately here, but is added to the business enterprise sector, and the regional governments and "Other" are summarised together with the Federal Government as the "Public sector". Figure 2-2 clearly shows that funding from the public sector has increased more than funding from the business enterprise sector and from abroad over the entire observation period. However, this has only been the case since the crisis year 2020; until 2019, funding from the business enterprise sector and from abroad grew particularly quickly.

The respective shares of funding are shown for each year from 2014 onwards in Figure 2-3, whereas in contrast to Figure 2-2 the research premium is shown separately. The business enterprise sector has the highest share each year, although it varies. 2020 saw a decline, since then the share of the business enterprise sector has risen again, but in 2023 and 2024 it is below the level of the 2010s. The share from abroad with 15.5% is also lower in 2024 than in the 2010s.

22 The fact that the figures are usually higher in even years than in odd years is because the R&D survey takes place in odd years. In even-numbered years, the funding figures for the federal states are taken from the regional government budgets, which structurally results in a quantitative difference which also impacts research intensity values.

Figure 2-4: R&D expenditure as a percentage of gross domestic product by sources of funds (in %), 2014–2024



The category "Public sector" contains the categories "Federal Government", "Regional governments" and "Other" (= "Other public funding" incl. higher education sector + "private non-profit sector"), the category "Business enterprise" contains the categories "Business enterprise sector" and "Research premium".

Source: Statistics Austria, global estimate of 24 April 2024; calculation and presentation: WPZ Research.

Figure 2-4 completes the overall picture: as all categories grow faster than GDP, the respective contributions increase as a percentage of GDP (based on the entire observation period). Here it once again becomes evident that the 2010s were characterised by rapid growth in funding from companies (again shown in this figure including the research premium). The 2020s, on the other hand, have so far been characterised by an increasing share of funding from the public sector.

2.1.2 R&D survey 2021

Methodological innovations

As with the two previous R&D surveys, Statistics Austria's biennial R&D survey for 2021 is methodologically based on the 2015 revised version of the Frascati Manual,[23] which contains OECD-wide guidelines for the definition of R&D and for the compilation of corresponding statistics.

There have been repeated changes to the methodology over the years. With the 2021 R&D survey, an EU regulation was implemented that defines an "enterprise" for the purpose of economic statistical analysis. Previously, all entities with their own legal form were counted as one enterprise. However, this did not take into account the fact that a company can have own units which act in its favour. From now on, such "legal entities" that operate "exclusively in favour of another legal entity" will be assigned to the latter and consequently treated together as "statistical entities".[24]

The consequence of this revision is a break in the time series that affects the allocation to sectors and size classes. The R&D of a legal entity is now allocated to the R&D of the legal entity that

23 OECD (2018).
24 Council of the European Communities (1993), Section III.

Table 2-1: R&D expenditure by sector of performance and source of funds, 2021

Sector of performance	in € million	in %	Source of funds	in € million	in %
Business enterprise sector	9,108	68.9	Business enterprise sector	7,004	53.0
Institutes' sub-sector	230	1.7	Public sector	3,765	28.5
Company R&D sub-sector	8,878	67.1	Private non-profit sector	40	0.3
Higher education sector	3,054	23.1	Higher education sector	138	1.0
Government sector	997	7.5	Abroad	2,278	17.2
Private non-profit sector	66	0.5	EU	275	2.1
			Foreign enterprises	1,927	14.6
			Other abroad excl. EU	77	0.6
Total	13,225	100.0	Total	13,225	100.0

Source: Statistics Austria, R&D survey 2021; calculations: WPZ Research.

is considered "dominant" for the entire company by virtue of its size.[25] If the allocated sectors of the two legal entities differ, the R&D is allocated to the sector of the newly formed "statistical entity", resulting in a discrepancy. In contrast to the old method, the statistically allocated R&D of the first sector is now lower, while that of the second is higher. However, differences according to the new method only affect sectors and size classes, not the federal states, as the latter are assigned to the location of the legal entity. In the R&D survey 2021, Statistics Austria shows the figures for the companies both by statistical companies and by legal units. In future R&D surveys, however, only statistical enterprises will be presented, which is why comparisons with previous R&D surveys will be possible only to a limited extent.

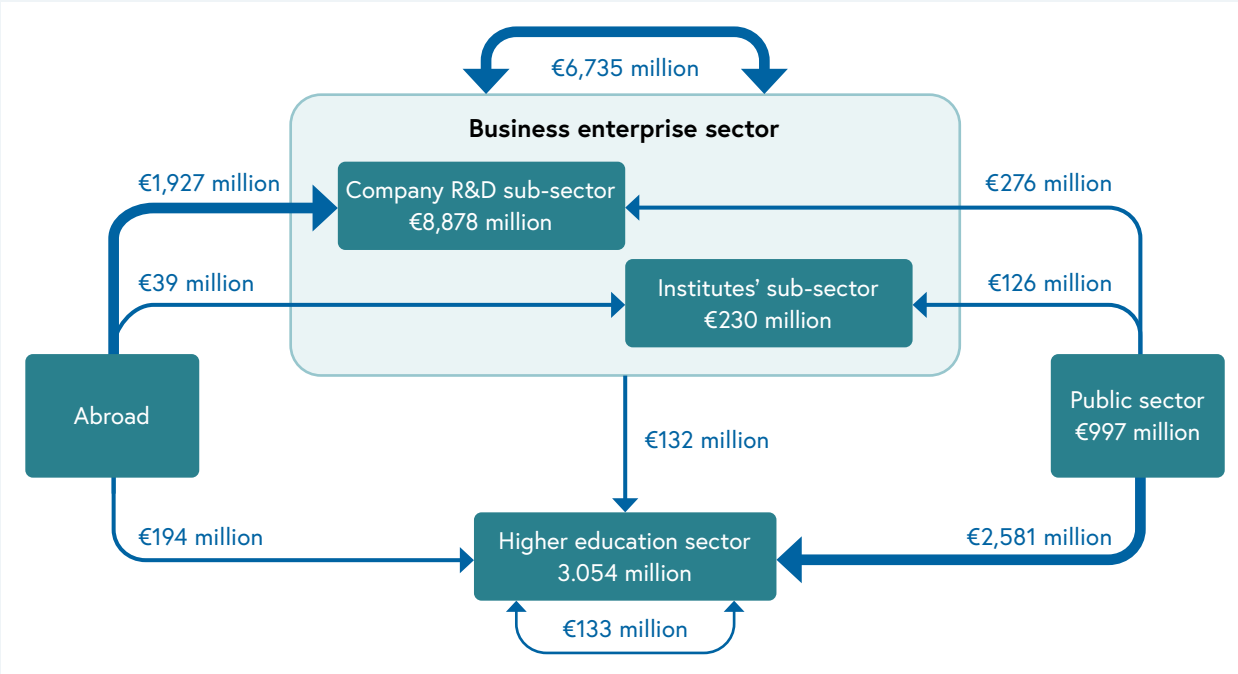
Results

The R&D survey allows for a precise breakdown of the R&D funding and expenditures. Table 2-1 provides an overview of the performance and funding of R&D expenditures in Austria in 2021. The performance sectors are categorised into four sectors, namely the business enterprise sector, the higher education sector, the government sector and the private non-profit sector. The business enterprise sector is also divided into a institutes' sub-sector (*kooperativer Bereich*) and the company R&D sub-sector (*firmeneigener Bereich*). The organisations in the sub-sectors are service organisations that carry out research and experimental development for companies but do not operate with the intention of generating a profit or other economic advantage.[26] As Table 2-1 shows, over two thirds of the total R&D expenditure (67.1%) is spent by the company R&D subsector. With just under a quarter of expenditure (23.1%), the higher education sector has the second-highest total expenditure.

The business enterprise sector also dominates the funding sector; however, it should be noted that all companies carrying out R&D in Austria are counted as companies in the performance sector, while only domestic companies are counted as companies in the funding sector. It is therefore not surprising that after the public sector, the "abroad" sector and within this

25 Statistics Austria (2024), p. 84.
26 Statistics Austria (2024), p. 47.

Figure 2-5: Performance and funding of R&D, 2021



Note: The private non-profit sector and the flows from the higher education sector are not shown, with the exception of own funding. The arrows show the funding amounts by source, e. g. the sum of the amounts flowing into the business enterprise sector (6,735 + 1,927 + 39 + 276 + 126) plus the flows from the private non-profit sector and the higher education sector (together 5), which are not shown, results in the value of the expenditure of the business enterprise sector in Table 2-1 (9,108), which is distributed within the business enterprise sector between the company sub-sector and the R&D sub-sector (8,878 + 230 = 9,108).

Source: Statistics Austria, R&D survey 2021; calculations and graphic: WPZ Research.

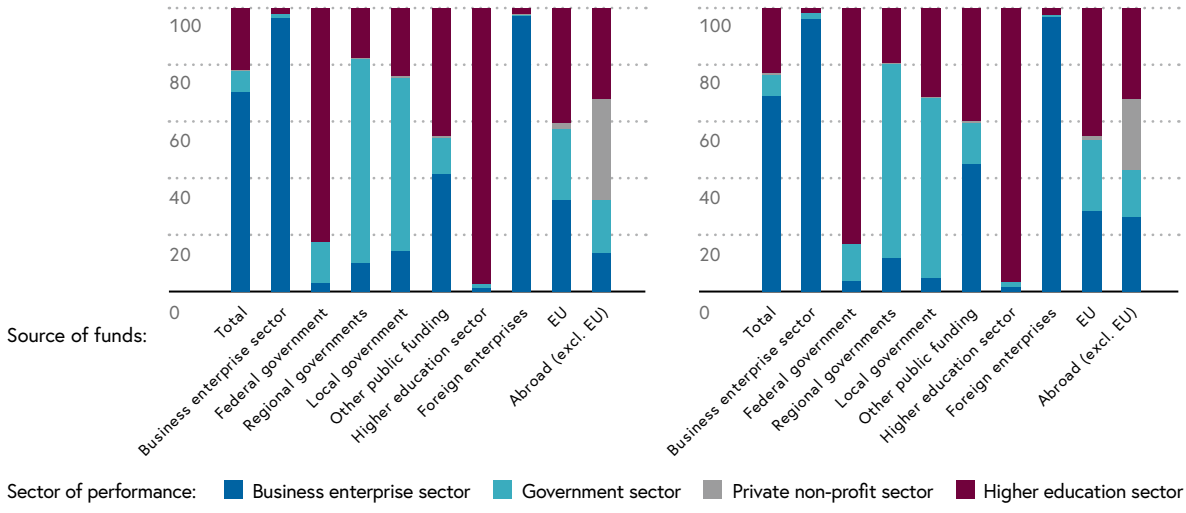
sector predominantly foreign companies, account for a significant share of funding.

Figure 2-5 shows the flows of R&D funding in Austria in 2021, with smaller sums not shown. The boxes show the expenditure, and the arrows indicate the direction of funding. At €6,735 million, half of all R&D funding (including the research premium) in Austria in 2021 will be provided within the business enterprise sector, of which €6,671 million is for the company R&D sector plus €64 million for the institutes' sub-sector, with the remainder of the funding shown in Table 2-1 flowing into other performance sectors. In addition, there is €1,927 million plus €39 million from abroad, including €1,845 million plus €23 million from foreign companies, which are not shown separately in the figure. The public sector funds far more than it implements, the majority of which goes to the higher education institutions.

Figure 2-6 compares the funding flows of 2021 (right-hand diagram) with those of 2019.[27] The comparison of these two years is particularly relevant as it relates to the last year before the outbreak of the

27 In contrast to previous issues of the Austrian Research and Technology Report (FTB), most recent data are compared here with that from two years previously. The reason for this is that larger shares of funding were allocated differently in 2011, which makes a comparison almost impossible. These allocations primarily relate to the research institutions Joanneum Research, AIT, OeAD. In addition, data on the higher education sector and foreign companies is available for 2019 and 2021, but not for 2011. For details, see the Austrian Research and Technology Report 2022.

Figure 2-6: Distribution of funding by sector of performance (in %), 2019 [left] and 2021 [right]



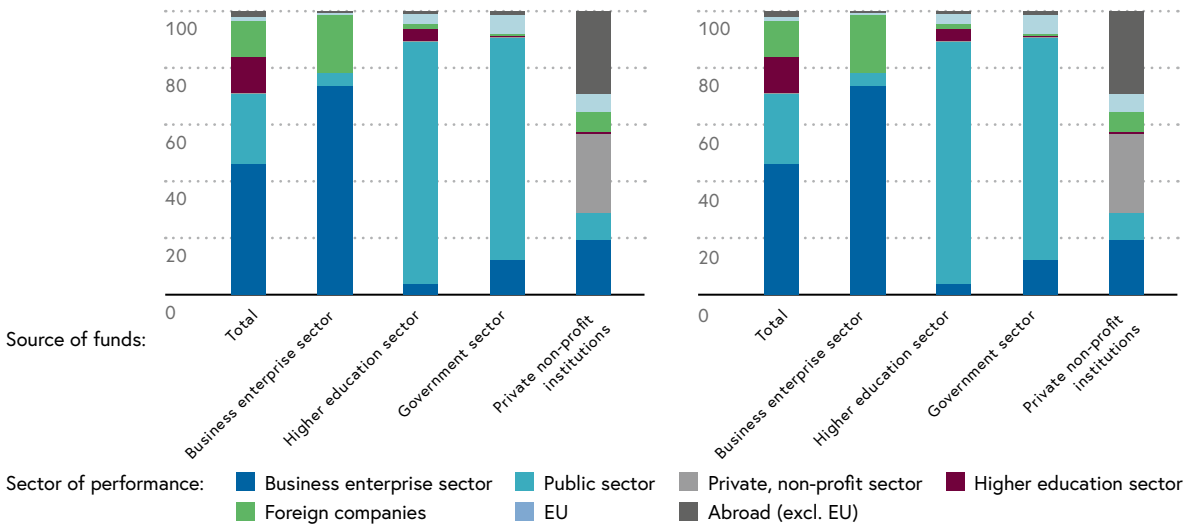
Source: Statistics Austria, R&D survey 2021; calculations and graphic: WPZ Research.

COVID-19 pandemic and the first year after. In each case the bars show how the funding from the sources indicated on the horizontal axis is distributed across the four performance sectors. For example, the share of the business enterprise sector in performance has decreased slightly in relation to total funding, while the share of the higher education sector has increased.

In terms of volume, the funding of higher education institutions by the Federal Government and of companies by foreign companies has increased the most. The financing of the private non-profit sector from abroad (excl. EU) and of the public sector by foreign companies has decreased significantly. In terms of percentage points, the financing of companies by other foreign countries and of higher education institutions by the local governments increased significantly, while the financing of the private non-profit sector by abroad (excl. EU) and of companies by the local governments decreased the most.

While Figure 2-6 illustrates which sector funds which performance sector ("where to"), Figure 2-7 shows the sources from which each performance sector receives its funding ("from where"). To provide a better overview, the funding from the Federal Government, regional governments, and local governments as well as other public funding are summarised as the public sector. Proportional changes of more than two percentage points can be seen overall due to the decline in the business enterprise sector; in the higher education sector, where funding from the public sector has increased and funding from abroad (excl. EU) has decreased; in the government sector, where funding from (domestic) companies and the public sector has increased and funding from abroad has decreased; and in the private non-profit sector, where funding from the public sector, the private non-profit sector and foreign companies has increased and funding from abroad (excl. EU) has decreased.

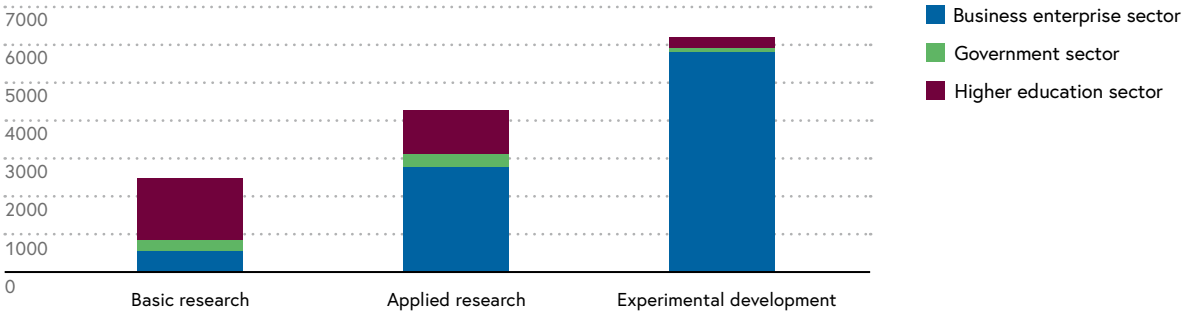
Figure 2-7: R&D expenditure by source of funds (in %), 2019 [left] and 2021 [right]



Note: The sectors Federal Government, regional governments, local governments, other public funding and higher education sector are summarised in the category public sector; "PGS" is short for the private non-profit sector.

Source: Statistics Austria, R&D survey 2021; calculations and graphic: WPZ Research.

Figure 2-8: Expenditure for various types of research by performance sector (in € million), 2021



Note: The private non-profit sector is not shown due to its small share.

Source: Statistics Austria, R&D survey 2021; calculations and graphic: WPZ Research.

Table 2-2: Types of expenditure 2011, 2019 and 2021

Type of expenditure	2011		2019		2021	
	in € million	in %	in € million	in %	in € million	in %
Labour costs	4,186.4	50.6	6.358,7	51.1	6,833.0	51.7
Current operating costs	3,422.8	41.4	5.196.1	41.8	5,464.,3	41.3
Facilities and equipment	501.8	6.1	690.1	5.5	738.3	5.6
Buildings and land	165.4	2.0	196.4	1.6	189.8	1.4
Total	8,276.3	100.0	12,441.2	100.0	13,225.5	100.0

Source: Statistics Austria, R&D survey 2021.

Figure 2-8 shows the distribution by type of research: the majority of experimental development is carried out by companies, while the majority of basic research is carried out by higher education institutions. Applied research is distributed 64.7% on companies, 8.1% on government and 27.3% on higher education institutions.[28] Table 2-2 shows the distribution of expenditure across various categories for 2011, 2019 and 2021, with the share of labour costs remaining stable at just over 50% and material expenditure at just over 40%. Expenditure on facilities and equipment and expenditure on buildings and land, on the other hand, have decreased significantly since 2011.

Figure 2-9 summarises how R&D expenditure in the business enterprise sector differs by sector and the technology classes to which they are allocated.[29] Displayed are the share of R&D in each sector's gross value added, each sector's share of R&D and the share of gross value added in the overall sector. In this way, the contributions of the various sectors to entrepreneurial R&D can be read and compared. While the service sector accounts for the majority of economic activities (69.5%), manufacturing accounts for the largest share of R&D (71.9%). The secondary sector in Austria, which is economically quite large by Western European standards, is therefore also responsible for a large proportion of the R&D carried out. A further differentiation by technology classes reveals some relevant details:

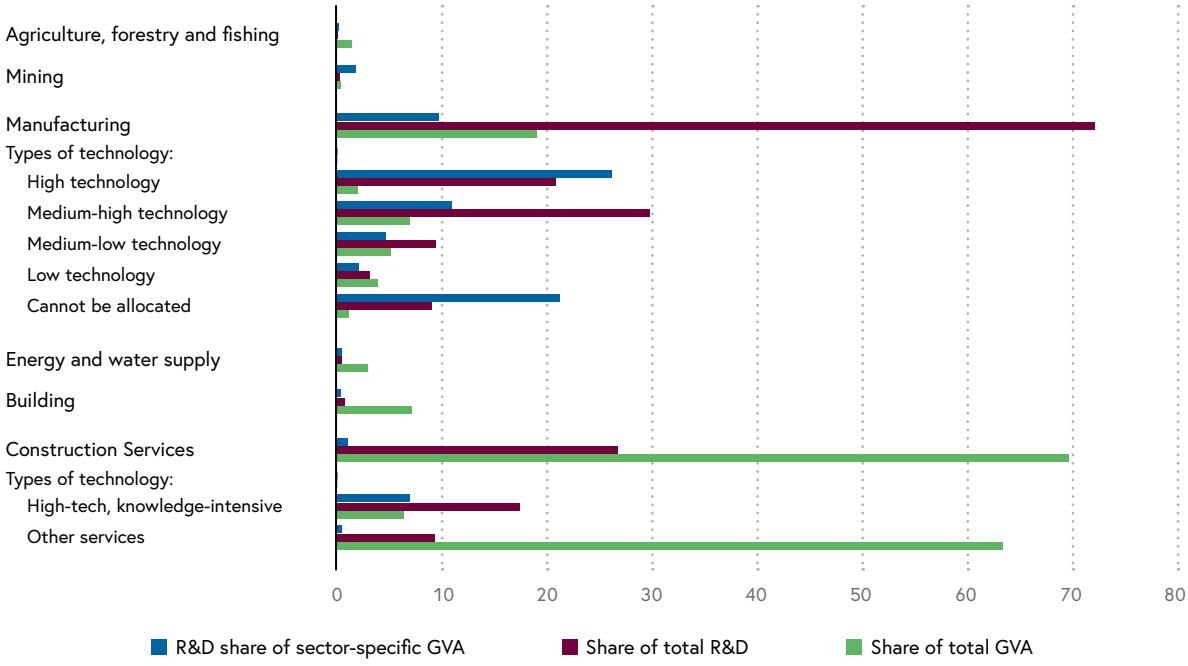
- High technology's R&D share in gross value added is highest, but the share in total R&D is highest for medium-high technology.
- The service sectors classified as "high-tech knowledge-intensive" also contribute a high proportion, although their share of the overall economy is comparatively low.
- The industrial sectors categorised as medium-low and low-tech together account for over 12% of total entrepreneurial R&D.
- The proportion of industrial sectors categorised as high-tech is increasing over time, while that of other sectors is falling.[30]

28 The total is >100% due to rounding errors.

29 The Austrian industry classification can be viewed at: https://www.statistik.at/KDBWeb/kdb_Einstieg.do?NAV=DE; the Eurostat classifications can be viewed at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:High-tech_classification_of_manufacturing_industries (industry) and https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Knowledge-intensive_services_(KIS) (services).

30 See also Austrian Research and Technology Report 2022, Table 2-5.

Figure 2-9: R&D expenditure in the business enterprise sector by industry, 2021



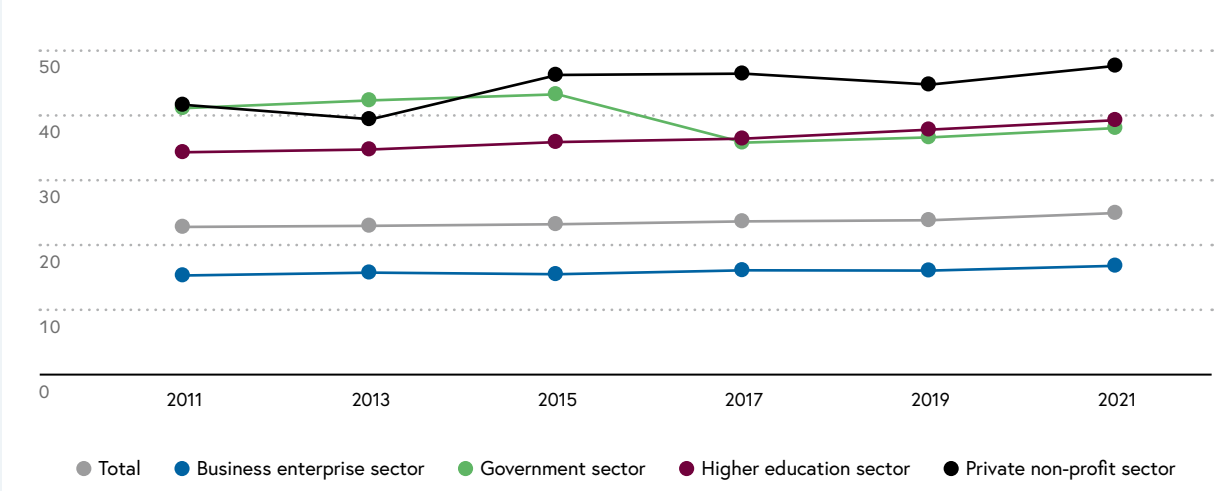
Note: "GVA" is short for gross value added; R&D share of sector-specific GVA = R&D expenditure of the sector divided by GVA of the same sector, share of total R&D = R&D expenditure of the sector divided by the sum of R&D expenditure of all sectors shown, share of total GVA = GVA of the sector divided by the sum of GVA of all sectors shown; economic sectors according to ÖNACE 2008, the calculation is based on two-digit numerical ÖNACE classification and may therefore differ slightly from other calculations, technology types according to Eurostat: high technology (sectors 21, 26), medium-high technology (sectors 20, 27–30), medium-low technology (sectors 19, 22–25, 33), low technology (10–13, 15–18, 31–32); due to unpublished data, sectors 14 and 19 are included in the "not assignable" category. Knowledge intensity according to Eurostat: High-tech knowledge-intensive includes sectors 59–63 and 72, other services: rest.
Source: Statistics Austria, Eurostat; Calculation: WPZ Research.

Table 2-3 compares the R&D expenditure of the federal states and relates this to the regional GDP ("research intensity") and the total Austrian R&D ("R&D share") for the years 2011 and 2021. The research intensity has increased significantly in all federal states, with Styria showing the highest ratio in both years, ahead of Vienna. Upper Austria's research intensity increased significantly from 2.61% to 3.55%; Upper Austria was in fifth place in 2011 and third place in 2021, overtaking Tyrol and Carinthia. Lower Austria (falling back) and Vorarlberg (rising) have swapped places six and seven, although Lower Austria's share of total R&D has risen. Overall, disparities have increased, i. e. the interregional disparity in R&D ratios was lower in 2011 than in 2021.[31]

Figure 2-10 illustrates the development of the percentage of women among researchers, measured by full-time equivalents. The share of women in the business enterprise sector is consistently the lowest by a wide margin and has only increased slightly

31 The variances of the natural logarithms of the values in Table 2-3 are used as a criterion here.

Figure 2-10: Percentage of female researchers, by sector and in full-time equivalents (in %), 2011–2021



Source: Statistics Austria, R&D survey 2021; calculations and graphic: WPZ Research.

Table 2-3: Regional R&D (in %), 2011 and 2021

Type of expenditure	2011		2021	
	Research intensity	R&D share	Research intensity	R&D share
Burgenland	0.74	0.69	0.84	0.60
Carinthia	2.65	5.80	3.05	5.12
Lower Austria	1.52	8.54	1.81	8.77
Upper Austria	2.61	15.66	3.55	18.92
Salzburg	1.38	3.48	1.77	3.96
Styria	4.40	19.90	5.15	20.18
Tyrol	2.68	8.81	3.23	8.39
Vorarlberg	1.46	2.45	1.87	2.91
Vienna	3.30	34.69	4.01	31.16

Source: Statistics Austria; calculations: WPZ Research.

from 15.3% in 2011 to 16.8% in 2021. As the business enterprise sector has the largest share of researchers (2021: 63.7%), the overall proportion of women across all sectors is correspondingly low and stands at 25.0% in 2021. However, the proportion of women is significantly higher in all other three performance sectors, as shown in Figure 2-10. The significant drop in the percentage of women in the government sector in 2015/2017 is primarily due to the reclassification of some large R&D units to the government sector (AIT, *Joanneum Forschungsgesellschaft*, OeAW). These institutions employ comparatively few women.

Promotion of women in the higher education sector

A look at the academic career ladder shows that there were 54.2% female students at Austrian universities in 2022, 38.6% female career positions, but only 29.4% female professors. Nevertheless, a positive trend can be observed with regard to the declining proportion of women at the various qualification levels and career stages (leaky pipeline), as the proportion of female professors in 2012, for example, was still only 21.6%, with 53.0% female students and 34.1% female career post holders.[32] This increase of almost 8% in professorships was achieved through measures such as setting binding targets for increasing the proportion of women in professorships and career positions in the performance agreements with the universities.

In addition to equal representation, the BMBWF's efforts to promote women also focus on removing structural barriers. The gender equality plans are an important lever for the gender equality-orientated cultural change at research institutions. These were defined by the European Commission for the first time with Horizon Europe as a mandatory criterion for the awarding of research funding. Together with the BMK and the BMAW, the BMBWF has therefore launched initiatives, some of which can be found as concrete measures in the National Action Plan for the European Research Area (ERA NAP) 2022–2025, to support Austrian higher education and research institutions in the (further) development and implementation of their gender equality plans. In addition to a guideline published in 2022, a series of workshops was launched in 2023 to present examples of good practice, among other things. The BMBWF has also anchored the instrument of equality plans in the performance agreements with the Institute of Science and Technology Austria, the Ludwig Boltzmann Society and the Austrian Academy of Sciences.

Some funding programmes are also specifically aimed at promoting women in research, such as the FWF's ESPRIT programme. For example, the application guidelines have been designed in such a way that career breaks do not result in any disadvantages and that women are favoured in the awarding of funding if the applicants have the same qualifications and the applications are of equal quality. In addition, the FWF offers female researchers with ongoing ESPRIT projects their own networking activities (annual workshops and network meetings) and visibility measures.

Promotion of women in R&D and innovation

Despite an increase in the number of female students and graduates at universities and universities of applied sciences, there are still relatively few women in creative roles in application-oriented research, or women who work as entrepreneurs, as managers in the natural sciences or technology sector, or as heads of externally funded projects. Although gender differences in science and research have changed significantly in favour of female participation in recent years and decades, women are still significantly underrepresented in applied, business-related research, development and innovation.[33]

32 Source: University data reports based on UHSBV.
33 See Régent et al. (2023), Wroblewski (2022), Greussing et al. (2016), OECD (2016).

As long as this underrepresentation persists, targeted measures to promote women are also indispensable in the segment of highly skilled women.[34] There are indications in the relevant scientific literature that targeted coaching and mentoring programmes in which women are supported and advised by women play a particularly important role. However, depending on the field of work or research, there are difficulties in finding suitable support.[35]

The BMK supports the promotion of young female talent and gender equality in RTI. Various activities in the area of gender equality and diversity were funded by the FFG in 2023:[36]

- Funding of scientific and technical internships for female students with €2.618 million
- Funding of female doctoral students in companies and research institutions for future economic topics with €2.0 million

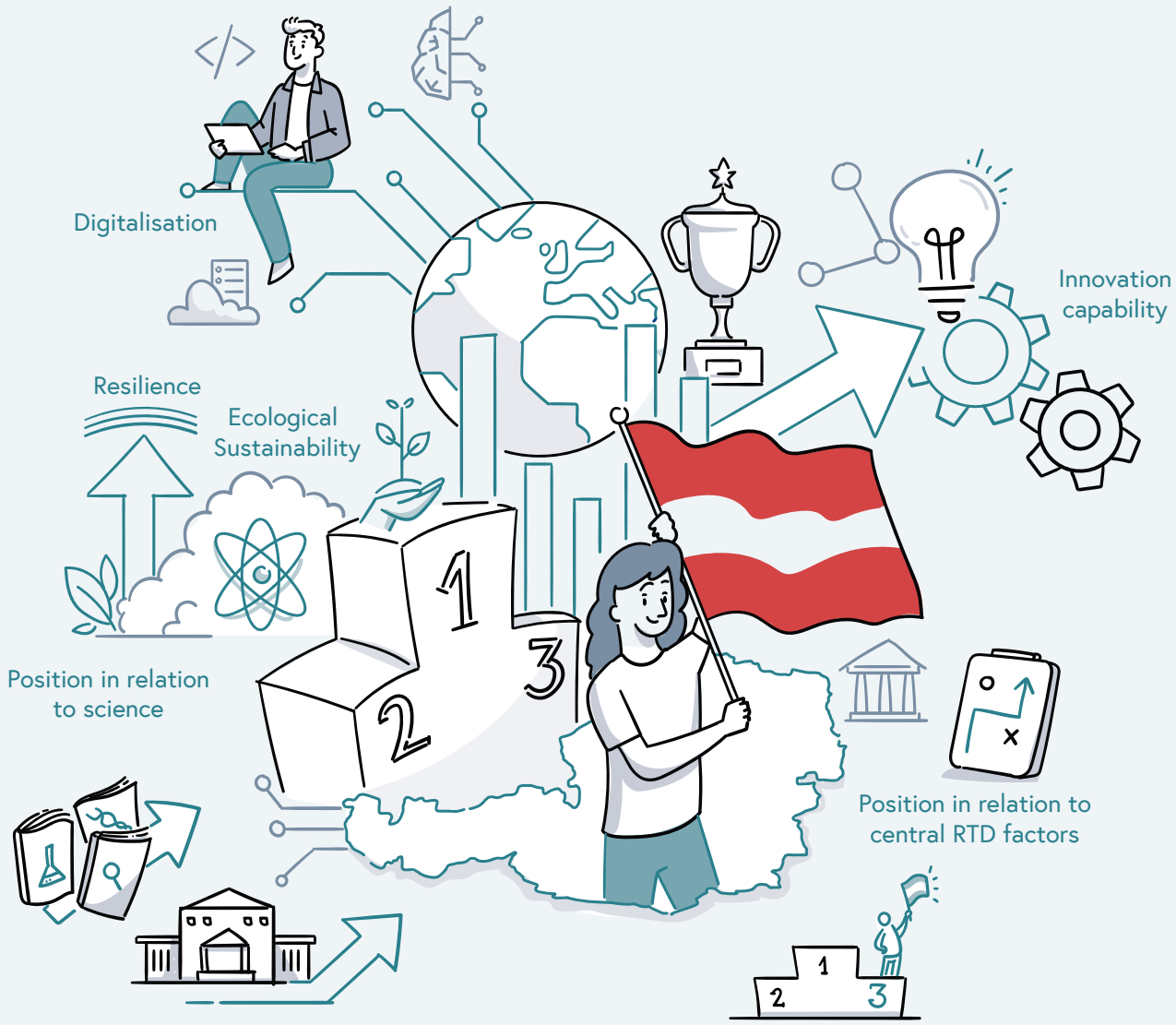
FEMtech Career Promotion supports organisations that want to employ, promote and retain more women in scientific and technical professions. At the same time, these projects also serve to create good and fair framework conditions for all employees (work-life balance, paternity leave, etc.). The measures of a FEMtech Career Project can be individually tailored to the objectives and needs of organisations. From 2024, this support programme will be further developed and relaunched under the name "DIVERSITEC".

The previous FEMtech initiative (network with more than 2,500 female Femtech experts) will expire at the end of 2023. The BMK is launching a new initiative on "Cultural change for a sustainable RTI location: diversity, equal opportunities and inclusion as success factors" just in time. The focus is on bundling the strengths of the now numerous equality networks, closer cooperation with opinion leaders and top management in companies and research institutions as well as target group-oriented communication of examples of success. A Europe-wide tender will be launched by the end of 2024 to commission this new initiative.

The BMAW is addressing these challenges and, with the INNOVATORINNEN programme, is pursuing the goal of specifically supporting women in applied, business-related research and development and, in particular, women in their creative role – both in terms of their needs and their personal development and the application of their professional expertise – as well as making R&I-interested, committed women visible. As part of the INNOVATORINNEN programme, highly skilled women are encouraged to develop their ideas, establish new network contacts and gain more creative freedom and professional development. INNOVATORINNEN offers workshops, events, empowerment training, a leadership programme (including alumnae networking) and, since autumn 2022, the new INNOVATORINNEN CLUB. The INNOVATORINNEN programme thus also builds on the programme findings of w-fFORTE (2005–2021).

34 See Alber et al. (2021).
35 See Weissenrieder et al. (2017).
36 https://www.ffg.at/gleichstellung

2.2
Austria's position in international comparisons



This chapter focuses on Austria's position in research, technology and innovation in an international comparison. This takes place against the backdrop of major (ongoing) global crises and technological changes as well as the associated uncertainties, which also have an impact on the economy and RTI policy. The COVID-19 pandemic and the Russia-Ukraine war have resulted in efforts to reduce mutual (technological) dependencies, with the EU, China and the USA taking initiatives to strengthen domestic RTI capacities.[37] In addition, Russia's War in Ukraine has triggered an energy crisis, which has led to an extraordinary rise in electricity and gas prices in particular. Overall, inflation in 2023 was four times higher than the European Central Bank's target of 2.0%.[38] Higher energy prices can have a negative impact on research budgets in the economy[39] and also affect the higher education sector. Higher education institutions have been urged to save energy[40] and some of the planned new tenders and appointments of new staff have also been reconsidered.[41] However, a decline in RTI expenditure in times of crisis also harbours the risk of a decline in economic output. For example, the Austrian Council for Research and Technology Development[42] pointed out that during the economic and financial crisis in 2009, countries that did not reduce their R&D spending during the crisis were able to maintain their economic performance better than others during and after the crisis.[43] Empirical analyses also point to a positive correlation between research and innovation performance and crisis resilience.[44]

Another consequence of the energy crisis is a reorganisation of the energy supply in the EU and, associated with this, the striving for energy security. Sustainable (innovative) solutions, such as renewable energies, not only contribute to energy security,[45] but also make a positive contribution to a country's carbon footprint. The extent to which research and innovation can be advanced in this area will have an impact on the future competitiveness of an economy and the successful realisation of national and global sustainability goals. Driving forward the digital, green and sustainable transformation of the economy and society is a key objective of the Federal Government's RTI Pact 2024–2026 and therefore guides Austrian RTI policy.

Against this background, the following chapter analyses Austria's position in research, technology and innovation in an international comparison in several sections. Section 2.2.1 analyses Austria's performance in research and development using a series of selected key input and output indicators, while section 2.2.2 focuses on performance with regard to science. This is followed in section 2.2.3 by an international comparison of Austria's position in selected key areas such as digitalisation, future technologies, quantum research and artificial intelligence. Section 2.2.4 shows Austria's innovative capability in an international

37 USA: Inflation Reduction Act, CHIPS and Science Act, Infrastructure Investment and Jobs Act; China: Made in China 2025, Belt and Road Initiative, 14th Five-Year Plan, Dual Circulation Strategy; EU: CHIPS Act for Europe, NextGenerationEU, New Industrial Strategy Europe.

38 Cf. Statistics Austria (2024), p. 1: https://www.statistik.at/fileadmin/announcement/2024/01/20240117VPIJahr2023.pdf

39 During the COVID-19 pandemic, for example, it was observed in Austria that financing restrictions and entrepreneurial uncertainty led to a slump in business enterprise financing for research and development in 2020 (cf. Reinstaller, 2022).

40 https://www.austriainnovativ.at/singleview/article/nachhaltig-gegen-die-energiekrise

41 https://www.forschung-und-lehre.de/politik/einstellungsstopp-an-der-uni-wien-5108

42 The Austrian Council for Research and Technology Development and the Austrian Science Council were dissolved on 1 July 2023 and transferred to the newly established Council for Research, Science, Innovation and Technology Development (FWIT Council).

43 See Council for Research and Technology Development (2020).

44 See Friesenbichler et al. (2020).

45 See Wuppertal Institute (2022).

comparison and, finally, section 2.2.5 looks at Austria's positioning in the areas of environmental sustainability and resilience in view of their social and economic relevance.

Each section compares relevant indicators from different sources for the 27 EU Member States. The EU average values shown in each case are calculated from the data available for EU Member States.[46] Depending on the availability of data, a comparison is also made with Switzerland as a highly successful science and innovation nation over the years, as well as with economies on other continents, such as the USA, China, Brazil, South Africa and Australia.

Key results of important indicators are highlighted at the beginning of each section. The indices used for the empirical analysis are described in more detail in the sections themselves; the development over time is presented for selected RTI indicators; where possible, the development of an indicator is also compared with the corresponding targets in the RTI Strategy 2030.[47] With reference to the key topic of this report "Excellence and innovation in life sciences and health" (Chapter 2.4), this chapter also addresses Austria's position in the field of life sciences in selected indicators. The data sources used are listed in Annex I.

2.2.1 Development of Austria's position in terms of key RTI indicators

RTI indicators

- R&D expenditure in 2022 (Eurostat): 3rd place; Austria continues to occupy a very good position in the EU and once again ranks fifth in terms of R&D employees.
- Venture Capital 2022 (European Innovation Scoreboard): 15th place; Austria still has some catching up to do but has improved by two places.
- Patent intensity 2021 (OECD): 9th place; Austria drops 4 places but is still among the top 10 within the EU in terms of triadic patents.

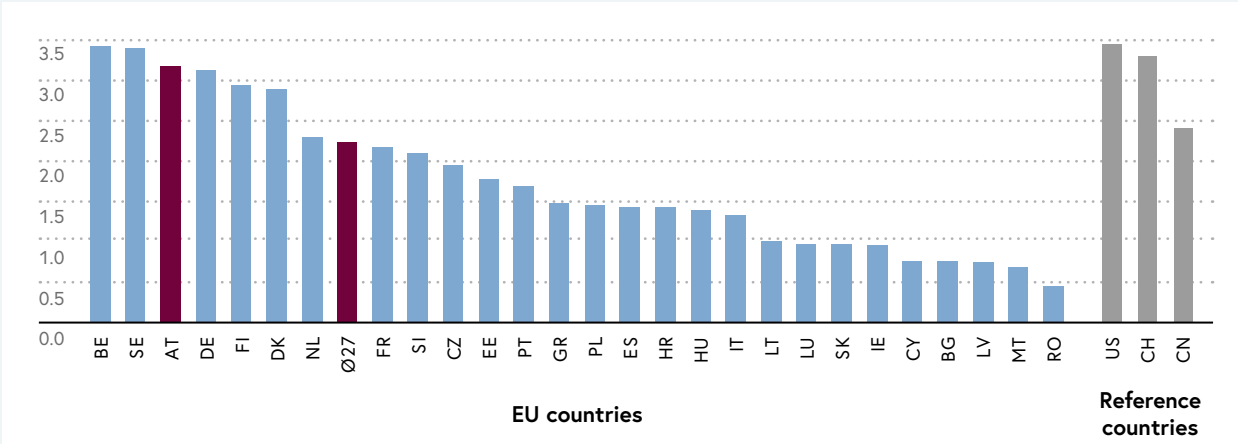
In this section, Austria's position in terms of performance and efficiency in research, technology and innovation is presented in an international comparison. To this end, classic input and output indicators are analysed. On the input side, these include expenditure on research and development, venture capital investments and R&D personnel. On the output side, the indicators of patent intensity (triadic patents), scientifically cited publications, European funding (ERC grants) and the number of outstanding higher education institutions in the country (measured by the Times Higher Education World University Ranking)[48] are used. Austria's position in global innovation rankings, such as the Global Innovation Index[49] and the European Innovation Scoreboard,[50] is then analysed.

R&D expenditure

R&D expenditure, i. e. the total gross domestic expenditure on research and development, is set in

46 For some indicators, values (possibly for the year under review) are missing for individual countries in the data sets. As the indicators come from different sources, the year of the currently available data differs in some cases.
47 See Federal Government of the Republic of Austria (2020).
48 Cf. Times Higher Education (2023); Times Higher Education (2024).
49 See WIPO (2023).
50 See European Commission (2023a); European Commission (2023b).

Figure 2-11: R&D expenditure as a percentage of gross domestic product (in %), 2022



Note: No current data are available for Brazil, Australia, South Africa, Russia and the United Kingdom. The data for Denmark, Switzerland and the United States are from 2021, for China from 2020. The data for 2022 are provisional figures from Eurostat.

Source: Eurostat (2023), Statistics Austria (2024); illustration: iit.

relation to gross domestic product (GDP) and thus forms the research intensity. This input indicator for R&D is one of the classic, central and widely recognised indicators for a country's RTI system. In its RTI Strategy 2030, Austria has defined the goal of being among the top 5 nations.[51]

Figure 2-11 shows a country comparison of the research intensity for 2022. Belgium leads the ranking with a research intensity of 3.43, followed by Sweden (3.40) and Austria (3.18). Therefore, there is no change in the ranking among the top 3 nations compared to the previous year; Austria once again has a high research intensity overall.

Globally, the following eight countries have higher research intensity than Austria: Israel, South Korea, Taiwan, the USA, Sweden, Belgium, Japan and Switzerland (source: OECD, according to research intensity in 2022, except Switzerland: 2021). This means that the RTI Strategy 2030 target of being among the five countries with the highest research intensity has currently not been achieved.

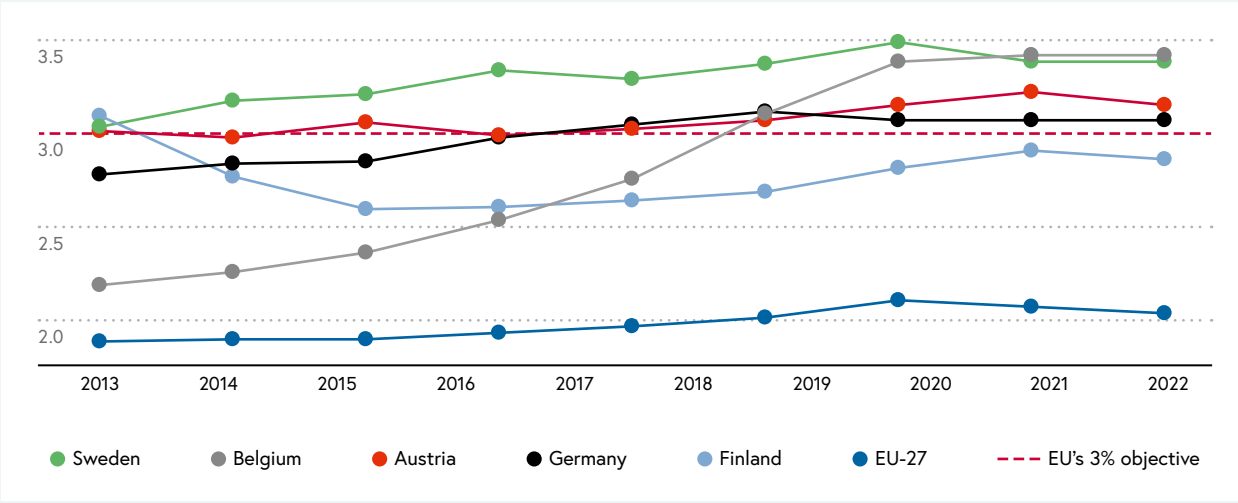
Figure 2-12 illustrates the development of the research intensity of Austria and selected EU Member States over time for the years 2013 to 2022.[52] Belgium was able to significantly increase its research intensity and was ahead of Sweden in the last two years. While Belgium, Sweden and Germany were unable to further increase their research intensity but were able to keep it constant, the EU-27 average – as well as Finland – shows a decline. Austria, on the other hand, is still among the top EU nations and continues to exceed the EU's 3% objective.[53]

51 See Federal Government of the Republic of Austria (2020), p. 7.

52 The development of Austria's research intensity is discussed in detail in Chapter 2.1.1.

53 The European Council adopted the Europe 2020 strategy in summer 2010 (see European Commission, 2010). One of the central objectives of the Europe 2020 strategy is to increase expenditure on research and development to 3% of gross domestic product. A new target for the research intensity has not yet been announced by the European Commission since the Europe 2020 strategy, but the European Commission has confirmed the European innovation objectives and European R&D expenditure in the "New European Innovation Agenda" (European Commission, 2022b).

Figure 2-12: R&D expenditure as a percentage of gross domestic product over time (in %), 2013–2022



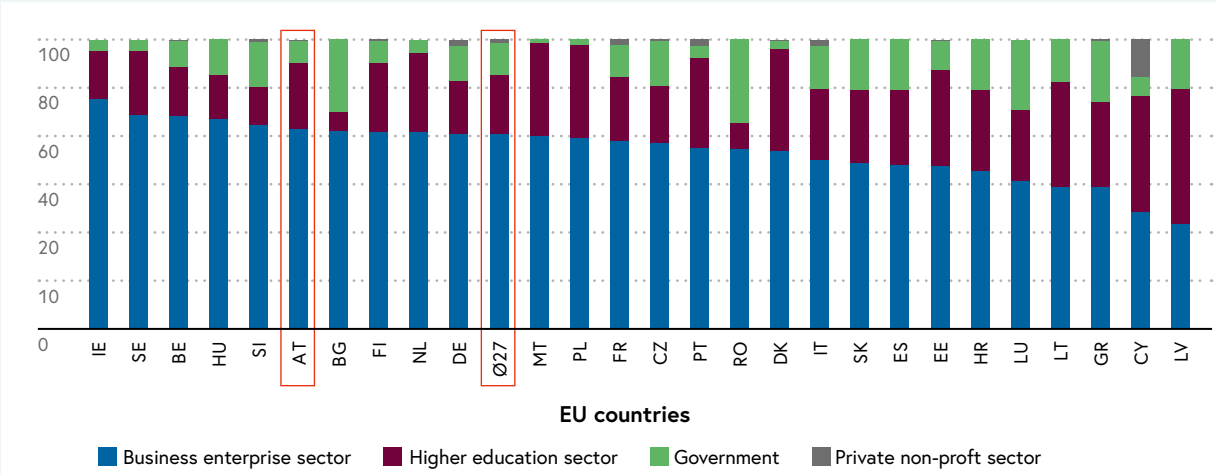
Note: The data for 2022 are provisional figures from Eurostat.

Source: Eurostat (2023); illustration: iit.

A country's R&D expenditure is borne by different performance sectors: the business enterprise sector, the higher education sector, the public sector and private non-profit organisations. However, the survey is not carried out consistently in all Member States with regard to the differentiation between the public sector and private non-profit organisations (this applies to Ireland, Sweden and the Netherlands, among others). In 2022, Germany also reported for the first time non-profit private organisations which were included in the public sector in previous years. Against this backdrop, Figure 2-13 shows the composition of R&D expenditure by performance sector in an international comparison. Despite the difficult framework conditions, the business enterprise sector continues to be the most important R&D implementing sector in almost all Member States (with the exception of Latvia and Cyprus).[54] Usually, the share of the business enterprise sector in the EU-27 Member States is over 50%,[55] the EU-27 average is 67.3% and among the top 5 nations it is between 70.5% (Slovenia) and 79.4% (Ireland). The second-highest R&D expenditure is in the higher education sector (exceptions here are Slovenia and Romania),[56] while the proportion of R&D expenditure in the public sector and in private non-profit organisations is lower. For Austria, the picture of R&D expenditure is almost unchanged compared to the previous year (2021). In 2022, the business enterprise sector was responsible for around two thirds (68.8%) of R&D expenditure[57] and the higher education sector

54 In Cyprus, the business enterprise sector and the higher education sector are equally important with a share of 40.3% each.
55 The exceptions are Lithuania (49.0%), Greece (49.0%), Cyprus (40.3%) and Estonia (36.0%).
56 The EU-27 average share of the higher education sector is 21.6%. Bulgaria (6.6%), Romania (8.9%) and Slovenia (12.9%) have the lowest shares among the Member States, while the highest shares are found in Latvia (46.7%), Cyprus (40.3%) and Lithuania (36.3%).
57 The proportion of business enterprise R&D expenditure in Austria is the sixth highest in the EU-27.

Figure 2-13: R&D expenditure by sector of performance in international comparison (in %), 2022



Note: No current data are available for the reference countries. The data for 2022 are provisional data from Eurostat.

Source: Eurostat (2023); illustration: iit.

for around a quarter (23.1%), while the public sector and non-profit private organisations accounted for 7.5% and 0.6% respectively.

Venture capital

For many newly-founded innovative companies, venture capital investments are particularly important in the start-up and growth phase, to successfully establish themselves on the market. A country's venture capital volume can therefore be seen as an indicator of future economic stimulus. In 2022, the share of venture capital investments in Austria's gross domestic product reported in the EIS was 0.115% (three-year average: 2020–2022).[58] This figure puts Austria in 15th place in an EU-27 comparison, with Estonia (1.062%), Sweden (0.407%) and Finland (0.399%) leading the way. Although Austria is still below the EU-27 average of 0.214%, it was once again able to increase the volume of venture capital investments – measured as a three-year average – and move up two places compared to the previous year (2021: 17th place; three-year average 2019–2021: 0.107%). However, an annual look at venture capital investments shows that at 0.067% in 2022, they are back at the level of 2020 (0.066%) after the positive outlier in 2021 at 0.211%.[59, 60] Austria has therefore not yet achieved the target defined in the RTI Strategy 2030 of increasing venture capital investment as a percentage of gross domestic product from 0.02% to 0.1%, given the level reported in 2022.[61]

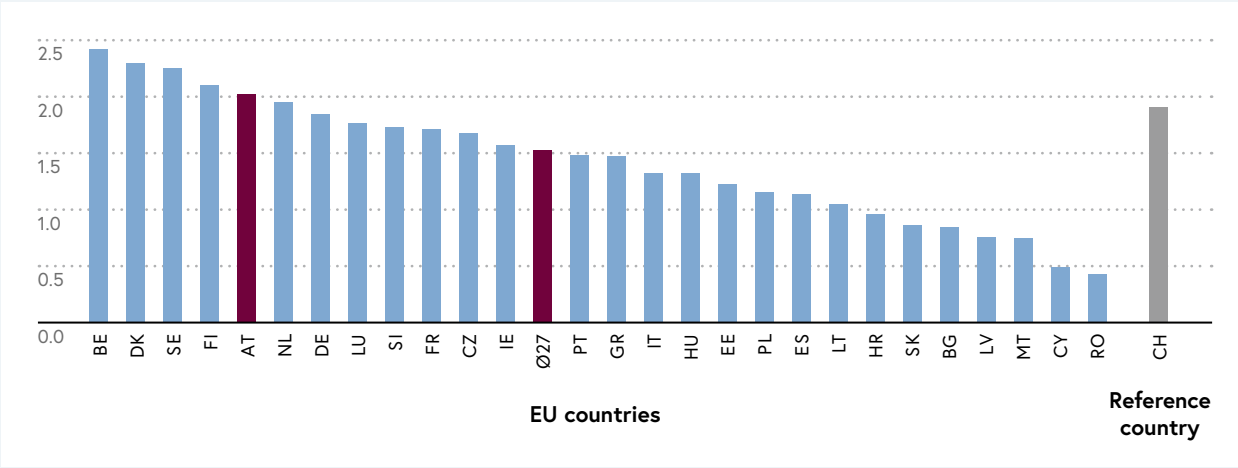
58 The European Innovation Scoreboard (EIS) shows the three-year average of venture capital investments to minimise the effect of outliers.

59 The investments in the companies Bitpanda and GoStudent are the reason for the high venture capital investments in 2021.

60 The annual data come from Invest Europe, the organisation on whose data the information in the European Innovation Scoreboard is also based.

61 See Federal Government of the Republic of Austria (2020), p. 7.

Figure 2-14: R&D staff as percentage of the working population (in %), 2022



Note: The figures for Denmark and Switzerland refer to 2021. No current data are available for Australia, Brazil, China, the USA, Russia, South Africa and the United Kingdom. For better comparability, full time equivalents are used in the figure as the basis for the calculations.
Source: Eurostat (2023); illustration: iit.

R&D employees

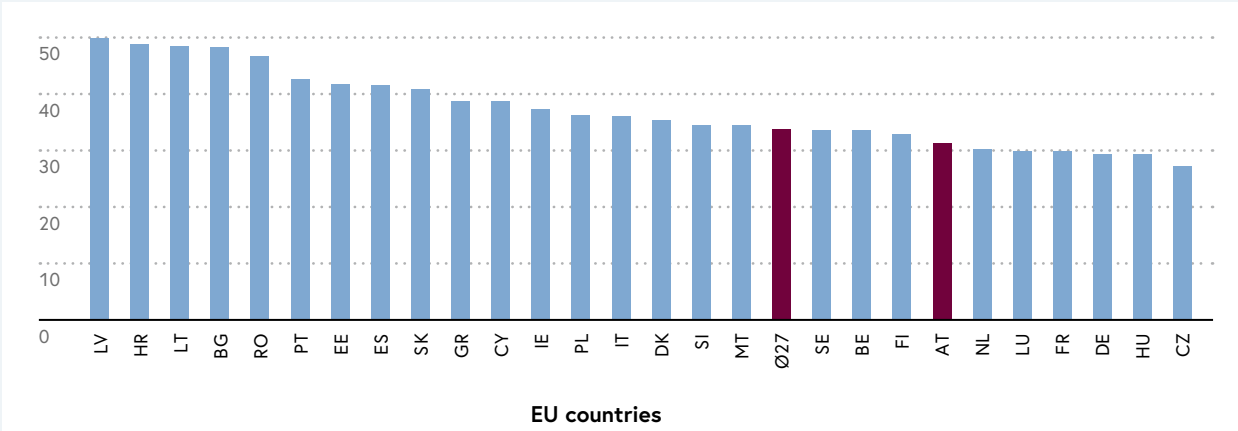
The proportion of R&D personnel in the working population is another key input indicator for the RTI system.[62] R&D personnel includes all persons who are directly involved in R&D, i. e. not only scientific personnel (researchers) but also technical personnel, for example. Figure 2-14 shows the proportion of R&D employees in the total working population in 2022 in an international comparison. With a share of R&D personnel of 2.02%, Austria ranks fifth in the EU-27 comparison, placed in the top group and – as in the previous year – behind Belgium (2.42%), Denmark (2.30%), Sweden (2.25%) and Finland (2.10%). In fact, Austria continued the growth of previous years in R&D personnel in 2022 and was able to achieve a share of over 2% for the first time. Although the gap to the leader Belgium has increased slightly compared to the previous year (+0.09 percentage points), the gap to second-placed Sweden has narrowed (-0.08 percentage points) and remained almost constant compared to Denmark and Finland. Compared to the development of the EU-27 average (1.53%), the year-on-year increase in Austria was almost twice as high: AUT: +0.08 percentage points; EU-27 average: +0.04 percentage points).

Figure 2-15 provides a closer look at women working in R&D by showing the proportion of female researchers among all researchers[63] – again in an international comparison. The percentage of female researchers is shown in relation to all service areas (government, companies, higher education institutions, private non-profit organisations) and measured in headcount. Compared to 2019, Austria was able to

62 "R&D personnel in a statistical unit include all persons engaged directly in R&D, whether employed by the statistical unit or external contributors fully integrated into the statistical unit's R&D activities, as well as those providing direct services for the R&D activities (such as R&D managers, administrators, technicians and clerical staff)", Frascati Manual 2015, §5.6.

63 "Researchers are professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques instrumentation, software or operational methods", Frascati Manual 2015, §5.35).

Figure 2-15: Share of women in research (in %), 2021



Note: No current data are available for Australia, Brazil, China, the USA, the United Kingdom, Switzerland and South Africa. The data for Denmark refer to 2019.
Source: Eurostat (2023); illustration: iit.

improve the proportion of female researchers in 2021, from 30.4% to 31.3%.[64] However, this had little impact on the ranking, and at rank 21 Austria still has some catching up to do. This need to catch up also becomes clear when looking at the proportion of female researchers measured in full-time equivalents rather than in headcount. Here, Austria is in third-last place with a share of 25.0%, ahead of the Czech Republic with 24.0%, and Germany with 22.7%.[65]

Applications for triadic patents

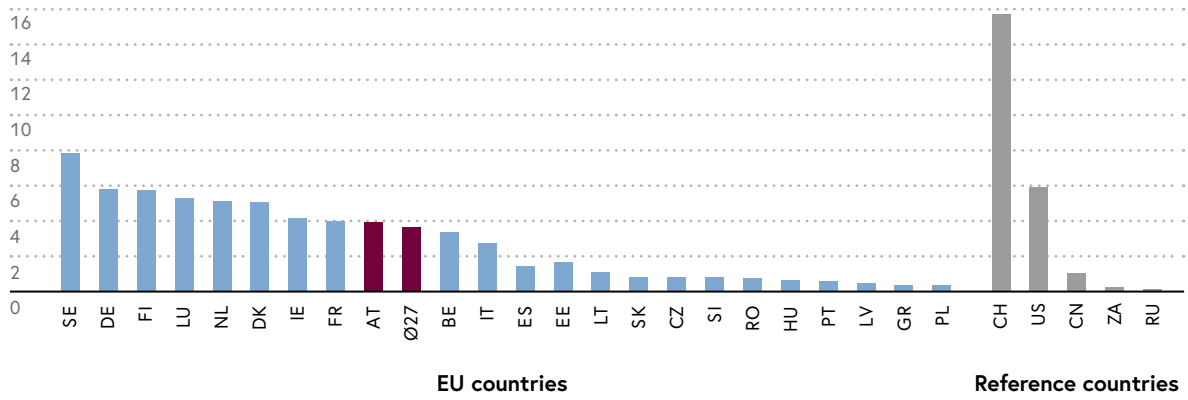
Triadic patents are a "family" of patents for the same invention filed simultaneously with the three major patent offices in Europe (European Patent Office, EPO), Japan (Japan Patent Office, JPO) and the United States (United States Patent and Trademark Office, USPTO).[66] As filing patents is resource-intensive and time-consuming, filing an invention with three patent offices at the same time can be seen as an indicator of the quality of inventions.

Figure 2-16 shows the number of triadic patents per 1,000 R&D employees ("triadic patent intensity") by country of origin. In an international comparison, Switzerland continues to hold an outstanding position with a triadic patent intensity of 15.73. In an EU-27 comparison, Sweden, Germany, Finland and Luxembourg are again the leaders, although Finland and Luxembourg have swapped places compared to 2020. Austria worsened its position by four places in 2021 and is now in 9th place.

As the data for triadic patents since 2020 are OECD estimates for the individual countries based on

64 No data are available for Austria for 2020.
65 The figures for Germany are from 2019. No data are available for Belgium, Denmark, France, the Netherlands and Finland.
66 See OECD (2024a).

Figure 2-16: Patent intensity (triadic patents) per 1,000 R&D employees, 2021



Note: No data are available for Bulgaria, Malta, Croatia, Cyprus, Australia, Brazil and the United Kingdom. The data on R&D employees for Switzerland refer to 2019, for Russia, the United States and South Africa to 2020. Source: OECD (2024b); illustration: iit.

the latest trends in patent applications in the three patent offices,[67] Austria's actual position may differ. In addition, the OECD has switched to a new platform for data dissemination this year and the data may still change as a result of further updates.

A comparison of the number of estimated triadic patents between the OECD's old and new platforms shows, for example, that 436.9 patents were estimated for Austria on the old platform, compared to 346.3 patents on the new platform.

2.2.2 Austria's international position in relation to science

Science

- Scientific publications 2022 (Scimago): 9th place; no change compared to the previous year.
- ERC Grants 2022 (European Research Council): 3rd place; the RTI Strategy 2030 target of being in the top 10 is achieved.
- Times Higher Education World University Ranking 2023: Austrian universities not yet among the top 100.

In the following, (i) the number of scientifically citable publications, (ii) the number of acquired European funding (ERC grants) and (iii) international university rankings are analysed to illustrate Austria's scientific performance in an international comparison.

67 The OECD chooses the priority date, i. e. the date of the first international registration of a patent, as the reference date. Counting patent families according to the earliest priority date has the disadvantage that not all information is available. The time span between the priority date and the availability of information on patent applications can be up to four years.

Austrian Research and Technology Report 2024 focus: Patents in the field of life sciences

Patents in the life sciences sector are of particular importance as they amortise the long-term development of drugs, therapies, diagnostic procedures or medical devices and create incentives for companies to invest in – sometimes high-risk – life sciences research and development. In 2022, Austria registered 234 patents in the field of life sciences with the European Patent Office. This means that around 10% of all patent applications in Austria (2,388 in total) were in this field. The number of patent applications in the life sciences sector in Austria has remained constant over the last five years (2018–2022), fluctuating only slightly between 206 and 249 patent applications. This puts patent applications below the average for the EU-27 Member States, which has risen from 329 applications to 373 applications in the last five years. However, European patent applications in the Member States are very unevenly distributed. For example, the three countries with the most patent applications in 2022 (Germany, France and the Netherlands) accounted for around 58% of all patent applications in the life sciences sector in Europe. While a positive trend can be observed in patent applications, there has been a slight decline in the number of patents granted since 2019, both in Austria and on average in the EU-27. In Austria, the number of patents granted in the life sciences fell continuously from 137 in 2019 to 80 patents granted in 2022. The average number of patents granted in the EU-27 Member States fell from 190 to 107 in the same period.

For a global comparison of the development of the share of biotechnology patents, IP5 patent families can be considered in this area. The IP5 patent families include applications filed with the European Patent Office and the patent offices of the USA, Japan, China and Korea. The share of biotechnology patents granted to EU-27 Member States fell from 25.1% in 2010 to 17.1% in 2020, while the USA accounted for by far the largest share of patents in the field of biotechnology in both years (2010: 35.3%; 2020: 37.4%). China was able to catch up strongly between 2010 and 2020 and, with a global share of 12.7% in 2020, is ahead of Japan (10.8%) and in third place behind the USA and Europe.

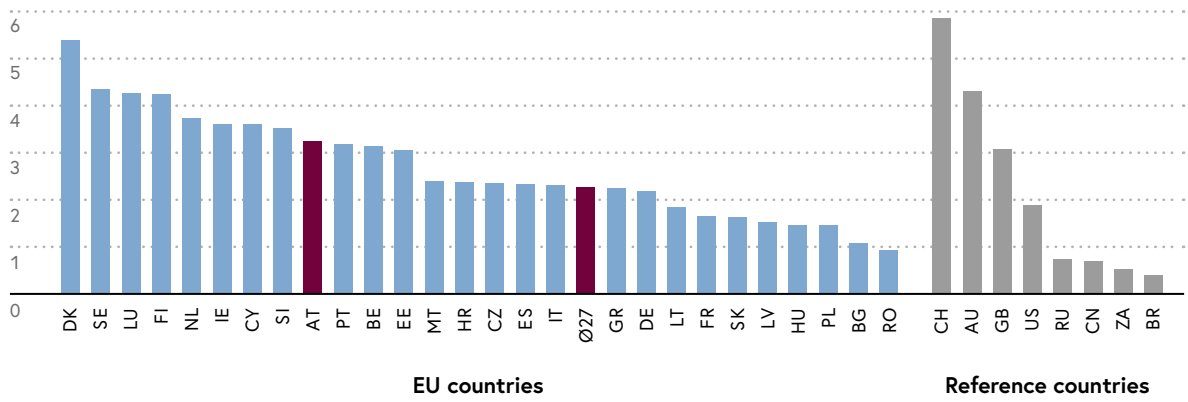
Citable scientific publications

Scientific findings are published in specialist publications and can form the basis of new technologies and services. The number of citable scientific publications in a country is therefore a quantitative measure of scientific performance. Figure 2-17 shows the result of a bibliometric analysis based on the Scimago publication database,[68] in which the citable publications (including scientific studies, reviews, books, articles) per country are taken into account and their total number is set in relation to the country population.[69]

At 3.24 citable publications per 1,000 inhabitants, the value for Austria in this indicator has deteriorated slightly compared to the previous year (2021: 3.36). In an international comparison, however, Austria was able to maintain its 9th place and thus remains in the upper midfield. A decline in the number of citable publications can also be observed overall

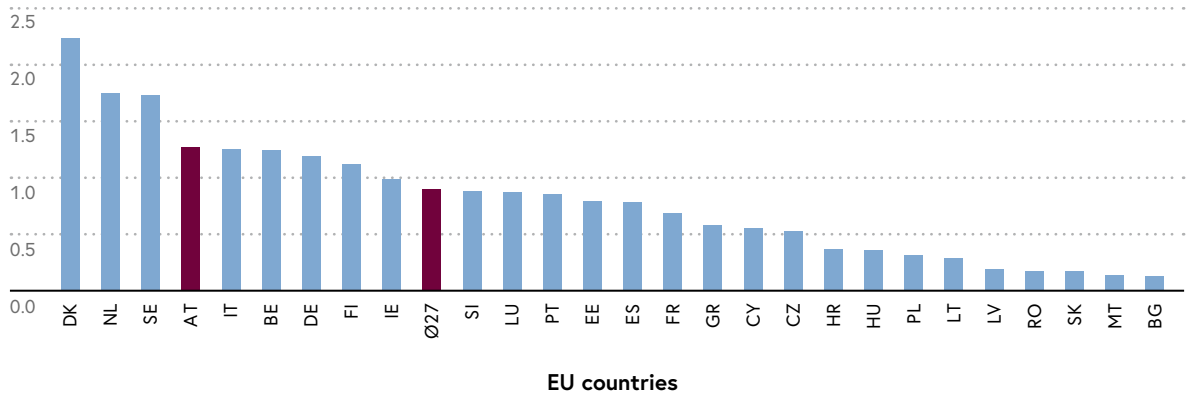
68 The data basis for the "Scimago Journal & Country Rank" is Scopus.
69 See Scimago Journal & Country Rank (2023).

Figure 2-17: Number of scientific (citable) publications in all disciplines standardised by country population, 2022



Source: Scimago Journal & Country Rank (2023); illustration: iit.

Figure 2-18: Number of excellent scientific publications in the field of "Biochemistry, Genetics and Molecular Biology" standardised by country population, 2021



Source: OECD (2023b); illustration: iit.

among the EU-27 Member States. The EU-27 average fell from 2.32 citable publications per 1,000 inhabitants in 2021 to 2.26 in 2022, which is slightly less than the decline in Austria. Denmark (5.39) and Sweden (4.34) are once again the leaders in this indicator in an EU-27 comparison, followed this year by Luxembourg (4.26) instead of Finland (4.23). In a global comparison of countries, Switzerland remains in leading position (5.85).

Austrian Research and Technology Report 2024 focus: Excellent scientific publications in the field of life sciences

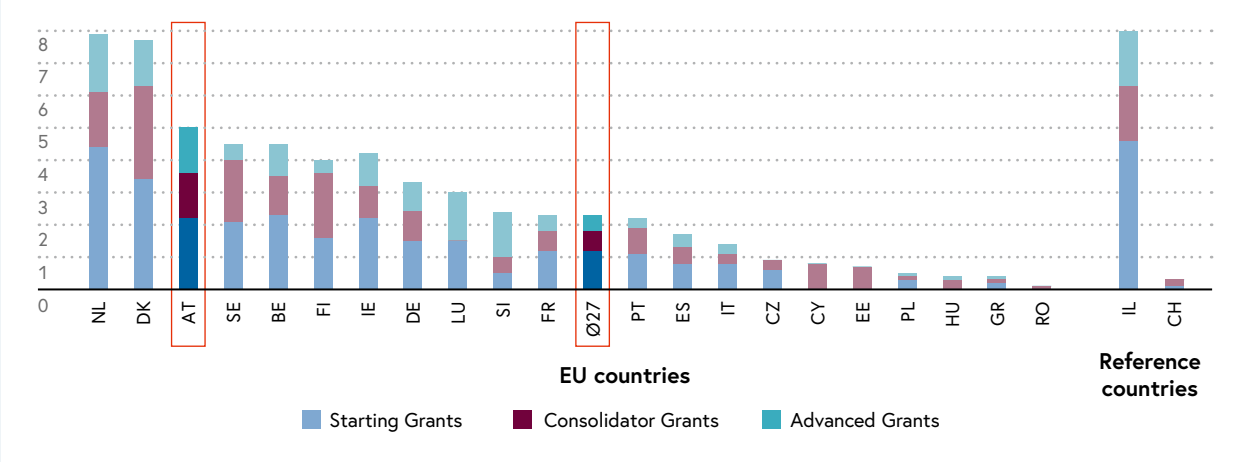
One indicator of the importance for a scientific publication is the frequency with which it is cited by other scientists. If a scientific publication is among the 10% most cited publications worldwide in the respective scientific discipline, it can be considered an excellent publication.

To illustrate Austria's status in terms of excellent scientific publications in the life sciences, we look at journals that fall under the classification of "Biochemistry, Genetics and Molecular Biology", "Pharmacology, Toxicology and Pharmaceutics" and "Medicine".[70] Overall, the picture for Austria is mixed: while the country is one of the leading nations in the EU-27 comparison in 2021 with 1.27 excellent publications per 100,000 inhabitants in the field of "Biochemistry, Genetics and Molecular Biology" (4th place; see Figure 2-18), it ranks seventh in the EU-27 comparison in the field of "Medicine" with 4.58 excellent publications per 100,000 inhabitants; in the field of "Pharmacology, Toxicology and Pharmaceutics", on the other hand, it ranks 12th in the EU-27 comparison with 0.27 excellent publications per 100,000 inhabitants.

Austria is above the EU average in all three classifications. Denmark (2.24), the Netherlands (1.75) and Sweden (1.72) lead the field of "Biochemistry, Genetics and Molecular Biology", while the EU average is 0.90. Denmark (0.61) also leads the field of "Pharmacology, Toxicology and Pharmaceutics", this time followed by Portugal (0.50) and Ireland (0.46); the EU average is 0.25 excellent publications per 100,000 inhabitants. In the field of "Medicine", Denmark also leads the EU-27 ranking with 11.68 excellent publications per 100,000 inhabitants, followed by the Netherlands (9.82) and Sweden (7.77); the EU average is 3.76 excellent publications per 100,000 inhabitants.

70 See OECD (2024b): https://data-explorer.oecd.org/vis?fs[0]=Topic%2C1|Innovation and technology23INT23%7CBibliometric 20indicators23INT_BIB23&pg=0&fc=Topic&bp=true&snb=3&vw=tb&dfds]=dsDisseminateFinalDMZ&dfid]=DSD_ BIBLIO40DF_BIBLIO&dfag]=OECD.STI.STP&dfvs]=1.0&pd=2007%2C&dq=.FPUBS_NBFRAC.PBL_SC.22.& ly [rw]=REF_ AREA&ly[cl]=TIME_PERIOD&to[TIME_PERIOD]=false

Figure 2-19: Number of European science awards (ERC grants) in Horizon Europe per million inhabitants, 2022



Note: Only countries that have acquired ERC grants in 2022 are listed. ERC grants that were acquired as coordinator are shown.
Source: Data retrieved from the FFG EU Performance Monitor (2024) as of January 2024; illustration: iit.

European Research Council (ERC) grants

The number of ERC grants[71] can be seen as an indicator of the quality of a country's science system and serve as indicator of future high-quality scientific research results. ERC grants are part of the Excellence Science pillar of the Horizon Europe programme and are considered very prestigious in the scientific community. In principle, ERC grants are awarded in five different categories: ERC Starting Grant, ERC Consolidator Grant, ERC Advanced Grant, ERC Proof of Concept and ERC Synergy Grant.[72]

Figure 2-19 shows the number of ERC Starting Grants, ERC Consolidator Grants and ERC Advanced Grants awarded in 2022 per million inhabitants. The data come from the FFG's EU Performance Monitor (2024) and were provided by the FFG. ERC grants in Horizon Europe that were acquired in the role of coordinator in 2022 were analysed. The ERC Proof of Concepts are not included due to the comparatively low funding volume. Similarly, the ERC Synergy Grants are not presented in a country comparison, as two to four researchers from different countries are funded by one grant. If all three ERC grant categories are added together, Austria was able to acquire 5.1 ERC grants per million inhabitants, putting it in 3rd place. With this ranking, the goal defined in the RTI Strategy 2030[73] of being among the top 10 has been achieved. The Netherlands is in first place with 7.9 ERC grants per million inhabitants. Austria is also among the top 10 in the individual ERC grants, ranking 4th in the ERC Starting Grants, 5th in the ERC Consolidator Grants and 3rd in the ERC Advanced Grants in 2022.

Universities

One output indicator for a country's performance in science is the number of outstanding higher education

71 ERC Grants are funds of the European Research Council funding excellent research in all fields of research.
72 See European Commission (2023c).
73 See Federal Government of the Republic of Austria (2020), p. 7.

Austrian Research and Technology Report 2024 focus:
ERC Grants in life sciences

The data on ERC grants was provided by the FFG and analysed separately for the field of life sciences for the Austrian Research and Technology Report 2024. ERC grants in the field of life sciences are allocated to nine different panels: LS1: Molecules of Life; LS2: Integrative Biology; LS3: Cellular, Development & Regenerative Biology; LS4: Physiology in Health, Disease & Ageing; LS5: Neuroscience & Disorders of the Nervous System; LS6: Immunity, Infection & Immunotherapy; LS7: Prevention, Diagnosis & Treatment of Human Diseases; LS8: Environmental Biology, Ecology & Evolution; LS9: Biotechnology & Biosystems Engineering.

ERC grants acquired in 2022 as a coordinator in the field of life sciences were evaluated. Austria was able to acquire a total of 16 ERC grants in the field of life sciences. Of these, three ERC grants can be allocated to Panel LS1, one to Panel LS2, three to Panel LS3, one to Panel LS4, four to Panel LS5, two to Panel LS7 and two to Panel LS8. 1.77 ERC grants per million inhabitants puts Austria in 4th place in the EU-27 comparison. The leader in the field of life sciences is the Netherlands with 2.203 ERC grants per million inhabitants, followed by Denmark (2.202) and Sweden (1.81). A breakdown of the individual ERC grant types shows that Austria ranks third for Starting Grants, fourth for Consolidator Grants and second for Advanced Grants.

institutions. They are key players in the national knowledge and innovation system, as they generate new knowledge and drive technological developments, among other things. International university rankings, such as the Times Higher Education World Ranking (THE Ranking[74] can therefore be used as an indicator of a country's performance in science. The THE ranking compares universities based on a total of 18 performance indicators in the areas of teaching (learning environment), research environment (volume, income and reputation), research quality (citation impact, research strength, research excellence, research influence), internationality (staff, students and research) and industry (income and patents).[75] in the THE Ranking 2024, Austria once again could not place a higher education institution among the top 100 universities worldwide. As a result, Austria has not yet succeeded in achieving the RTI Strategy 2030 target of having at least two universities in the top 100. The United States remains by far the international leader, having placed 34 universities in the THE Ranking 2023, and has managed to expand its position in the current ranking to 36 universities among the top 100 universities worldwide. This is followed, as in previous years, by the United Kingdom with 11 universities and Germany with eight universities. A look at the individual Austrian universities reveals a mixed picture. Accordingly, the University of Vienna was able to continue the positive trend of recent years and also position itself in the top 200 in the revised ranking (119th place). The Medical University of Graz and the Medical University of Vienna were no longer able to place themselves in the top 200.[76]

74 See Times Higher Education (2024a).
75 One possible explanation is that the performance indicators in the THE Ranking 2024 were increased from 13 to 18. In addition, the names of the five areas in which performance indicators are collected have been changed. This also limits the comparability of the results with previous years.
76 For a possible explanation, see the previous footnote.

Austrian Research and Technology Report 2024 focus: THE ranking for the field of life sciences

In addition to an overall ranking, the Times Higher Education World Ranking (THE) also publishes a ranking of higher education institutions by subject.[77] This also applies to the subjects "Life Sciences" and "Clinical and Health", whose rankings are based on the same performance indicators as the THE overall ranking 2024. In the THE subject rankings, life sciences includes the disciplines of agriculture and forestry, biology, veterinary medicine and sports sciences.[78] As in the THE overall ranking, the United States is also the leader in this subject-specific ranking (34 universities in the top 100). After the United States, the United Kingdom (10) and Germany (9) are again the most strongly represented nations in the top 100, followed by Australia (7) and China (7). In contrast to the overall THE ranking, an Austrian university is also represented in the top 100 in the subject-specific ranking of life sciences with the University of Vienna in 99th place. The next best-ranked Austrian university is the University of Innsbruck in the group of 301–400.

The subject "Clinical and Health" in the THE subject ranking includes the disciplines of medicine, dentistry and other health subjects. Here too, Austria was able to position an institution in the top 100 with the Medical University of Vienna in 95th place and two further institutions in the top 200 with the Medical University of Graz (186th place) and the Medical University of Innsbruck (187th place). The United States is again the leader in this subject ranking, albeit with 29 universities, a lower number compared to the "Life Sciences" subject ranking and THE overall ranking. It is followed by the United Kingdom (13) and China (8).

77 Universities can be ranked in the THE ranking for the following subjects: arts and humanities, business administration and economics, medical and health sciences, computer science, education, engineering, law, life sciences, natural sciences, psychology and social sciences.

78 The definition of life sciences here therefore differs from the definition in the *Zukunftsstrategie,* where the term life sciences primarily focuses on the "health aspect and thus on research, development and application in medical and molecular biology and biotechnology (red biotechnology), (bio)medicine, pharmacy and medical technology".

Austria's position in global innovation rankings

Global innovation rankings: Global Innovation Index (GII) & European Innovation Scoreboard (EIS)

- GII 2023 (WIPO): 8th place (EU-27 comparison); loss of one rank compared to the previous year.
  - 15th place in the overall ranking in the innovation output sub-index; improvement of six places compared to the previous year.
  - 18th place in the overall ranking in the innovation input sub-index; loss of one place compared to the previous year.
- EIS 2023 (European Commission): 6th place (EU-27 comparison); improvement of two ranks compared to the previous year.
  - Top 5 rankings in the areas of "Finance and support" and "Intellectual assets"
  - 15th place in "Use of information technologies" and "Digitalisation".

The Global Innovation Index (GII)[79] and the European Innovation Scoreboard (EIS)[80] are two important and established international overall indices for which the following targets have been set in the RTI Strategy 2030: 10th place in the GII and 5th place in the EIS.[81]

Both indices summarise the many individual areas of innovation into an overall index and enable an overarching international classification of countries' innovative capability and performance.

The Global Innovation Index 2023 (GII) consists of two equally weighted sub-indices and represents a measure of the innovative capability and performance of countries. The innovation input sub-index consists of five dimensions that contain those elements of the economy that enable and facilitate innovative activities (e. g. institutional framework conditions, human capital or information and communication technologies). The innovation output sub-index consists of two dimensions and measures the output of innovative activities in

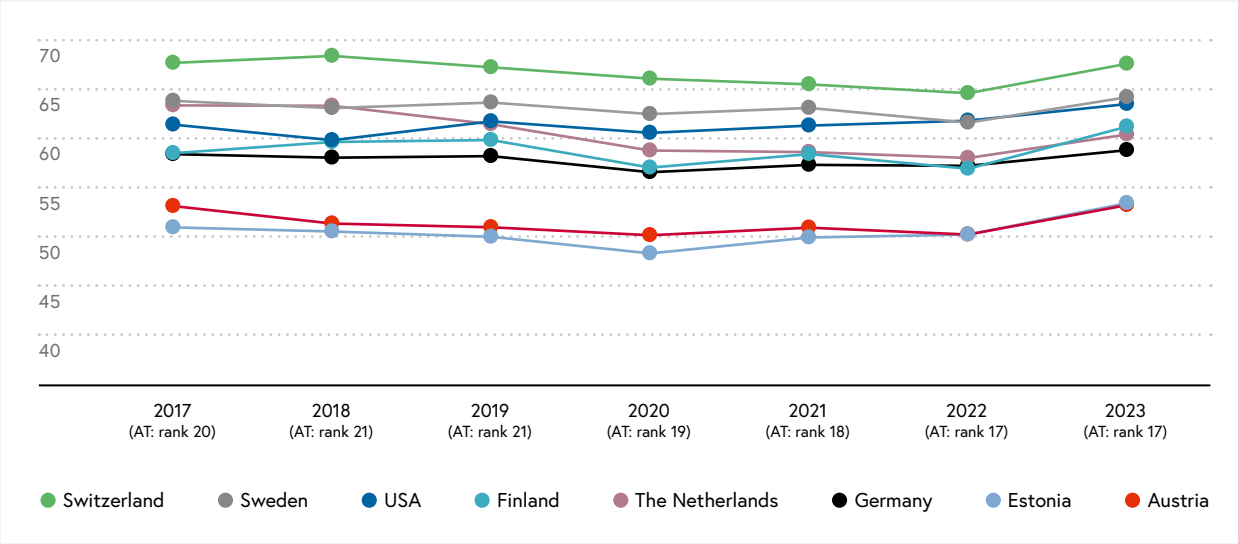
Table 2-4: Austria's international position in the GII and EIS, 2023

	European Innovation Scoreboard (EIS)	Global Innovation Index (GII)
Publisher	European Commission	WIPO
Publication rhythm	Annually (summer)	Annually (summer)
Current issue	2023	2023
Number of reference countries	38	132
Top 3 nations	Switzerland, Denmark, Sweden	Switzerland, Sweden, USA
Top 3 EU-27	Denmark, Sweden, Finland	Sweden, Finland, Netherlands
Rank Austria	7	18
Rank Austria EU-27	6	8
Number of sub-indices	4 main types and 12 innovation dimensions	2 sub-indices and 7 pillars
Number of indicators	32	81

Source: WIPO (2023); European Commission (2023b); illustration: iit.

79 See WIPO (2023).
80 See European Commission (2023b).
81 See Federal Government of Austria (2020), p. 7.

Figure 2-20: Global Innovation Index (GII) over time, 2017–2023



Source: WIPO (2023); illustration: iit.

the economy (e.g. knowledge creation, knowledge dissemination or creative goods and services).

In the GII 2023, Austria ranks 8th in the EU-27 comparison and 18th in the global comparison. Although Austria improved its index value from 50.2 in 2022 to 53.2 in 2023, it dropped one place in the ranking in both the EU-27 and global comparison. The reason for this is that Estonia, which was only just behind Austria in 2022, was able to improve its index value to a greater extent than Austria. This is the first step backwards towards achieving the target formulated in the RTI Strategy 2030 (10th place) in the last three years, in which Austria was always able to improve its ranking compared to the previous year. Looking at the sub-indices of the GII 2023 for Austria in the overall ranking, there was a drop of one place in the innovation input sub-index (2022: 17th place; 2023: 18th place). In four out of five pillars of this sub-index, the country's ranking deteriorated, in some cases significantly. In the "Institutions" pillar, the position deteriorated by five places (13th place), in the "Infrastructure" pillar by three places (12th place), in the "Market sophistication" pillar by one place (39th place) and in the "Business sophistication" pillar also by one place (19th place). In the "Human capital" pillar, the 11th place from the previous year was maintained. The "Innovation output" sub-index shows a reversed – positive – picture. Here, Austria was able to significantly improve its ranking from 21st place in 2022 to 15th place in 2023. This was due in particular to the improvement of thirteen positions in the "Creative outputs" pillar (13th place, previously 26th place), but an improvement of two positions was also achieved in the second pillar of the "Knowledge and technology outputs" sub-index (17th place, previously 19th place).

Figure 2-20 shows the development of the overall GII index value in an international comparison for the period 2017–2023. In 2023, Switzerland topped the ranking of the most innovative economies for the thirteenth time in a row. The gap between Switzerland and the second and third-placed countries, the USA and Sweden, widened again in 2023, after narrowing in 2022. In 2023, Sweden was able to regain second place from the United States, having lost it to the United States a year earlier. For Austria, the previous trend of a falling index value appears to have been broken,

as the index value in 2023 is significantly higher than in previous years. However, a higher index value is the case for all countries listed in Figure 2-20. It is possible that this increase in the index values is due to minor methodological changes in the GII 2023.[82] Austria's higher index value does not mean that the country has also improved its ranking. On the contrary, Austria loses one position in the GII ranking in 2023. If all of Austria's rankings in the years 2017 to 2023 are considered, a slightly positive trend emerges. While Austria occupied either 20th or 21st place in the years 2017 to 2019, its rankings have improved in each of the last four years (2020: 19th place; 2021: 18th place; 2022: 17th place; 2023: 18th place).

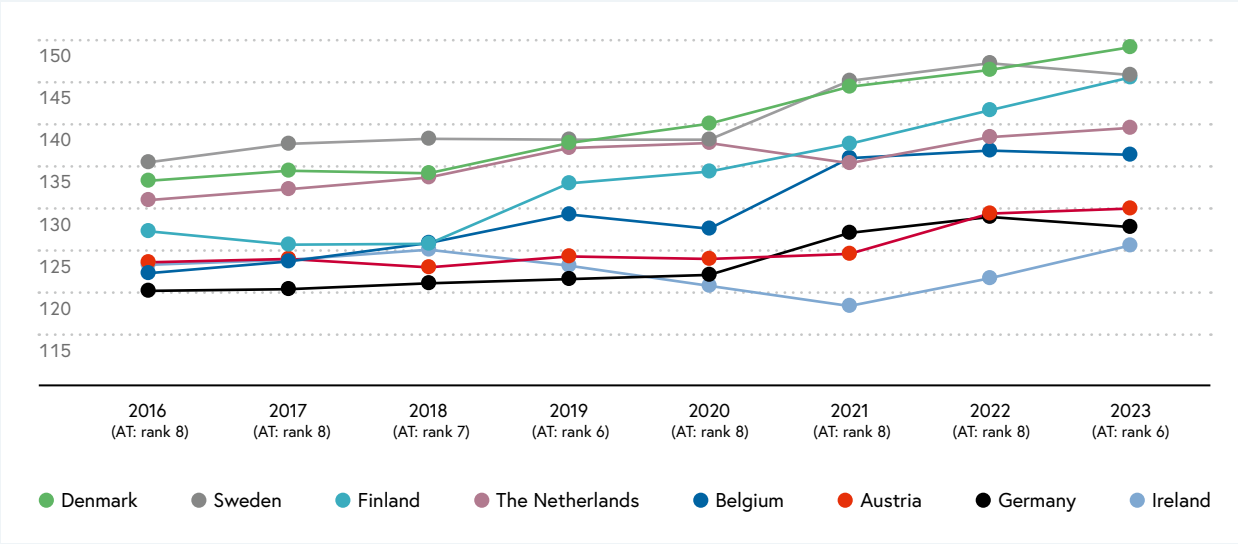
The European Innovation Scoreboard (EIS) is used to assess the research and innovation performance of EU Member States and to evaluate the relative strengths and weaknesses of research and innovation systems. Four dimensions are created as part of the EIS, namely: i) framework conditions, ii) investments, iii) innovation activities and iv) impacts. The four dimensions each consist of three sub-dimensions, which in turn are each made up of two to three indicators. A total of 32 individual indicators are collected in the EIS. Finally, the overall performance of each country's innovation system is expressed in a composite indicator, the Summary Innovation Index. In comparison to previous years, Israel is not included in the EIS 2023 due to a lack of statistical data.

In the EIS, EU Member States are defined as "Innovation Leaders" if their overall index value relative to the EU average is greater than 125% and as "Strong Innovators" if the overall index value is between 100% and 125%. Among the EU-27 Member States, Denmark, Sweden, Finland, the Netherlands and Belgium are among the Innovation Leaders in the EIS 2023. Denmark leads the ranking of the Innovation Leaders group and Belgium is the country with the lowest overall index score in this group. Austria belongs to the Strong Innovators group, as do Germany, Luxembourg, Ireland, Cyprus and France. In fact, Austria leads the Strong Innovators, while France is at the bottom of this group. With a score of 119.9%,[83] Austria has improved compared to the previous year (2022: 118.3%) and is above the average score of the Strong Innovators group (111.6%).[84] This brings Austria closer to the goal of the RTI Strategy 2030[85] of becoming one of the top 5 Innovation Leaders.[86] In the EU-27 ranking, Austria overtook Ireland and Luxembourg in 2023 and moved up two places to 6th place. In the individual sub-indices of the EIS, Austria was able to maintain its position in the areas of "Intellectual assets" (1st place) and "Finance and support" (4th place) and achieve a top 5 ranking. Austria still has a lot of catching up to do in the areas of "Use of information technologies" and "Digitalisation" (both ranked 15th).[87]

Figure 2-21 compares the EIS values for Austria and selected nations over the years 2016 to 2023. The index values in Figure 2-21 show the performance relative to the EU in 2016. The EIS indicators were changed to a greater extent in 2021. The values shown in the figure were calculated retrospectively on the

82 One indicator was newly included in the GII and two other indicators were removed from the GII in return. There were also methodological changes to three other GII indicators.
83 This EIS value indicates the performance relative to the EU in 2023.
84 European Commission (2023b).
85 See Federal Government of the Republic of Austria (2020).
86 See European Commission (2023b).
87 A more detailed analysis of Austria's position in the EIS indicators can be found at: https://www.wpz-research.com/wp-content/uploads/2023/07/WPZ-Research_EIS-2023_Analyse_27072023.pdf

Figure 2-21: European Innovation Scoreboard (EIS) over time, 2016–2023



Source: European Commission (2023b); illustration: iit.

basis of these new indicators.[88] Austria's value in the Summary Innovation Index has developed positively overall in recent years. While the index value was between 123.0 and 124.6 in the years 2016–2021, it has increased in the last two years in particular, rising to 130.0 in 2023. This is also reflected in Austria's ranking. While Austria was always in 8th place in the years 2020–2022, it achieved 6th place in 2023. As can be seen in Figure 2-21, most EU Member States – like Austria – have improved continuously over time. Denmark and Finland in particular show a strong upward trend. Sweden and Germany, on the other hand, suffered a decline in their EIS scores. After overtaking Germany in 2022, Austria was able to further extend its lead over Germany in 2023. However, at 6.4 percentage points, Austria's increase in the EIS value in the period 2016–2023 is lower than the average growth rate in the EU of 8.5 percentage points, meaning that, according to the European Commission,[89] its lead over other nations has narrowed.

2.2.3 Austria's position in terms of digitalisation

Austria supports the digital transformation through various political initiatives and measures. These include, for example, the Digital Austria Act[90] in 2023, which sets out 36 principles and 117 planned measures, and the 2020–2026 Recovery and Resilience Plan[91] with €1.8 billion for digitalisation. In the following, the status of digitalisation in Austria is examined in an

88 It is not possible to compare the EIS values in the Austrian Research and Technology report 2024 with the EIS values stated in previous research and technology reports, as the reference year for which a country's performance is calculated changes annually. For example, the EIS values in the 2023 Austrian Research and Technology Report indicated the performance of a country relative to the performance of the EU in 2015. In this Research and Technology Report, however, the performance of a country is stated relative to the performance of the EU in 2016.

89 European Commission (2023b).

90 See Federal Government of the Republic of Austria (2023).

91 See Federal Ministry of Finance (2021).

international comparison using four selected indices or indicators, namely the European Commission's Digital Economy and Society Index (DESI),[92] the Readiness for Frontier Technologies Index 2022[93] and indicators relating to future technologies such as artificial intelligence (AI) and quantum technology. Last year, the European Commission's Digital Economy and Society Index (DESI)[94] was discussed here. However, as a composite DESI index has no longer been reported since 2023, the performance indicators of the Digital Decade will be discussed here.[95]

Performance indicators of the Digital Decade

Performance indicators of the Digital Decade

- Austria is above the EU-27 average in 6 out of 11 performance indicators of the Digital Decade.
- "Access to electronic patient records": 5th place; Austria's best ranking in this performance indicator.
- "Gigabit network connection": 24th place; there is a need to catch up in this performance indicator.

As part of the Digital Decade policy programme 2030, the EU Commission publishes an annual report on the Digital Decade, which provides an overview and analysis of the digital transformation in the European Union and an assessment of progress towards achieving the objectives of this decision and the digitalisation targets for the period up to 2030.[96] To this end, the DESI was integrated into the State of the Digital Decade report this year, giving the DESI a new role by developing structured, transparent and joint monitoring on its basis.[97]

The integration of the DESI into the report on the status of the Digital Decade aims to enable a clear link between the DESI indicators and the objectives of the Digital Decade.[98] The indicators are thus assigned to four dimensions, namely: i) digital skills, ii) digital infrastructure, iii) digitalisation of companies and iv) digitalisation of public services.[99]

In view of this, the performance indicators (KPIs) of the Digital Decade Policy Programme 2030 are discussed in more detail below and Austria's respective positioning in an international comparison is presented. A description of the content of the KPIs, their metrics and data source can be found in the glossary in the annex. Table 2-5 provides an overview of Austria's ranking in the respective KPIs; it also lists the three leading nations and shows whether Austria is above or below the EU-27 average. Overall, it can be seen that Austria is only above the EU-27 average in 6 out of 11 performance indicators, with no leading position (1st–3rd place) in any performance indicator. With 5th place, Austria achieved its best ranking in "Access to electronic patient records"[100] (dimension "Digitalisation of public services"). Austria's second-

92 See European Commission (2023d).
93 See United Nations (2023).
94 See European Commission (2023d).
95 See European Commission (2022a).
96 See European Commission (2022a).
97 See European Commission (2023e).
98 As a result of the adjustments to the DESI, composite index values are no longer provided, i. e. neither for the DESI as a whole nor for the previous four main DESI areas of connectivity, human capital, integration of digital technologies and digital public services. The DESI 2023 now consists of a system of indicators that has been adapted to the goals of the Digital Decade.
99 See European Commission (2023e).
100 Measured as: (i) the nationwide availability of online access services for citizens to their electronic health data (via a patient portal or mobile patient app) with additional measures to enable certain groups of people (e. g. guardians of children, people with disabilities, older people) to also access their data, and (ii) the percentage of people who have the ability to obtain or use their own minimum set of health-related data currently stored in public and private electronic health record systems.

Table 2-5: Performance indicators of the Digital Decade, 2023

Digital goals	KPI	Top 3 EU-27	Rank Austria EU-27	Year of most recent data collection	Austria above the EU-27 average
Digital skills	At least basic digital skills	Finland, Netherlands, Ireland	9	2021	yes
	ICT specialists	Sweden, Luxembourg, Finland	9	2022	yes
Digital infrastructure	Gigabit network connection	Malta, Netherlands, Denmark	24	2022	no
	5G network coverage	Cyprus, Malta, Netherlands	9	2022	yes
Digitalisation of companies	Cloud computing	Sweden, Finland, Denmark	18	2021	no
	Big data	Malta, Netherlands, Denmark	18	2020	no
	Artificial intelligence	Denmark, Portugal, Finland	11	2021	yes
	SMEs with at least basic digital intensity	Finland, Denmark, Sweden	14	2022	no
Digitalisation of public services	Online provision of important public services for citizens	Malta, Luxembourg, Estonia	14	2022	yes
	Online provision of important public services for companies	Finland, Ireland, Estonia	15	2022	no
	Access to electronic patient records	Denmark, Lithuania, Finland	5	2022	yes

Note: For further information on the performance indicators of the Digital Decade, see explanations in Annex I.

Source: European Commission (2023d); illustration: iit.

best ranking was 9th place for the indicators "At least basic digital skills", "ICT specialists" and "5G network coverage"; here Austria is in the top third of all EU Member States. There is a clear need to catch up with 24th place for the "Gigabit network connection" indicator. Austria is in the middle of the field for the other performance indicators of the Digital Decade (between 11th and 18th place). The leader in the performance indicators of the Digital Decade is Finland, which was able to achieve a place among the top 3 nations in seven performance indicators. Finland is followed by Denmark (six top 3 rankings), the Netherlands and Malta (four top 3 rankings each).

Ability to apply future technologies (Readiness for Frontier Technologies Index)

Readiness for Frontier Technologies Index

- Readiness for Frontier Technologies Index 2022 (United Nations): Consistent 11th place in the EU-27 comparison.
- Global country comparison: 24th place; loss of 2 places.

Future technologies take advantage of digitalisation and connectivity and range from artificial intelligence (AI) to green hydrogen and biofuels. These technologies have experienced high growth over the last two decades. While the total market value of future technologies in 2021 was around 1.5 trillion US dollars in 2021, it is estimated that this could grow to up to 9.5 trillion US dollars by 2030.[101]

The Readiness for Frontier Technologies Index 2022[102] is used to measure a country's ability to develop, adopt, utilise and adapt future technologies. The index comprises five areas: i) ICT deployment, ii) skills, iii) research and development, iv) industrial activities and v) access to finance, with each area consisting of two indicators. An exception is the area "Access to finance", which consists of only one indicator. The indicators for the five areas are described in more detail below:

ICT deployment: the use, adoption and adaptation of future-oriented technologies require a sufficient ICT infrastructure, especially as the Internet of Things (IoT), big data and blockchain are internet-based technologies. This sub-index thus reflects the level of ICT infrastructure, taking into account two aspects of ICT infrastructure in particular: the diffusion of ICT to ensure that everyone has access to the infrastructure, and the quality of ICT infrastructure to enable more advanced and efficient use. For these purposes, the two indicators internet users (as a percentage of the population) and average download speed are used.

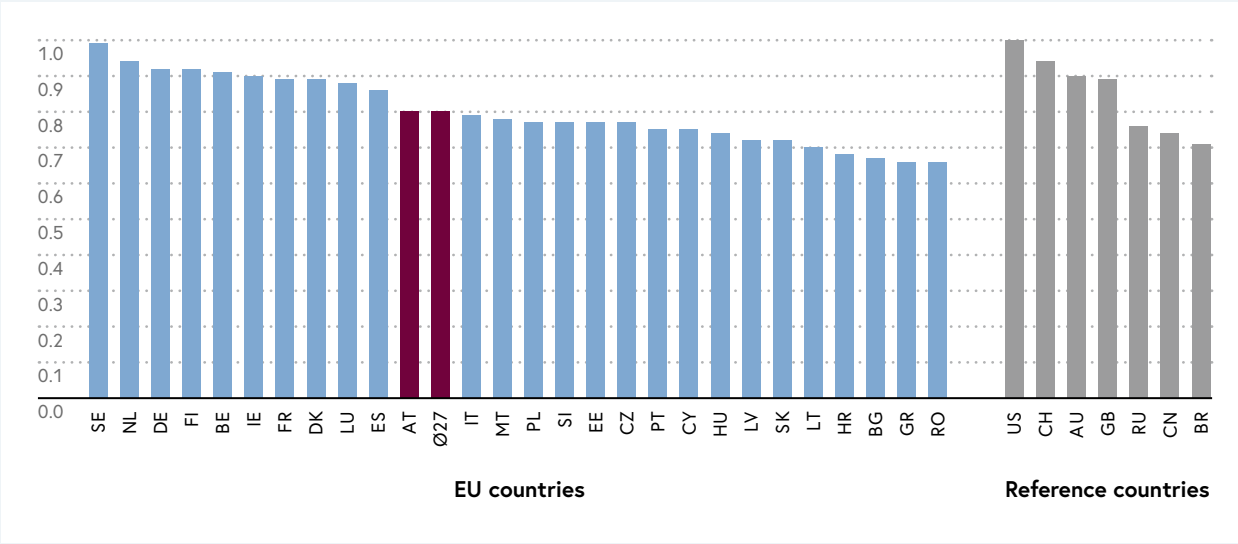
Competences: the use, adoption and adaptation of future-oriented technologies require people with the appropriate skills. Two types of skills are relevant here: Skills acquired through education, and skills acquired on the job through practical training or learning by doing. The general level of education of the population is measured by the expected years of schooling, while the level of skills on the labour market is measured by the proportion of highly skilled employees.

Research and development: R&D is not only required for the development of pioneering technologies, but also for their application and adaptation, as these technologies often have to be adapted or modified for local use. Research and development are measured by the number of scientific publications and the number of patents registered in the field of pioneering technologies.

Industry activities: this captures ongoing activities in an industry related to the use, adoption

101 See United Nations (2023).
102 See United Nations (2023).

Figure 2-22: Readiness for Frontier Technologies Index, 2022



Source: United Nations (2023); illustration: iit.

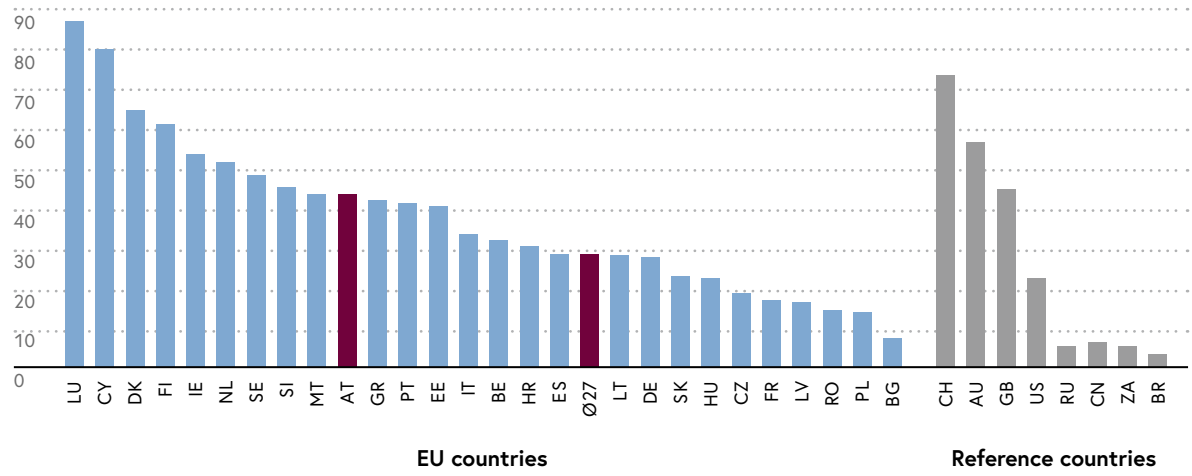
and adaptation of pioneering technologies. Three sectors are considered that are among the early adopters, namely: manufacturing (with high-tech production considered the frontrunner), finance and information and communication technologies, which generally interact with other technologies. Export data on high-tech products and digitally provided services are used as indicators.

Access to finance: In this area, the availability of funding for the private sector is assessed. Better access to finance can accelerate the utilisation, introduction and adaptation of future-oriented technologies. Domestic lending to the private sector is therefore measured as a percentage of GDP. This indicator thus measures the funds provided by financial corporations such as finance and leasing companies, money lenders, insurance companies, pension funds and foreign exchange companies.

In the overall analysis of the Readiness for Frontier Technologies Index 2022 (Figure 2-22), Austria is in 11th place in the EU-27 country comparison, as in the previous year, but was able to increase its index value slightly: from 0.79 in 2021 to 0.80 in 2022. The leading EU-27 countries are once again Sweden and the Netherlands, followed this year by Germany (4th place in 2021) instead of Belgium (5th place in 2022). While Austria was able to maintain its position in the EU-27 country comparison, it lost two places to Iceland and New Zealand in the global country comparison and is now ranked 24th out of 166 nations. Austria remains in the top group, which is led by the USA, Sweden, Singapore and Switzerland. However, the United Kingdom lost significant ground compared to 2021, slipping from third place to 17th. On the other hand, Finland moved up significantly from 17th to 8th place and China from 15th to 9th place.

A differentiated analysis of the five index areas shows that Austria lost places in the EU-27 comparison in the areas of ICT deployment (21st place; -5 places), research and development (11th place; -2 places) and industrial activities (16th place; -2 places). The ranking in the area of skills (17th place; +-0) was maintained and improved in the area of access to finance (10th place; +2 places).

Figure 2-23: Number of scientific publications in the field of AI per million inhabitants, 2022



Source: Scopus (2023); illustration: iit.

Artificial intelligence

Artificial intelligence

- Scientific publications in the field of AI 2022 (Scopus): 10th place again (EU-27 comparison)
- Overall, the number of scientific publications in the field of AI has increased.

The market for artificial intelligence is characterised by high growth. In 2020, the market totalled around USD 65 billion and private investment increased by 103% in 2021 compared to 2020 (from USD 46 billion to USD 96.5 billion).[103] In addition, the cost of developing AI-based tools is falling sharply; for example, the cost of training AI systems fell by 64% between 2018 and 2022.[104] The increasing spread of cloud-based applications and services and the use of big data – on which artificial intelligence can be based – are factors for further growth. The importance of AI is also reflected in the RTI Strategy 2030, as the strengthening of (key) technologies in the area of digitalisation is formulated as a central field of action, which includes artificial intelligence.[105]

Figure 2-23 shows the standardised number of scientifically citable publications in the field of AI in a country comparison and is the result of a bibliometric analysis carried out on the basis of the Scopus publication database.[106] In Scopus, the keywords "ai" and "artificial intelligence" were used to identify all publications in 2022 that were published as scientific articles, reviews, books, book chapters, notes, short surveys or letters. Overall, it can be

103 See United Nations (2023).
104 See United Nations (2023).
105 See Federal Government of the Republic of Austria (2020, p. 10).
106 See Scopus (2023).

seen that the number of scientific publications has increased significantly compared to the previous year. While the EU-27 average in 2021 was 347 scientific publications in the field of AI, in 2022 it was 476 (+37%). Austria was also able to increase the number of scientific publications in the field of AI: with around 44 publications per million inhabitants in 2022, the country is well above its previous year's figure (around 30 publications per million inhabitants) and again above the EU-27 average (around 29). Despite this increase, Austria is once again in 10th place. As in 2021, Luxembourg (87.6), Cyprus (80.7) and Denmark (65.2) are once again the leading nations in the country comparison, although Luxembourg and Cyprus have swapped places compared to 2021.[107] A look at the comparison countries shows that Switzerland, with 73.9 publications in the AI sector per million inhabitants, plays a leading role and is ahead of Denmark.

Quantum technology

Quantum technology

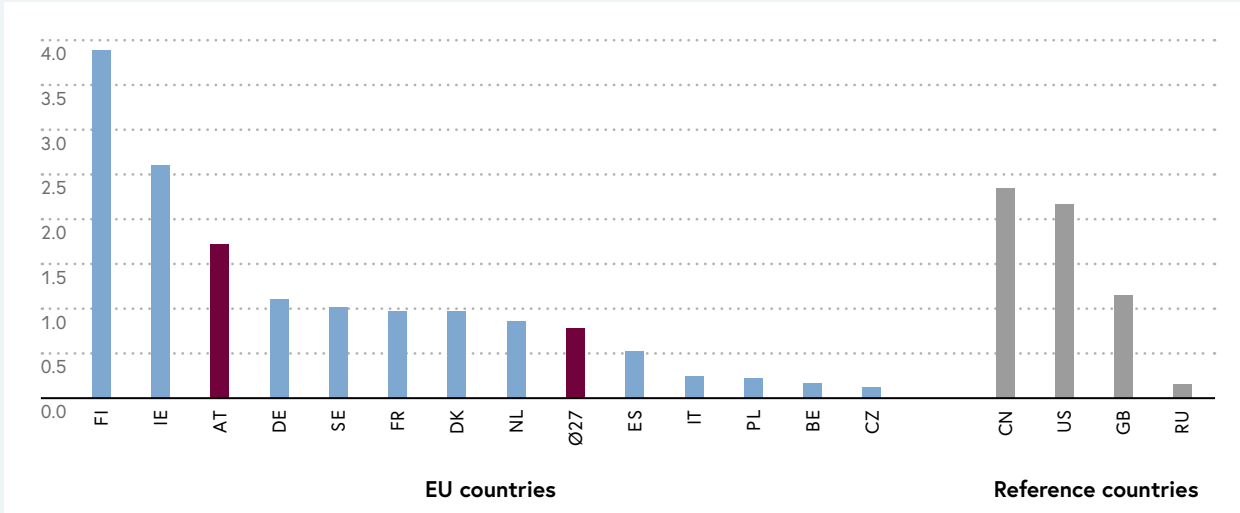
- Patents 2021 (European Patent Office): 3rd place; tripling of the number of patent applications (increase from 8th to 3rd place in the EU-27 comparison).
- Publications 2022 (Scopus): 2nd place for scientific publications.

The field of quantum technology has the potential to produce a large number of far-reaching innovations in a wide variety of areas. According to the European Commission, a quantum revolution is currently underway; individual particles and their physical connections can now be detected and manipulated.[108] New technologies and systems can be developed on the basis of quantum mechanics, which has already led to major technological advances, such as in the field of quantum computers, sensors, simulations, cryptography, optics, metrology and communication. These new quantum technologies have the potential for far-reaching effects in both economic and social terms.[109] Austria is also focusing on quantum technologies as an important technology of the future and, as a result, considerable amounts of funding have been released for science in recent years.

The innovation and performance of a country in the field of quantum technology was measured with the help of a patent analysis and a bibliometric analysis. For the patent analysis, Cooperative Patent Classification Codes (CPC codes) and keywords were used to filter out the patents displayed at the European Patent Office.[110] CPC codes and keywords from four different areas of quantum research were

107 Cyprus led the country comparison in 2020 and 2021 and has performed very well in this indicator in recent years, not least because the University of Cyprus in Nicosia has specialised in research into future technologies.
108 See European Commission (2023f).
109 See European Commission (2023f).
110 See European Patent Office (2023).

Figure 2-24: Patents in the field of quantum technology per 10,000 R&D employees, 2021



Note: No patent data and/or R&D personnel data available for Portugal, Hungary, Latvia, Estonia, Lithuania, Slovenia, Slovakia, Luxembourg, Romania, Greece, Bulgaria, Croatia, Malta, Cyprus, Brazil and Australia.

Source: European Patent Office (2023); illustration: iit.

used for the analyses,[111] namely: quantum computing, quantum key distribution, entanglement and cold atom interferometry.[112]

Figure 2-24 shows the number of patents across all four areas of quantum technologies per 10,000 R&D employees (measured in full time equivalents). As patent applications are usually published 18 months after the filing date at the European Patent Office, the year 2021 was chosen for the patent analysis.

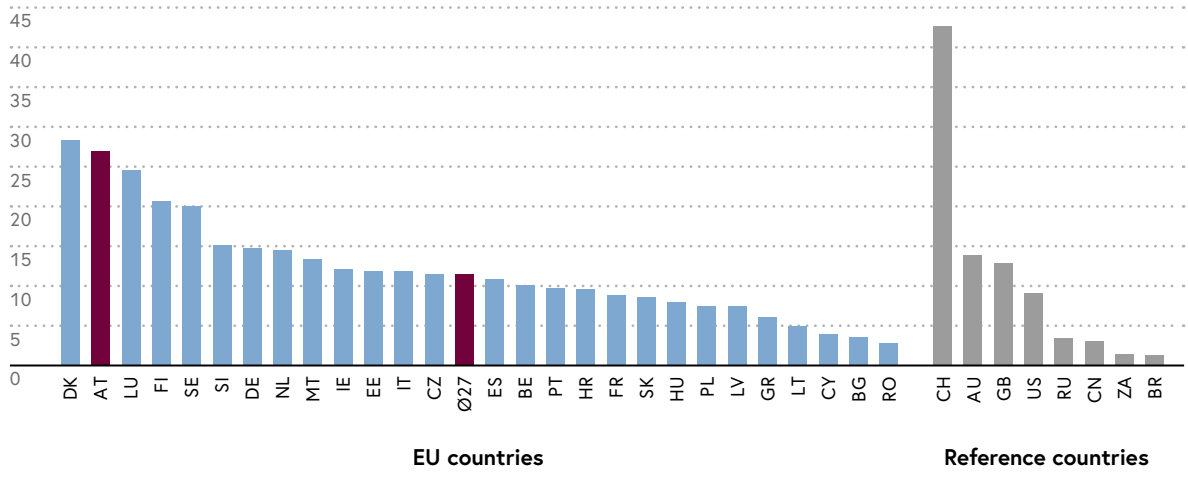
Overall, the number of patent applications in the field of quantum technologies has once again increased. While 1,839 patents were filed with the European Patent Office in 2020 by the EU-27 Member States and the reference countries combined, this figure had already risen to 2,201 patent applications in 2021. This corresponds to an increase of approx. 19.7% and represents a further significant increase compared to the growth of approx. 9.3% from 2019 to 2020. Austria was also able to increase the number of patent applications in the field of quantum technologies in 2021 and, with 15 patent applications, tripled the number compared to 2020 with five patent applications.[113] This result puts Austria in third place in a country comparison with 1.72 patent applications per 10,000 R&D employees, after ranking eighth in 2020. This allowed Austria to overtake Germany (2021: 4th place; 2020: 3rd place), making it one of the leading nations in the EU-27 country comparison once again, behind Finland and Ireland, which once again took the top places.

111 The CPC codes used for the patent analysis and the keywords used for the bibliometric analysis are based on analyses carried out by the Joint Research Centre (cf. Travagnin, 2019).

112 See European Commission (2023g).

113 As in 2020, the patent applications in Austria were all in the field of quantum computing.

Figure 2-25: Number of scientific publications in the field of quantum research per million inhabitants, 2022



Source: Scopus (2023); illustration: iit.

Figure 2-25 shows the result of the bibliometric analysis for the year 2022, which was carried out using the Scopus publication database. Publications in the field of quantum research that were published as scientific articles, reviews, books, book chapters, notes, short surveys or letters were included.[114] With around 27 publications per million inhabitants, Austria achieved second place in 2022, making it one of the leading top 3 nations in the EU-27 country comparison for the third year in a row. However – compared to the previous year – Denmark caught up with Austria. With around 28.3 publications per million inhabitants, Denmark now takes first place, closely followed by Austria. In relation to the EU-27 average, Austria was once again able to widen the gap (gap to EU average 2021: 14.5; gap to EU average 2022: 15.5). However, in an international comparison, Switzerland remains the undisputed leader in scientific publications in the field of quantum technologies (2021: 37.6; 2022: 42.7).

2.2.4 Austria's innovation capability

In the following, indicators that can provide information about a country's innovation capability are presented in a cross-country comparison. This refers to the ability to generate new ideas and translate them into competitive products, processes and services. Innovative capability plays a central role in the RTI system, as it is one of the most important prerequisites for competitiveness and wealth in developed economies. To get a picture of a country's innovative capability, indicators are used that depict the initial situation or framework conditions for innovative activities. These indicators cover three

114 See Scopus (2023). Keywords used: qbit; qbits; qubit; qubits; quantum computer; quantum computers; quantum computation; quantum computations; quantum memory; quantum memories; quantum error correction; quantum simulation; quantum simulations; quantum key distribution; qkd; quantum cryptography; photon; photons; photonic; entangled; or entanglement; entangling; entangle; cold atom; atom; atoms; atomic; interferometer; interferometry.

areas: human capital, complexity capital and relational capital. Human capital is understood as knowledge, in particular that of working people; complexity capital as the diversity of useful knowledge that allows complex products to be manufactured, and relational capital as the ability to pool knowledge across organisational boundaries. The significance of human and relational capital as important determinants of innovation capability is also reflected in several studies in the context of intellectual capital reporting.[115] Complexity capital draws on the theoretical considerations and empirical data on which the Atlas of Economic Complexity[116] is based.

Human capital

Talents

- IMD World Talent Ranking 2023: 6th place; loss of one rank in the EU-27 comparison to 2022.
- Tertiary education qualifications in 2022 (OECD): again 14th place for the proportion of 25–64-year-olds with a tertiary education qualification, slight increase in the proportion, especially for Bachelor's degrees.
- STEM graduates 2021 (UNESCO): (again) 2nd place.
- Continuing education/lifelong learning 2022 (European Commission): (again) 8th place; above-average proportion of 25– 64-year-olds participating in further training with a slight upward trend.

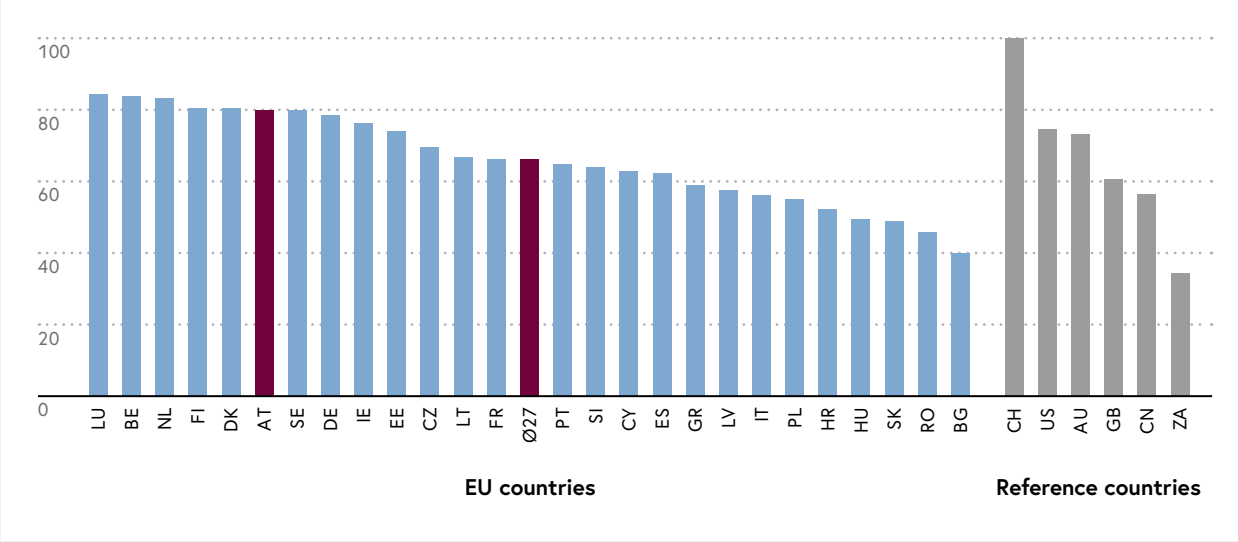
Human capital is a key factor in an economy's ability to innovate, as innovations can only come about through initial ideas and their implementation by people. Formal, non-formal and informal learning processes can all contribute to the further development and enhancement of human capital. The better trained employees are, and the more skilled researchers are, the higher the probability of developing and implementing high-quality and novel innovations. As informal learning can hardly be depicted in the relevant statistics and indicators, Austria's position in the area of formal (tertiary education) and non-formal learning (continuing education) in particular is depicted below. Overall, the state of human capital in Austria is analysed in an EU country comparison using four indicators, namely: i) IMD World Talent Rankings (WTR); ii) percentage of 25–64-year-olds with a tertiary degree; iii) percentage of graduates in STEM subjects; and iv) the percentage of 25–64-year-olds participating in continuing education.

The IMD World Talent Ranking (WTR)[117] combines quantitative education data (e.g. public spending on education) with qualitative factors (e.g. the perceived quality of management training) and presents the development of skills and the retention and international attractiveness of and for highly skilled workers. In the RTI Strategy 2030, Austria has set itself the goal of being among the top three nations in this ranking.[118] Figure 2-26 shows the IMD World Talent Ranking 2023 for the EU Member States and selected comparative countries. Austria has dropped one place compared to the previous year (2022) and now shares 6th place with Sweden. A look at the three sub-factors of the WTR shows that Austria was able to maintain its positions in the "Investment and Development" factor (3rd place in the EU-27 comparison) and in the "Readiness" factor (3rd place in the EU-27 comparison). In the "Appeal" factor, however, it dropped two places in the EU-27 comparison (from 6th to 8th place).

A larger proportion of people with a higher qualification at tertiary level leads to a larger proportion

115 See e.g. Secundo et al. (2020), Mertins et al. (2016) and Alwert (2006).
116 See Hausmann et al. (2013).
117 See IMD World Competitiveness Center (2023).
118 See Federal Government of the Republic of Austria (2020, p. 7).

Figure 2-26: IMD World Talent Ranking, 2023



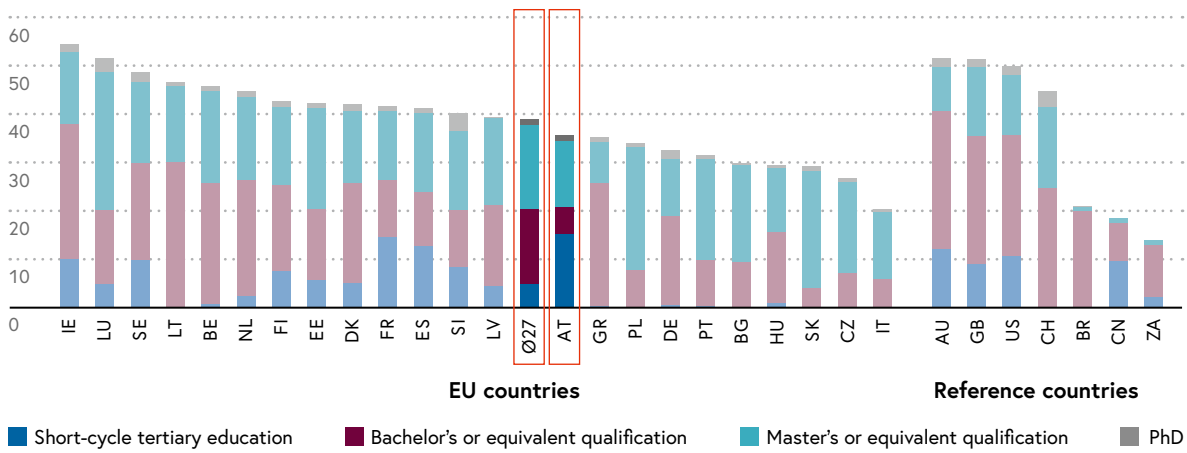
Note: No data available for Malta and Russia. The EU-27 average is calculated from 26 countries.
Source: IMD World Competitiveness Center (2023); illustration: iit.

of people who are particularly capable of contributing to innovation. In the following, the focus is placed on the proportion of tertiary-level qualifications and the proportion of graduates in STEM subjects, not least because graduates of STEM subjects in particular are considered to have great potential for innovation, as they are prepared for the development and performance of innovative processes by learning complex scientific and technical contexts.[119]

Against this background, Figure 2-27 shows the percentage of 25–64-year-olds with a tertiary qualification. Both short-cycle tertiary education (e. g. degrees from university and higher education programmes) and Bachelor's and Master's degrees are taken into account. In 2022 Austria once again took 14th place in the EU-27 comparison and increased overall participation in tertiary education in Austria by 1 percentage point to 35.6%. This brought the country even closer to the EU average of 37.7%, which simultaneously fell by 0.6 percentage points. Splitting up the various tertiary qualifications shows that the increase in the overall share is largely due to an increase in Bachelor's degrees from 4.9% in 2021 to 5.6% in 2022. In contrast, there were no significant changes in the other types of degree. Short-cycle tertiary degrees rose slightly to 15.1% (2021: 15.0%), Master's degrees remained stable at 13.6% and doctorates increased slightly to 1.2% (2021: 1.1%). Ireland (54.4%), Luxembourg (51.5%) and Sweden (48.8%) are the leaders in the EU comparison, although their strengths vary. While Ireland and Sweden have the highest proportion of Bachelor's degrees (Ireland 27.7%, Sweden 20.0%), Luxembourg's strength lies in Master's degrees (28.5%).

119 See Center for Security and Emerging Technology (2023).

Figure 2-27: Percentage of 25–64-year-olds with a tertiary education, 2022



Note: No data available for Cyprus, Croatia, Malta and Russia. For China and South Africa there are no data available for "PhD". The EU average is calculated from 24 countries; for "Short-cycle tertiary education" data from 21 countries, for "Bachelor's or equivalent qualification", "Master's or equivalent qualification and PhD" from 22 countries. For Lithuania, Bulgaria, Switzerland and Brazil no data are available for "Short-cycle tertiary education". The figures for China are from 2020. For Romania, only the total is available.

Source: OECD (2023a); illustration: iit.

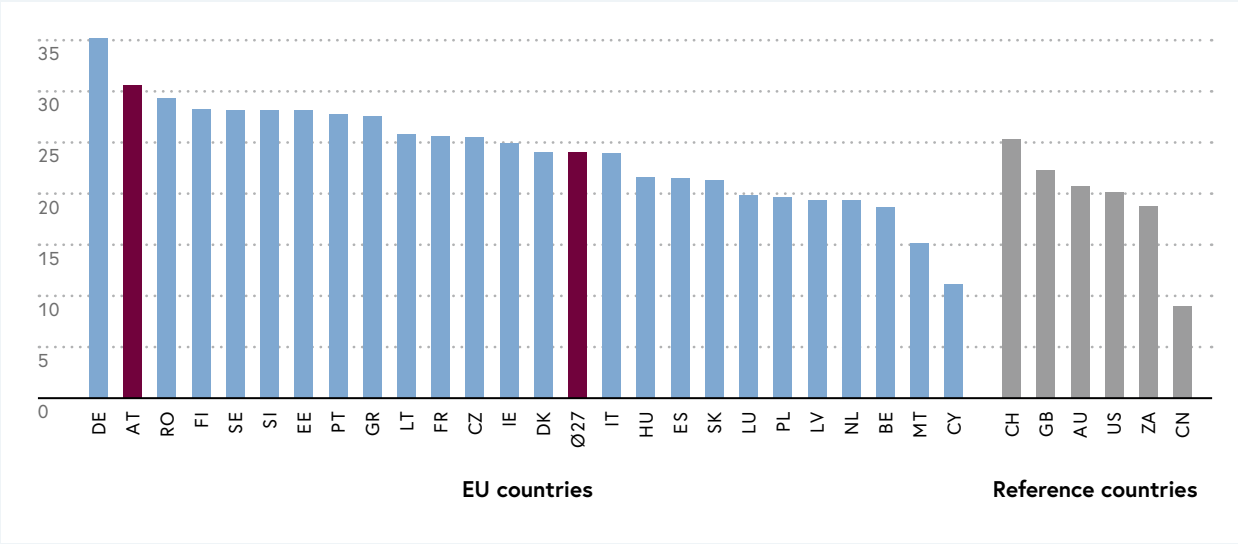
It is worth noting that a comparison of the proportion of tertiary education qualifications between Austria and the group of leading countries is only of limited value, as there are important structural differences between the education systems. In the German-speaking countries, dual vocational education and training has a similarly high status and share in the education system as academic education. Accordingly, in the German-speaking countries, the area of continuing vocational education and training is more fragmented and much more characterised by non-formal and informal learning, which is not always certified with standardised educational qualifications or degrees.[120] As the OECD statistics only record formal educational qualifications lasting two years or more, it can be assumed that the significance of the indicator for German-speaking countries is limited and that the associated innovation potential is therefore rather underestimated. Accordingly, it makes sense to compare Austria with Germany and Switzerland. Austria (35.6%) is still 3.1 percentage points ahead of Germany (32.5%), which was able to increase its value significantly compared to the previous year (Germany: +1.4 percentage points; Austria: +1.0 percentage point). The gap to Switzerland (44.7%), which ranks higher, was also narrowed once again, as the proportion of people with a tertiary degree in Switzerland fell by 0.2 percentage points.

Remarkably, those countries in which dual vocational training plays a central role in the training of skilled labour are leading in terms of the proportion of graduates in STEM subjects.[121] Figure 2-28 shows the proportion of graduates in STEM subjects in an international comparison. Germany remains in first

120 See Bliem et al. (2016).

121 However, this does not necessarily mean that this correlation can be interpreted causally. For example, Switzerland is not the leader in graduates in STEM subjects, and is only slightly above the EU-27 average.

Figure 2-28: Proportion of graduates in STEM subjects, 2021



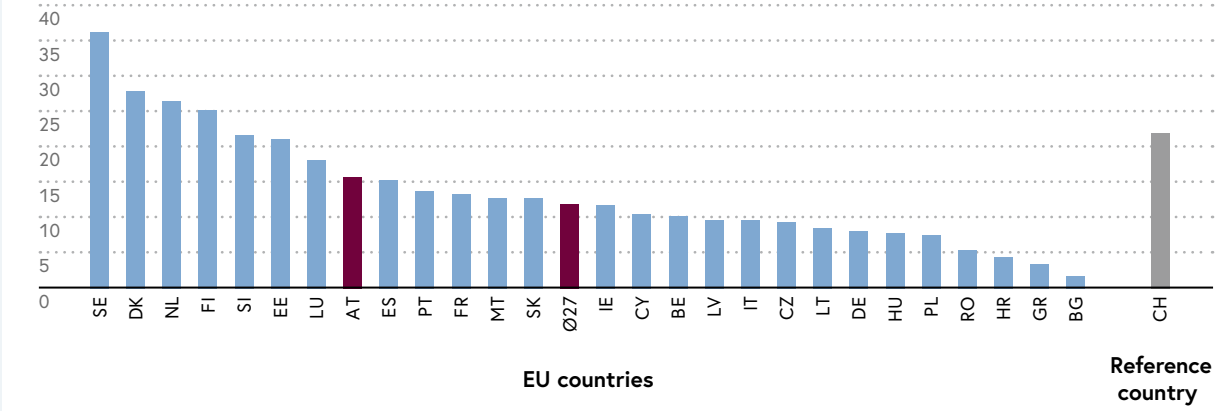
Note: No data available for Brazil, Croatia and Bulgaria.

Source: UNESCO (2023); illustration: iit.

place in this ranking with 35.1% (2020: 35.8%), followed by Austria with another 30.6% and Romania with 29.3% (2020: 29.1%). Graduates in STEM subjects are important future specialists in technology-based industries. A large proportion of STEM graduates therefore promises sustainable positive prospects for the country's future innovative capability. Although Austria has a high proportion of STEM graduates compared to the EU-27, the proportion declined between 2019 and 2020 (2019: 31.4% to 2020: 30.6%) and did not increase again in the following year 2021 (30.6%).

Due to the ongoing scientific and technological change, lifelong learning has become a requirement for most employees to remain competitive in the labour market in the long run. Employees can bring new impetus into companies through various forms of further training, which is why further training is generally considered to make an important contribution to innovative capability. Figure 2-29 shows the percentage of 25–64-year-olds who have participated in continuing education or lifelong learning in a country comparison for the year 2022. Lifelong learning encompasses all formal, non-formal and informal learning activities that are continuously linked to the goal of improving knowledge, skills and competences. As in the previous year, Austria ranks 8th and was able to increase its share of continuing education from 14.6% to 15.8%. This puts Austria well above the EU average, which also rose to 11.9% in 2022 (2021: 10.8%). Sweden once again clearly leads the ranking in 2022 with a share of 36.2%, followed by Denmark (27.9%) and the Netherlands (26.4%).

Figure 2-29: Percentage of 25–64-year-olds participating in continuing education, 2022



Note: No data are available for the United Kingdom, Australia, Brazil, China, Russia, the USA, Australia and South Africa.
Source: European Commission (2023h); illustration: iit.

Complexity capital

Complexity capital

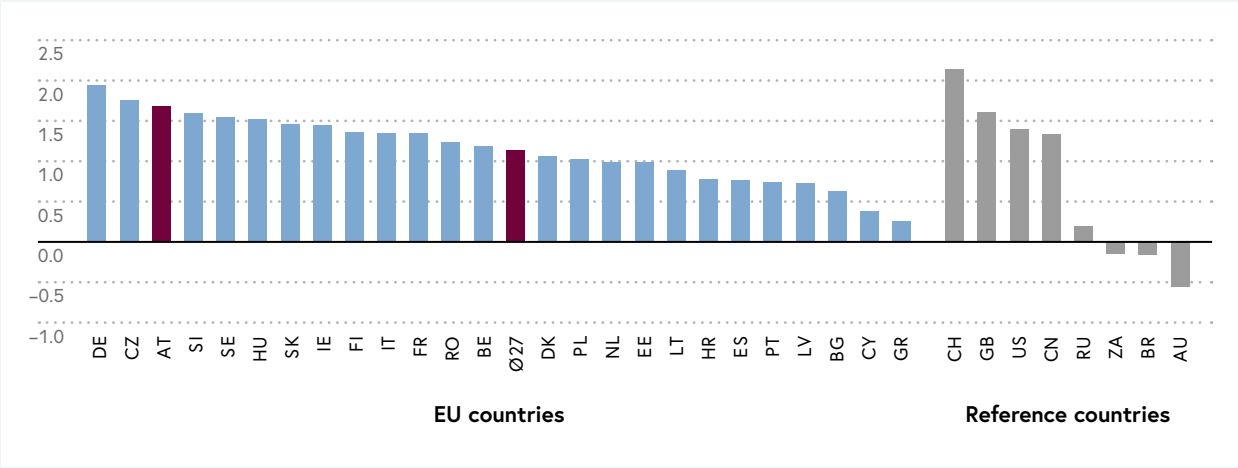
- Economic Complexity Index 2021 (The Growth Lab at Harvard University): 3rd place.
- The Austrian economy continues to be characterised by a very high level of complexity.
- Complexity is decreasing slightly in Austria and increasing slightly in the EU as a whole.

In addition to human capital, complexity capital is an important dimension in approaching a country's innovative capability. The manufacturing of highly complex products requires the combination of a wide variety of knowledge assets, which must then be brought to bear together in the R&D, innovation and production process. As a result, countries that are able to manufacture complex products should have a range of highly developed, specialist skills, which in turn are linked to a country's ability to innovate.

Complexity capital is subsequently measured using the Economic Complexity Index (ECI).[122] This index is used not only to analyse the absolute number of products manufactured and exported in the country, but also to examine how complex and diverse these products are. If the number of complex products in a country's total export volume increases, the value of economic complexity also rises. On the other hand, the value decreases if the number of countries that also export this product increases. The ECI is calculated on the basis of export data and is standardised to values between -2.5 and +2.5.

122 See The Growth Lab at Harvard University (2023).

Figure 2-30: Economic complexity, 2021



Note: No data are available for Luxembourg and Malta. The EU-27 average is therefore calculated from 25 countries.
The Economic Complexity Index is calculated on the basis of export data and is standardised to values between -2.5 and +2.5.
Source: The Growth Lab at Harvard University (2023); illustration: iit.

Figure 2-30 shows the economic complexity in a country comparison for 2021. At EU-27 level, the trend of decreasing complexity has been halted for the time being. The EU-27 average stagnated at a value of 1.14 in 2021 (2018: 1.19; 2019: 1.16; 2020: 1.14). However, the negative trend in complexity continued in the leading nations of Germany, the Czech Republic and Austria. Austria's complexity decreased to 1.68 in 2021 (2019: 1.77; 2020: 1.70). Despite the increasing diversification of Austria's exports,[123] Austria's complexity declined, albeit to a lesser extent than in previous years.[124] With the current value, however, the Austrian economy is still in the top group, 3rd place in the EU country comparison and characterised by a very high level of complexity. In a global comparison, Austria was able to maintain its position from the previous year (7th place).

Austria's diversified (export) economy is largely due to the numerous hidden champions, often characterised by small and medium-sized enterprises, i. e. successful companies that are often (world) market leaders in their field despite being little known to the general public. They concentrate on global niche markets and are characterised, among other things, by a high level of innovation and highly skilled employees.

123 The increasing diversification is related to new products in the export basket and the period from 2006–2021. Although the number of products is estimated to be sufficient at 14, the export volume of these products does not contribute enough to income growth.

124 Austria is already at a very high level in terms of economic complexity. Starting from this high level, it is not easy to increase complexity: the higher the complexity of a country, the more likely it is that an increase will no longer be possible or that economic complexity will decrease again. A further increase can be achieved by developing new complex products in the country. Although a comparatively large number of new products have been added in Austria in recent years, this is not only the case for very complex products such as vehicles, pharmaceutical products or industrial machinery, but also in moderately complex areas such as ICT and less complex areas such as transport, mineral oil and beverages. In addition, Austria has lost market share, particularly in highly complex products such as mechanical engineering (https://atlas.cid.harvard.edu/countries/15).

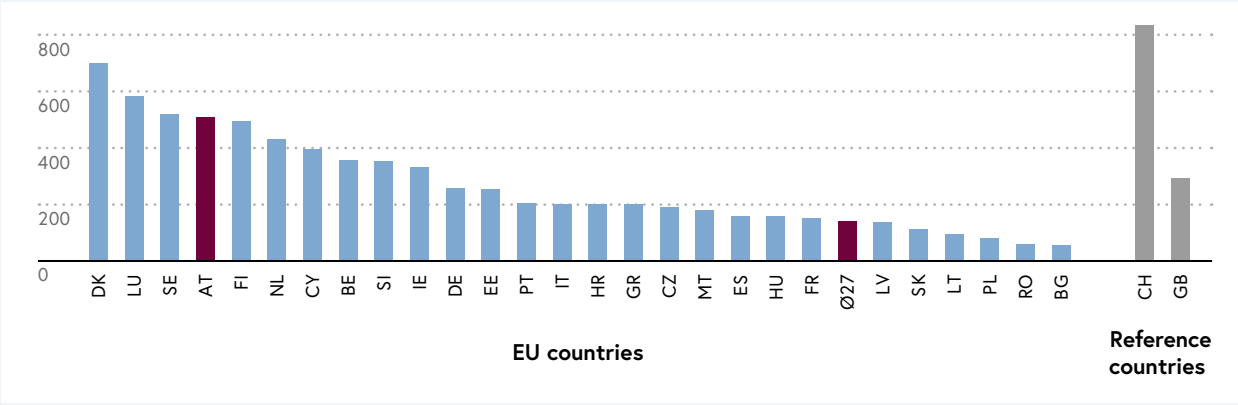
More than half of these Austrian companies are active in mechanical engineering or the metalworking and electrical industries.[125] Highly complex products that made up a relatively high proportion of Austria's exported goods in 2021 were mechanical engineering products – including machines for rubber and plastics processing as well as ironing machines and other rolling machines – chemicals (in the form of medicines, serums and vaccines), and automobiles and their components. Products with a lower trading volume but even greater complexity included apparatus and equipment for photographic laboratories, machines for processing materials using lasers and similar processes, ceramic and metal composites (cermets) and chemical elements for electronics. Austria once again holds the second-highest market share worldwide for ceramic and metal composites and was able to catch up with the leader Germany in terms of market share (AUT 2020: 16.98%; AUT 2021: 18.86%; DEU 2020: 38.64%; DEU 2021: 33.54%).

Austrian Research and Technology Report 2024 focus: Complexity capital in the life sciences sector

In addition to the aforementioned medicines, vaccines and serums, Austria also exports complex components such as polymers of various kinds as well as packaging materials and medical instruments and measuring devices. The four areas of pharmaceutical products, plastics, proteins, modified starches, adhesives and enzymes as well as other chemical products, all of which are categorised under chemicals, should be highlighted. The following rankings relate to Austria's position in the EU-27 in terms of market share of exports of the products mentioned. For pharmaceutical products, Austria ranks 9th overall in the EU-27 comparison, 8th in the subgroup "Manufacture of serums and vaccines" (7th place for animal vaccines and 5th place for human blood) and 12th in the subgroup of packaged medicines (5th place for antibiotics). In the area of plastics, which are important raw materials for medical products, among others, Austria ranks 8th in the EU-27 comparison. Austria ranks 12th in the production of proteins, modified starches and adhesives and 8th for enzymes. Austria ranks 10th for other chemical products and 12th in the sub-category of diagnostic and laboratory reagents. In the superordinate group of medical instruments (including electrocardiographs, electrodiagnostic devices, ophthalmic instruments and devices), Austria ranks 7th in the EU-27 comparison and 8th for X-ray equipment.[126]

125 See Außenwirtschaft Austria of the Austrian Federal Economic Chamber (2023).
126 https://atlas.cid.harvard.edu/countries/15

Figure 2-31: Joint publications by public and private partners per million inhabitants, 2022



Note: No data available for Australia, Brazil, China, Russia, USA and South Africa. The data for the United Kingdom refer to 2021.
Source: European Commission (2023h); illustration: iit.

Relationship capital

Relationship capital

- Joint publications by public and private partners 2022 (European Commission): 4th place; improvement of one rank in the EU-27 comparison.

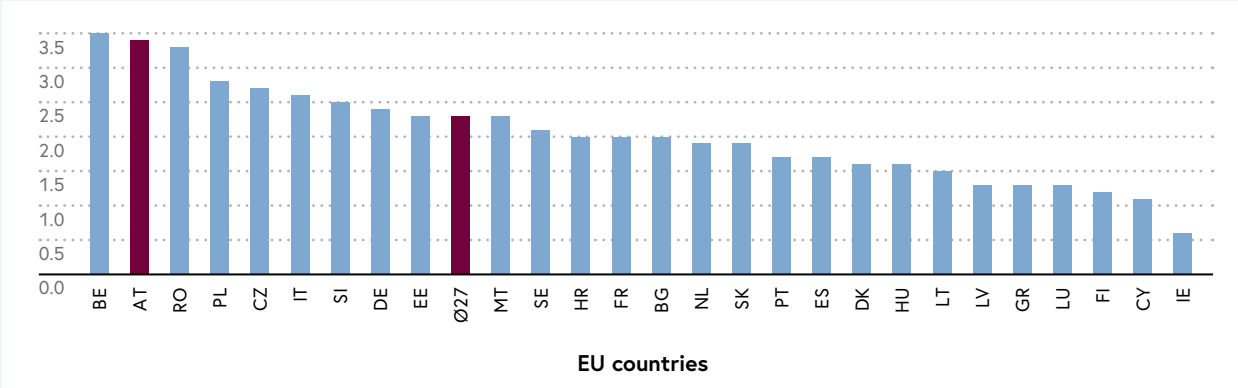
Innovations and new products are often the result of cooperation between research institutions and industry. Knowledge and technology transfer and co-operation networks are therefore decisive factors in increasing research efficiency and accelerating the development of new or improved products and technologies. To illustrate Austria's relationship capital,[127] the number of joint publications by public and private partners with domestic and foreign participation will be analysed below. Figure 2-31 visualises this indicator and refers to the country population (per million inhabitants). With 507.1 joint publications per million inhabitants, Austria is in fourth place behind Denmark (700.3), Luxembourg (581.0) and Sweden (517.1) and has improved by one place compared to the previous year. In an international comparison, Switzerland is still ahead of Denmark with 835.0 joint publications.

2.2.5 Austria's position in terms of environmental sustainability and resilience

Austria's position in an international comparison in the areas of environmental sustainability and resilience is presented below based on four indicators: (i) national expenditure on environmental protection, (ii) utilisation rate of reusable materials, (iii) resource productivity and (iv) share of renewable energies in gross final energy consumption.

127 In the Austrian Research and Technology Report 2023, two further indicators were used to analyse relational capital: cooperation between SMEs and other companies and the job mobility of employees in science and technology. Neither indicator is included in this report due to data availability. While the first indicator is only surveyed every two years, data collection for the second indicator was not continued for the years after 2020.

Figure 2-32: National expenditure on environmental protection as a percentage of gross domestic product (in %), 2020



Note: No data available for Switzerland and the United Kingdom.

Source: Eurostat (2023); illustration: iit.

Environmental sustainability

Environmental sustainability

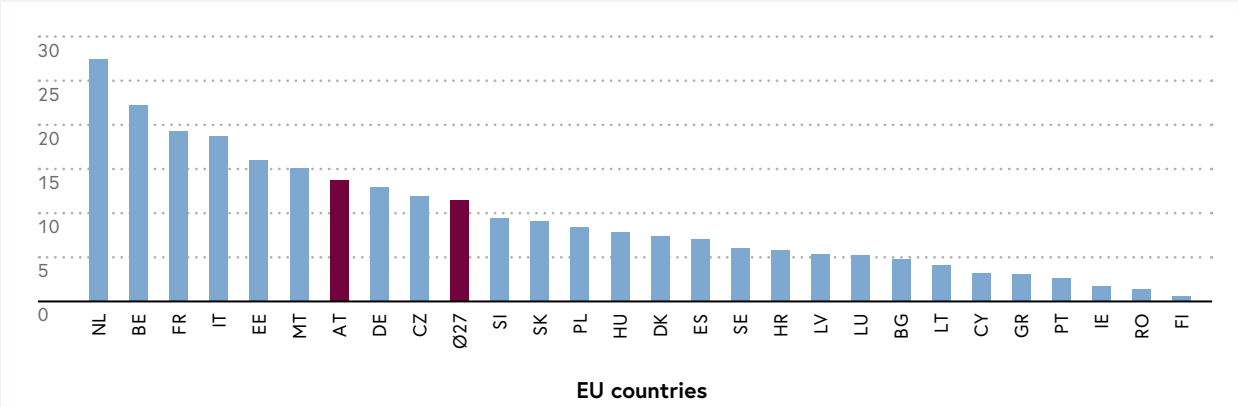
- National spending on environmental protection (Eurostat 2020): 2nd place; loss of one rank compared to the previous year.
- Circular material use-rate (Eurostat 2022): 7th place; positive development since the previous year compared to the EU-27 average.
- Resource productivity 2022 (Eurostat): 10th place; Austria on an upward trend and above the EU-27 average.
- Gross final energy consumption 2021 (Eurostat): 5th place; loss of one rank with an overall high share of renewable energies in gross final energy consumption.

Figure 2-32 shows the national expenditure on environmental protection as a percentage of gross domestic product for 2020.[128] Expenditure corresponds to the sum of current expenditure on environmental protection activities and investments, including net transfers to the rest of the world, used by resident units to protect natural habitats over a given period. With a value of 3.4%, Austria fell one place in this indicator from its top position in the previous year (2019: 3.5%). Austria was overtaken by Belgium (3.5%), followed by Romania (3.3%) in third place.

Another indicator of environmental sustainability is the circular material use rate. This rate is the ratio of the circular use of materials to total material use. Total material utilisation is measured by the sum of aggregated domestic material consumption and the circular use of materials. The circular use of materials is approximately determined by the amount of waste recycled in domestic recycling facilities, minus imported

128 Characteristics that must be reported for environmental protection expenditure include: Output of environmental protection services (distinguishing between market output, non-market output and output from ancillary activities), intermediate consumption of environmental protection services by specialist producers, imports and exports of environmental protection services, VAT and other taxes less subsidies on products on environmental protection services, gross fixed capital formation and acquisitions less disposals of non-financial non-produced assets for the production of environmental protection services, final consumption of environmental protection services and transfers (received and paid) for environmental protection.

Figure 2-33: Circular material use rate, 2022



Note: No data available for Switzerland and the United Kingdom.

Source: Eurostat (2023); illustration: iit.

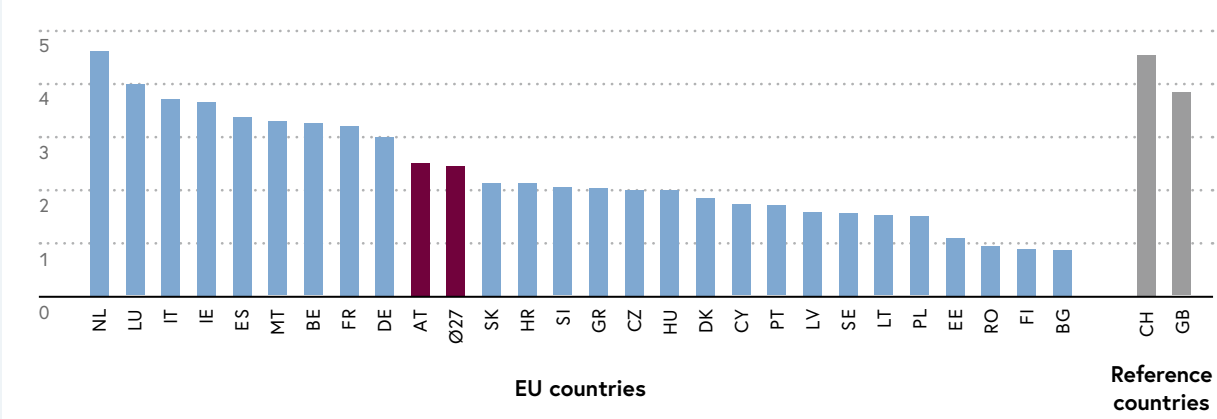
waste destined for recycling and waste destined for export to be recycled abroad.[129] A higher value means that the environmental impact of recovering primary material is reduced, as more primary material can be substituted by secondary material. This indicator can also be found in a similar form in the Austrian Action Plan for the European Research Area (ERA-NAP) 2022–2025.[130] Here, the "development of innovative technologies for the recycling of raw materials in industrial processes" is specifically named under "Action 9.2".[131]

Figure 2-33 shows the circular material use rate in an EU comparison. Compared to the previous year, Austria was able to increase the rate from 12.3% (2021) to 13.8% (2022), bucking the slightly negative trend of the EU average (11.7% to 11.5%). Austria thus remains in 7th place and above the EU average.[132] Since 2020, Austria has been able to increase the utilisation rate of reusable materials by a total of 2.3 percentage points, meaning the overall trend is clearly pointing in a positive direction. The Netherlands (27.5%) leads the EU 27 comparison, followed by Belgium (22.2%) and France (19.3%). Compared to the previous year, the Netherlands and France have seen a significant decline in this indicator in some cases (Netherlands -6.3 percentage points; France -0.5 percentage points), while Belgium has seen an increase of 1.7 percentage points.

Figure 2-34 shows resource productivity in the EU in 2022. Resource productivity is calculated by dividing gross domestic product by domestic material consumption. Resource productivity is therefore an indicator of how efficiently an economy uses its materials, i. e. how much gross domestic product can be generated with the consumption of one unit of

129 https://ec.europa.eu/eurostat/databrowser/view/SDG_12_41__custom_1315713/bookmark/table?bookmarkId=e4657bd0-03a1-480b-abe3-d122fa0ac4f2
130 Cf. BMBWF (2022).
131 Cf. BMBWF (2022, p. 50f.).
132 Eurostat provides provisional (estimated) figures for 2022 for all countries (except Luxembourg).

Figure 2-34: Resource productivity, 2022



Note: The figures for Switzerland refer to 2020 and the figures for the United Kingdom relate to 2019.

Source: Eurostat (2023); illustration: iit.

materials. Domestic material consumption is defined as the annual quantity of raw materials extracted from the domestic territory of the economy under consideration, plus all physical imports and minus all physical exports.[133] To be able to compare resource productivity across countries in a given year, gross domestic product is expressed in units of purchasing power standard.[134]

Austria was able to improve from 12th to 10th place compared to the previous year and thus remains in the midfield, but only slightly above the EU-27 average. The Netherlands remains the leader in resource productivity despite a significant drop in comparison to the previous year, followed by Luxembourg and Italy. In an international comparison, Switzerland and the UK still have high resource productivity values, with Switzerland now almost catching up with the Netherlands.

Austria was able to significantly increase its value from 2.1 to 2.5 purchasing power-adjusted GDP units per kg for the first time. This means that Austria has seen a positive development and has not yet been able to achieve the target for 2030 set in the Austrian Circular Economy Strategy of the BMK[135] of a 50% increase compared to 2015.

In terms of the share of renewable energies in gross final energy consumption (Figure 2-35), Austria remains in the top group, but fell from 4th place in 2020 to 5th place in 2021.[136] The share fell only slightly from 36.55% to 36.45%. In contrast, Estonia was able to score points here and overtake Austria. Sweden is in the leading role.

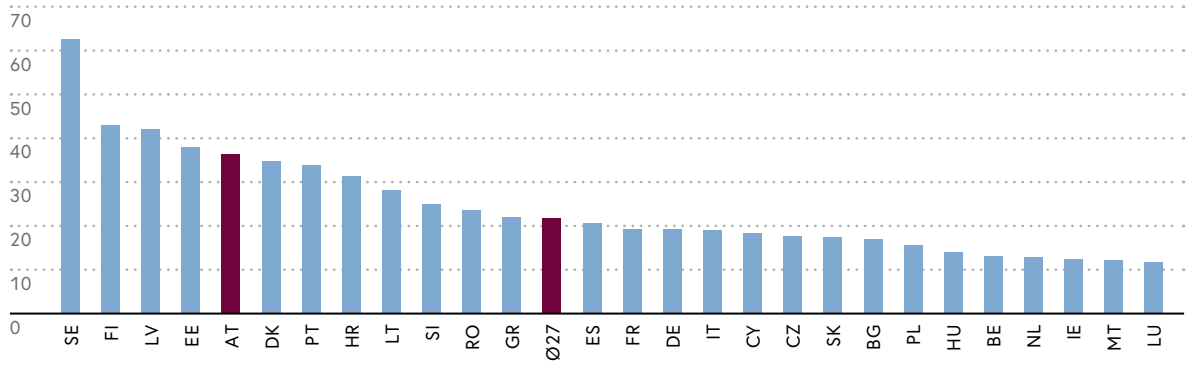
133 Eurostat points out that "consumption" refers to apparent consumption and not final consumption. Domestic material consumption does not include upstream flows related to imports and exports of raw materials and products originating outside the focal economy.

134 The purchasing power standard is a notional monetary unit to take account of the distortion caused by differences in price levels between different countries.

135 See BMK (2022).

136 Gross final energy consumption is calculated from the energy consumption of end consumers plus grid losses and the power plants' own consumption.

Figure 2-35: Share of renewable energies in gross final energy consumption, 2021



Note: No data available for Switzerland and the United Kingdom.

Source: Eurostat (2023); illustration: iit.

Resilience

Resilience 2023 (European Commission)

- Social and economic resilience: resilience capacities ranked 7th and resilience vulnerabilities 11th; slight deterioration by one position in each case, but still "medium-high" for resilience capacities and "medium-low" for resilience vulnerabilities.
- Green resilience: 2nd place for resilience capacities and 24th place for resilience vulnerabilities; once again very high resilience capacities ("Highest"), but loss of top position to Luxembourg; at the same time, resilience vulnerabilities remain medium-high, above the EU average.
- Digital resilience: resilience capacities ranked 14th and resilience vulnerabilities ranked 19th; digital resilience capacities remain medium-high, but digital resilience vulnerabilities have deteriorated significantly from medium-low to medium
- Geopolitical resilience: resilience capacities ranked 11th and resilience vulnerabilities ranked 12th

Austria's resilience in an international comparison is presented for four dimensions, namely i) the social and economic dimension, ii) the green dimension, iii) the digital dimension, and iv) the geopolitical dimension. The resilience indicators, the breakdown into the four dimensions and the associated data are based on the work of the European Commission's Joint Research Centre.[137] An index for resilience capacities and resilience vulnerabilities is created for each dimension. The index for resilience capacities quantifies the structural characteristics of a country that help it to manage transitions and cope with future shocks. The resilience vulnerability index measures the structural characteristics of a country that can exacerbate the negative effects of a changing environment (e. g. challenges related to the digital and green transformation of the economy and society). When interpreting the index values for resilience vulnerabilities, it is important to note that a lower indicator value indicates a better ranking.

137 See European Commission (2023i).

Resilience in the social and economic dimension is the ability to cope with economic shocks and achieve long-term structural change in a fair and inclusive way. Indicators in this dimension come from the areas of (i) inequalities and social impacts of transitions, (ii) health, education and labour, and (iii) economic and financial stability and sustainability. An example of an indicator of resilience capacities is the employment rate, and an example of an indicator of resilience vulnerabilities is the long-term unemployment rate. In this dimension, Austria continues to show rather high ("medium-high") resilience capacities and rather low ("medium-low") resilience weaknesses. However, Austria fell one place to 7th place in the European comparison in terms of resilience capacities, although the indicator value increased from 0.78 in 2022 to 0.79 in 2023. The lower ranking is due to the fact that Ireland, which was almost on a par with Austria in the previous year, was able to significantly expand its resilience capacities. In terms of resilience weaknesses in this dimension, Austria improved slightly in the indicator value from 0.34 to 0.33, but at the same time dropped one place to 11th place.

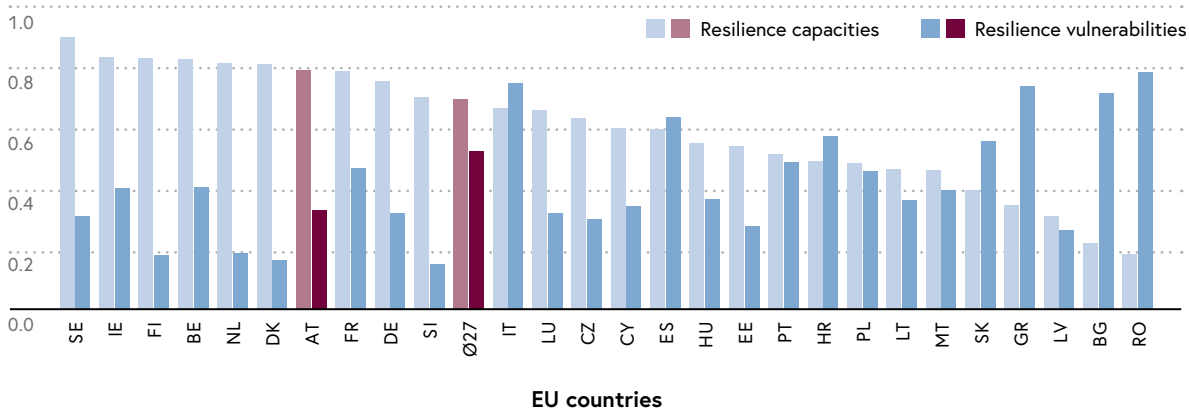
Resilience in the green dimension reflects a country's ability to achieve climate neutrality by 2050. The indicators of the index come from the areas of (i) climate change mitigation and adaptation, (ii) sustainable use of resources and (iii) ecosystems, biodiversity and sustainable agriculture. An example of a resilience capability indicator is national spending on environmental protection and an example of a resilience vulnerability indicator is per capita consumption. In the green dimension, there are only minor changes compared to the previous year. In terms of resilience capacities, Austria remains in the group with the highest capacities, but narrowly lost first place to Luxembourg. In terms of resilience vulnerabilities, Austria remains below the EU-27 average and fell two places to 24th place compared to the previous year.[138] Overall, there was a slight deterioration in the EU-27 average for resilience capacities and resilience vulnerabilities. The indicator value for resilience capacities fell from 0.69 in 2022 to 0.67 in 2023 and the indicator value for resilience vulnerabilities deteriorated from 0.48 to 0.52 (a lower value for resilience vulnerabilities should be interpreted positively).

For the EU Commission, resilience in the digital dimension means "ensuring that the way we live, work, learn, interact, and think in this digital age preserves and enhances human dignity, freedom, equality, security, democracy, and other European fundamental rights and values".[139] Indicators of this index come from the four areas of (i) personal digitalisation, (ii) industrial digitalisation, (iii) digitalisation of the public sector and (iv) cybersecurity. An example of a resilience capability indicator is the (advanced) digital skills of adults and an example of a resilience vulnerability indicator is the lack of cloud services. There were also changes for Austria in the digital dimension. In terms of resilience capacities, Austria fell from 13th place in 2022 to 14th place in 2023 and below the EU-27 average. In terms of resilience vulnerabilities, there was a significant deterioration from 6th place in 2022 to 19th place in 2023, just below the EU average. Malta and Denmark continue to lead the way in terms of resilience vulnerabilities, with Estonia now also leading the way.

The EU Commission defines resilience in the geopolitical dimension as the ability of Europe to "bolster its open strategic autonomy and global leadership".[140] Indicators for this index come from the

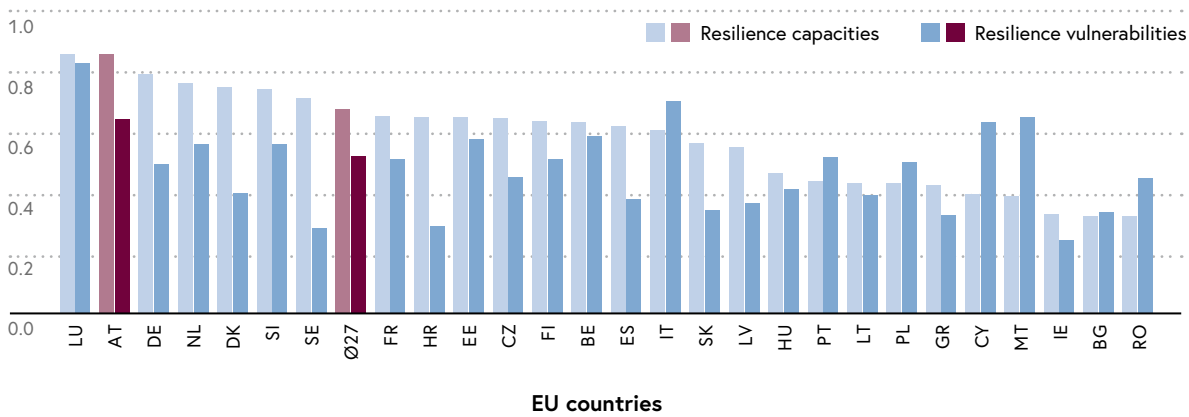
138 In terms of resilience vulnerabilities, the country with the lowest score ranks first.
139 See European Commission (2020, p. 29).
140 See European Commission (2020), p. 14.

Figure 2-36: Resilience: social and economic dimension, 2023



Source: European Commission (2023i); illustration: iit.

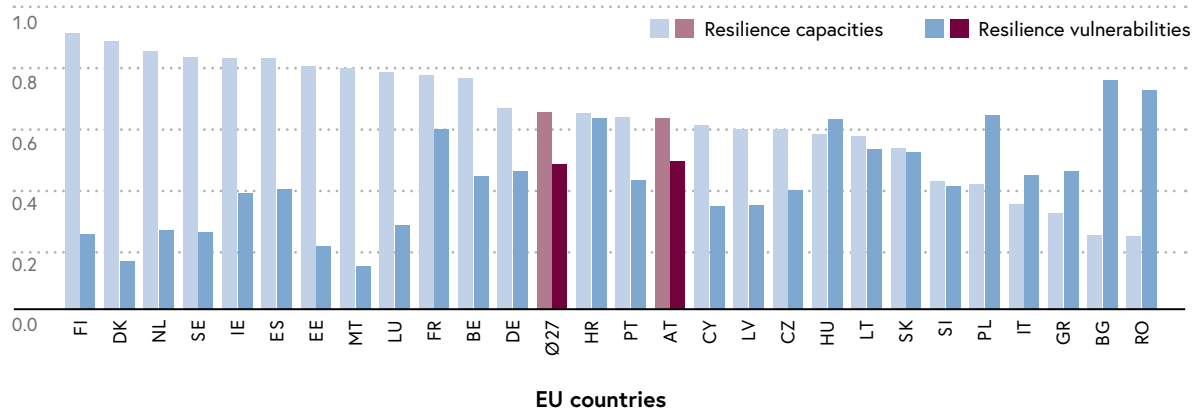
Figure 2-37: Resilience: green dimension, 2023



Source: European Commission (2023i); illustration: iit.

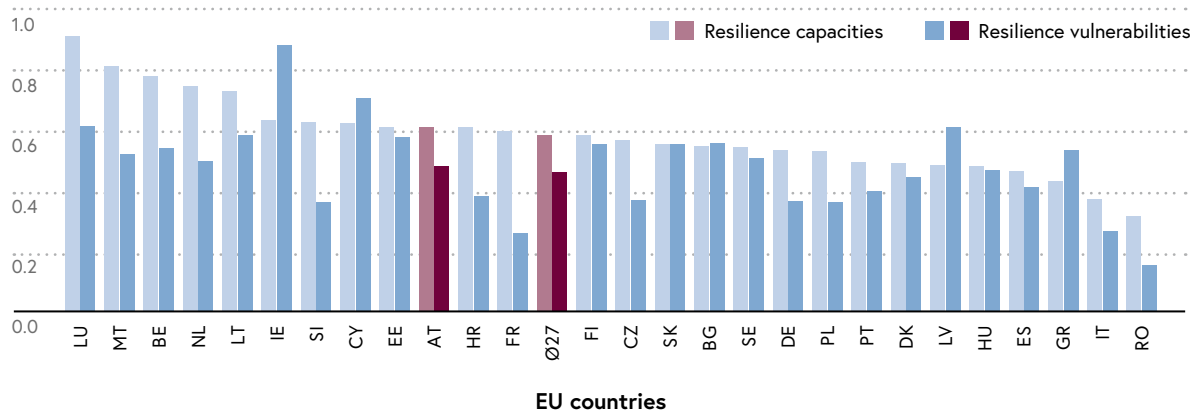
following areas: (i) raw materials and energy supply, (ii) value chains and trade, (iii) globalisation of finance and (iv) security, and demography. An example of a resilience capability indicator is the share of non-EU citizens in the labour force and an example of a resilience vulnerability indicator is the concentration of partners in the value chain. There were also only minor changes in the geopolitical dimension compared to the previous year. In terms of resilience capacities, Austria remained above the EU-27 average in 2023, but fell slightly behind the EU average in terms of resilience vulnerabilities. Despite maintaining the same indicator value of 0.61 for resilience capacities, Austria fell from 8th to 11th place, while the EU-27 average rose

Figure 2-38: Resilience: digital dimension, 2023



Source: European Commission (2023i); illustration: iit.

Figure 2-39: Resilience: geopolitical dimension, 2023



Source: European Commission (2023i); illustration: iit.

significantly from 0.52 to 0.58. In terms of resilience vulnerabilities, Austria's indicator value deteriorated slightly (2022: 0.45; 2023: 0.49) but improved from 15th to 12th place.

Figures 2-36 to 2-39 show the resilience capacities and resilience vulnerabilities in the EU country comparison across all four dimensions for the year 2023. A higher value in the capability index indicates a higher relative resilience capability and a higher value in the vulnerability index indicates higher relative resilience vulnerabilities.

2.2.6 Summary

In this chapter, Austria's positions in an international comparison in the areas of research and development, digitalisation, innovation capability, environmental sustainability and resilience were analysed using various indicators. Selected key results are summarised as a radar chart in Figure 2-40. The red segment of the figure includes basic indicators of performance in research and development, the blue segment contains indicators of the status of digitalisation, the yellow segment shows indicators of innovation capability and the green segment those of environmental sustainability and resilience. Austria's respective value (red line) is compared with the EU-27 average value (grey line). The various scales were standardised to values between zero and one. In addition, the respective leading nation is indicated in the square brackets.

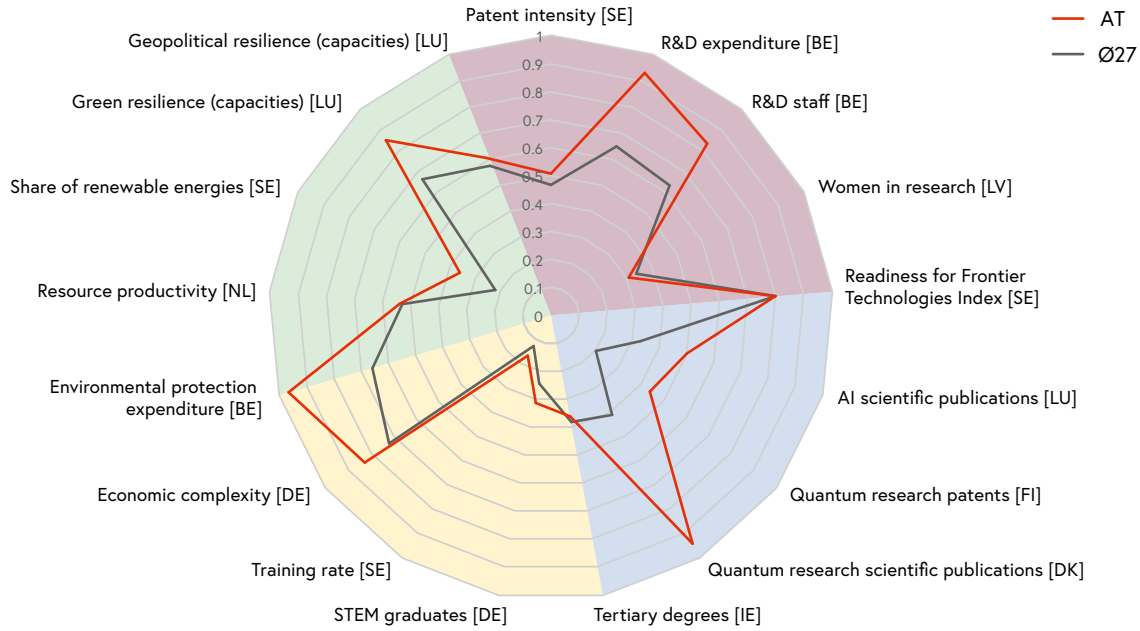
The key RTI indicators show that Austria was largely able to maintain its positions compared to the previous year. There were no changes in ranking in the RTI indicators R&D expenditure, R&D personnel, proportion of women in research, ERC grants and scientific publications. Although no change in ranking was achieved, the RTI indicators R&D personnel (over 2% for the first time) and proportion of women in research still managed to increase their respective values compared to the previous year. However, the value deteriorated in the RTI indicator scientific publications (while the ranking remained the same). Austria improved its ranking in EIS (+2 places) and venture capital investments (+2 places). On the other hand, there were two downgrades in the GII (-1 place), the Times Higher Education World University Ranking (THE Ranking) (two out of three universities dropped out of the top 200) and patent intensity (-4 places). However, it should be noted that the methodology of the THE ranking was adapted, i.e. in addition to adjustments to the existing indicators, additional indicators were also included. This means that the comparability of the rankings in previous years is limited. It should be emphasised that Austria was able to place one university among the top 100 in each of the THE subject rankings in the disciplines "Life Sciences" and "Clinical and Health". With regard to patent intensity, it should be noted that the number of patents is based on OECD estimates and that the OECD is currently changing its platform for data dissemination, which may lead to data updates.

Austria's performance in the field of digitalisation is mixed. Austria was able to maintain its ranking in the Readiness for Frontier Technology Index (11th place) while increasing its index value; the same applies to scientific publications in the field of AI (10th place). There was a significant improvement in patent applications in the field of quantum technologies (from 8th to 3rd place). In addition, Austria was able to maintain its position among the leaders in scientific publications in the field of quantum research (2nd place). In the performance indicators of the Digital Decade Policy Programme 2030, Austria is only above the EU-27 average in half of the performance indicators and was unable to achieve a position among the top three nations in any of them.

A differentiated picture also emerges for the indicators of innovative capability. In terms of human capital, tertiary degrees are still slightly below the EU average, but the proportion has increased. In terms of the proportion of STEM graduates,[141] Austria remains in the top group (2nd place in the EU). The comparatively low figure for tertiary degrees can be partly explained by the lack of comparability of the education systems analysed and the strong focus of German-speaking

141 In Figure 2-40, the proportion of STEM degrees appears comparatively low. This is due to the fact that this figure shows the comparison to the possible maximum value (100% STEM graduates), which is not a desirable goal. However, in order to enable a comparison with the other indicators, this form of presentation is appropriate. In fact, Austria has the second-highest proportion of STEM graduates among the EU Member States.

Figure 2-40: Summary of Austria's position compared to the EU average



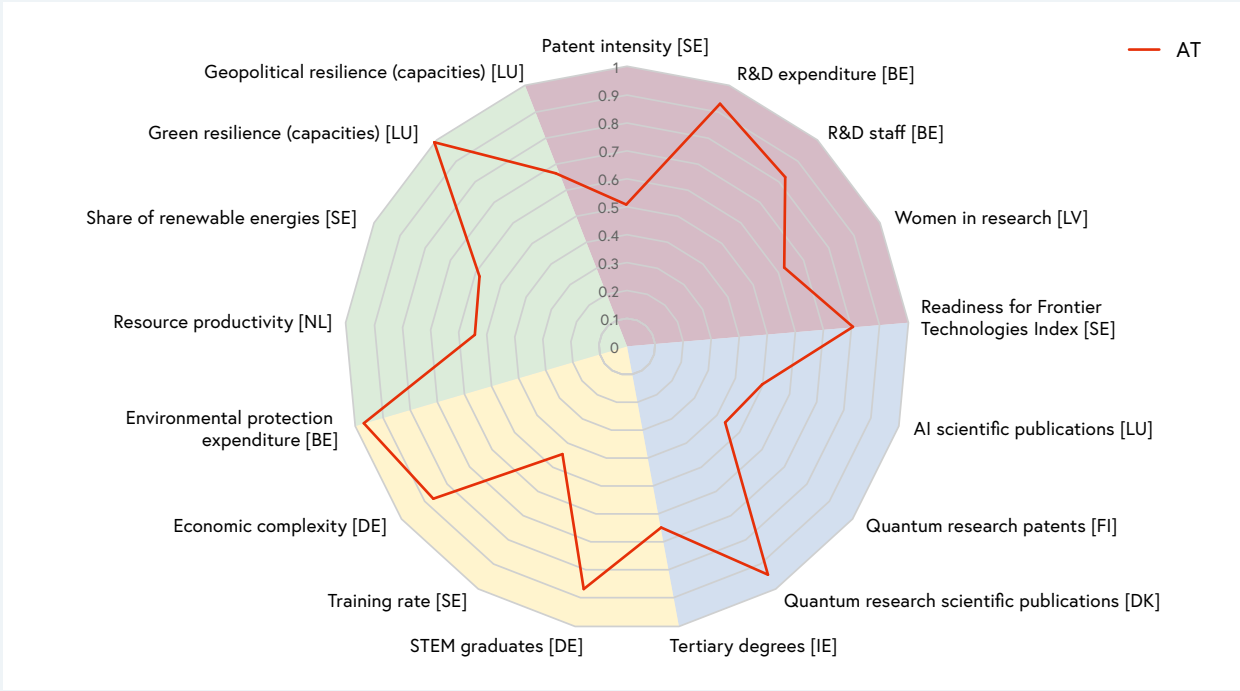
Note: To present the different indicators together in one graph, the different scales were normalised to values between zero and one. The red line visualises the standardised value for Austria and the grey line visualises the standardised value of the EU-27 average for the respective indicator.

Source: illustration iit.

countries on dual vocational education and training. This peculiarity is less relevant when looking at participation in further education, where Austria is well above the EU-27 average. Austria lost one place in the IMD World Talent Ranking and is no longer among the top 5 nations in Europe. As in the previous year, the country is in 3rd place for complexity capital, once again demonstrating its outstanding ability to manufacture complex products. However, it is also evident that complexity has decreased compared to the previous year, while the EU average has stagnated after a previous negative trend. In terms of relational capital, only public-private co-publications could be analysed due to data availability, where Austria was able to improve from 5th to 4th place.

A look at Austria's position in the environmental sustainability indicators also reveals a mixed picture. While both the utilisation rate of recyclable materials and resource productivity improved, Austria lost its top position in terms of national expenditure on environmental protection and deteriorated slightly in terms of the share of renewable energy in gross final energy consumption, although Austria has a very high value here. Overall, there is a slight downward trend in the dimensions of resilience, which should be kept in mind. There was a slight deterioration in the rankings in both the social and economic areas as well as in the area of green resilience capacities and vulnerabilities. There was also a slight deterioration of one place in digital resilience capacities compared to the previous year, but there was a significant deterioration in digital resilience vulnerabilities, falling from 6th place in the previous year to 19th place. In the geopolitical area, Austria fell three places in resilience capacities, by which it had improved in the previous year, but improved

Figure 2-41: Summary of Austria's score compared to the leading scores



Note: To present the various indicators together in one graph, the different scales were standardised to values between zero and one. The red line visualises the distance between Austria and the leading nation.
Source: illustration iit.

three places in geopolitical resilience vulnerabilities to 12th place.

Figure 2-41 visualises the distance to the leading nation for each indicator (shown in square brackets), i. e. the proportion of Austria's value in relation to the highest value in the EU. This provides a different perspective on Austria's strengths and weaknesses in an international comparison.

This clearly shows Austria's outstanding and in some cases leading position in R&D expenditure, R&D personnel, publications on quantum research, STEM graduates, economic complexity, national expenditure on environmental protection and green resilience. In contrast, there is a need to catch up with the leading EU-27 Member States in terms of the continuing education rate.

Here, Austria only achieves 44% of the value of the leading nation. Austria also only achieves 44% of the highest value in the EU in the "Patents in quantum research" indicator, but looking at Figure 2-41 and the overall ranking, there is no question of Austria needing to catch up, as it is in 3rd place behind Finland and Ireland. Other indicators for which Austria only achieves around half the value of the leading EU-27 Member State are scientific publications in the field of AI (50%), resource productivity (54%) and share of renewable energies (58%).

2.3
Austria and European research, technology and innovation policy

The following chapter 2.3.1 analyses Austria's performance in Horizon Europe in detail after three years. For the first time, it also includes an *excursus* on the EDF, the European Defence Fund. Following the presentation of the Austrian Action Plan for the European Research Area in its entirety in the Austrian Research and Technology Report 2023, the first steps in its performance with regard to open science and knowledge valorisation are presented in section 2.3.2. Section 2.3.3 presents the EU Chips Act and the associated Austrian activities. With the new European Innovation Agenda, which is explained in section 2.3.4, the European Commission (EC) sets out the guidelines for innovation policy measures in the coming years. This is also linked to a series of national measures, which are briefly described. Finally, section 2.3.5 provides information on Austrian activities within the framework of four so-called Knowledge and Innovation Communities (KIC) of the European Institute of Innovation and Technology (EIT).

2.3.1 Austria's performance in Horizon Europe

The European Commission's ninth framework programme for research and innovation, Horizon Europe, started with the first calls for proposals in spring 2021 and will provide a total of €95.5 billion to strengthen the European Research Area until 2027. The following section presents the participation of Austrian stakeholders in Horizon Europe as of January 2024. The participation data are provided periodically by the European Commission and enable statements to be made on participation patterns and distinctions according to submissions, approved budgets and participation in various programme tracks. The overview of Austrian participation in Horizon Europe is based on contract data, i. e. funding agreements between the European Commission and the project participants (usually consortia of several institutions). The data were retrieved via the European Commission's eCORDA monitoring system in January 2024 and processed by the FFG. Projects on the reserve list or contracts in preparation were not included in the analysis.

The data confirm the initial results that were identified in the last report but were still viewed with caution due to the small amount of data then available. With more than 2,100 registered participations by Austrian actors, the trends can now be considered to have stabilised. The data also show that the total amount of approved budget, i. e. the funding acquired by Austrian institutions from the EU, totalled €990 million for Austria on the reporting date, which corresponds to around 3.3% of the funds distributed by the European Commission. In Horizon 2020, the corresponding figure for funding acquired in Austria was 2.9%. The proportion of Austrian coordinators (355 in total in absolute figures) of all coordinators is 3.4%; a figure that is also significantly higher than that of Horizon 2020 (2.7%). The data therefore confirm – starting from an already high overall level – a further improvement in Austrian participation in Horizon Europe compared to Horizon 2020.

Of the total of 71,171 participations in the funded Horizon Europe projects, 2,217 came from Austria. This corresponds to a share of 3.0%. This puts Austria in ninth place in a European comparison, well behind the eighth-ranked United Kingdom (3,091 participations), but ahead of Sweden (1,996), Portugal (1,912), Finland (1,762), Denmark (1,734) and Switzerland (1,619). Naturally, the large European countries have the highest number of participants in absolute terms (Germany: 8,171; Spain: 7,976; Italy: 6,895 and France: 6,703). Austrian stakeholders have a success rate of 22.2%. The average success rate for the EU-27 in Horizon Europe is 21.4%. Austria therefore has the eighth highest success rate of the Member States. Belgium (26.1%), the Netherlands (25.5%) and France (24.8%) have the highest success rates of the EU Member States in Horizon Europe.

The participation of Austrian stakeholders in the individual pillars of Horizon Europe (see Table 2-6) varies greatly. This applies in particular to the sub-

Table 2-6: Austria's success in Horizon Europe by pillar/area, project participation, coordination and budget

	Approved participations (all countries)	Approved Austrian participations	Austrian share in % of funding	Approved coordinations (all countries)	Approved coordinations (Austria)	Austrian share in % of coordinations	EU funding in € million (all countries)	EU funding in € million (Austria)	Austrian share in % of the approved EU budget
Horizon Europe total	**71,171**	**2,117**	**3.0%**	**10,370**	**355**	**3.4%**	**30,201**	**990**	**3.3%**
Pillar 1: Scientific excellence	**19,013**	**517**	**2.7%**	**6,126**	**218**	**3.6%**	**7,582**	**273**	**3.6%**
of which ERC	3,497	133	3.8%	2,903	115	4.0%	4,990	197	3.9%
Pillar 2: Challenges and competitiveness	**46,633**	**1,457**	**3.1%**	**2,968**	**111**	**3.7%**	**18,458**	**633**	**3.4%**
of which Cluster 1: Health	6,795	159	2.3%	439	9	2.1%	3,408	96	2.8%
of which Cluster 2: Culture, creativity, society	2,658	79	3.0%	225	10	4.4%	667	27	4.0%
of which Cluster 3: Civil security	1,679	45	2.7%	100	2	2.0%	428	16	3.8%
of which Cluster 4: Digitalisation, industry, aerospace	12,933	477	3.7%	898	33	3.7%	5,223	196	3.7%
of which Cluster 5: Climate, energy, mobility	13,360	445	3.3%	803	41	5.1%	5,917	216	3.7%
of which Cluster 6: Bioeconomy, agriculture, natural resources	9,208	252	2.7%	503	16	3.2%	2,814	82	2.9%
Pillar 3: Innovative Europe	**3,285**	**83**	**2.5%**	**928**	**23**	**2.5%**	**3,211**	**67**	**2.1%**
Widening participation and strengthening the European Research Area	**2,240**	**60**	**2.7%**	**348**	**3**	**0.9%**	**950**	**17**	**1.8%**

Note: The slight deviations in the totals for EU funding (all countries and Austria) in data row 1 are due to rounding differences compared to the addition of the sub-items.
Source: FFG, adjusted data from eCorda as of 1 March 2024.

programmes within the three major programme areas, namely the three pillars "Excellence in Science", "Global Challenges and EU Industrial Competitiveness" and "Innovative Europe". Most of the funds were raised by Austrian stakeholders in the second pillar "Global Challenges and EU Industrial Competitiveness", totalling €632.9 million. Pillar 2 is also the pillar with the highest total funding in Horizon Europe. The Austrian share of funds raised in Pillar 2 corresponds to 3.4% of the funding amounts budgeted in all contracts in this pillar. In Pillar 1 "Excellence in Science", €272.8 million was acquired by researchers working in Austria, which equates to a share of 3.6% in this pillar. In Pillar 3 "Innovative Europe", €67.2 million has been raised by Austria to date, which corresponds to a funding share of only 2.1%. Finally, these three pillars are supplemented by a structurally RTI-policy characterised area "Widening participation and strengthening the European Research Area", in which the players active in Austria have so far been able to raise €17.0 million (1.8%). However, it should be noted here that many of the calls for proposals in this area are explicitly aimed at countries that are weaker in terms of research and innovation.

On average, Austrian stakeholders are involved in 3.0% of all projects in Horizon Europe and, at 3.4%, lead these projects as coordinators more frequently than average. In Pillar 1, "Scientific excellence", the proportion of participations is slightly below the Austrian average at 2.7%, but the number of coordinations is above average at 3.6%. Participation and the proportion of coordinations from Austria in Pillar 2, "Global challenges and the industrial competitiveness of the EU", are above average at 3.1% and 3.7% respectively. In contrast, Austrian participation and coordination in Pillar 3, "Innovative Europe", are below the corresponding Austrian overall averages at 2.5% each. Austrian participation in the area of "Widening participation and strengthening the European Research Area" amounts to 2.7%, whereby – unsurprisingly – the share of coordination of projects from Austria is only 0.9%, due to the programme specifications. In absolute figures, only three projects in this area have so far been coordinated by Austrian players.

Within Pillar 1 "Scientific excellence", the "European Research Council" (ERC) programme line shows above-average results with 3.8% for participations and 4.0% for coordination. In the Marie Skłodowska-Curie Actions (MSCA) programme line, both participations (2.5%) and funding awards (3.2%) are slightly below the Austrian average in Pillar 1. The Austrian shares are relatively low in terms of participations and funding amounts in the "Research infrastructures" programme line of Pillar 1.

Within Pillar 2 "Global challenges and the industrial competitiveness of the EU", Austrian applicants perform particularly well in Cluster 2 "Culture, creativity and inclusive society", in Cluster 4 "Digitalisation, industry, mobility" and in Cluster 5 "Climate, energy and mobility", measured against the overall performance of Austrian stakeholders in Pillar 2. In Cluster 2, the share of participations is 3.0%, the share of coordination is 4.4% and the share of funding raised is 4.0%. In Cluster 4, the share of participations, coordinations and funding raised is 3.7% in each case. Cluster 5 also has a high level of participation (3.3%) and an above-average share of funding acquired (3.7%) by Austrian applicants. Furthermore, this cluster also has a very high proportion of coordinators from Austria (5.1%). The "Civil security for society" cluster has a high proportion of acquired funding (3.8%), but below-average Austrian participation (2.7%). Austrian participation (2.7%) and funding raised (2.9%) in the "Food, Bioeconomy, Natural Resources, Agriculture and Environment" cluster are slightly below average in Pillar 2, although the proportion of Austrian coordinators is relatively high at 3.2%. In the "Health" cluster, the key figures for RTI organisations based in Austria are consistently below the Austrian average for Pillar 2, with 2.3% of participations, 2.8% of funding raised and 2.1% of coordinations.

The third pillar is the smallest, with a total of 928 projects and 3,285 participations from all countries. Within Pillar 3, "Innovative Europe", there are two programme lines in addition to the European Institute of Innovation and Technology (EIT), namely the "European Innovation Council" (EIC) and the "European Innovation Ecosystems" (EIE) programme line. With 799 projects, the EIC is the largest programme line of the third pillar. In these projects, Austrian stakeholders account for 66 participations (2.6%), 19 coordinations (2.4%) and a funding volume of €59.3 million (2.4%).[142] In the EIE programme line, the number of participations (2.2%) is below average, but the funding amount (2.9%) and the number of coordinations (3.6%) are above the Austrian average in Pillar 3. With regard to the EIT, the statistics reported in eCorda, the European Commission's monitoring system, are not very meaningful because they only show the Austrian-based Co-Location Centres Manufacturing and Health as well as start-up grants for the Co-Location Centre Culture & Creativity, which is currently being set up (see section 2.3.5). A special evaluation[143] of the EIT from the end of 2023, which includes the grants to the final beneficiaries, is more informative in this regard. In 2021 and 2022, the EIT awarded a cumulative total of €685.38 million in grants, of which a total of €15.41 million went to Austria, which corresponds to a share of 2.2%.

In the area of "Widening participation and strengthening the European Research Area", Austria performs significantly better in the programme line "Reforming and strengthening the European R&I system" than in the programme line "Widening participation and spreading excellence". However, the latter is aimed primarily at those European Member States and associated countries whose research and innovation performance is below average.

Measured in terms of funding raised, the higher education sector was the most successful in Horizon Europe on the reporting date, with €395 million (this corresponds to a 40% share of the funding raised by Austria), followed by the non-university research sector with €278 million (28%) and the business enterprise sector (private for profit) with €248 million in funding raised (25%). Other institutions in the public sector, such as the BMBWF, the BMK or the large Austrian research funding organisations, in particular the FFG, were able to raise €21 million (2%) in funding. €49 million (5%) went to other organisations that cannot be allocated to the aforementioned groups. Of the total of 661 participations by Austrian companies, 46.1% had SME status. This is just below the overall European share of SMEs, which is 51.6%. With regard to the funds raised, the share of Austrian SMEs within the business enterprise sector is also slightly below the pan-European average of 50.4% at 45.3%.

In Pillar 1, "Scientific excellence", the higher education institutions with strong basic research and the non-university research institutions are leading the way, particularly with regard to the ERC grants. A similar pattern can be found in the Marie Skłodowska-Curie Actions. The situation is completely different for the funding acquired from the "Research Infrastructures" programme line. Non-university research institutions dominate here with a share of more than half. One third of the funding in this programme line was acquired

142 The information in the individual programme sections of Horizon Europe includes funding. For the sake of completeness, it should be noted that the EIC Accelerator programme line, which accounts for around 2/3 of the total EIC funds, also includes an equity share financed from Horizon Europe funds, which is not shown in the EU funding statistics.

143 EIT Country Factsheets, https://eit.europa.eu/library/eit-community-country-factsheets-2023

by Austrian higher education institutions, and 8% by companies operating in Austria.

In Pillar 2, "Global Challenges and the Industrial Competitiveness of the EU", which has the highest funding overall, the participations by type of organisation are significantly less concentrated than in Pillar 1. Measured in terms of the funding raised, the non-university research sector is ahead in Pillar 2 with a share of 33% (measured in terms of all funds raised by Austria in Pillar 2). The business enterprise sector holds 32% and the higher education sector 26%. The non-university research institutions in the "Civil Security for Society" cluster stand out with almost two thirds of the funds raised. In contrast, non-university research institutions are only represented with 15% in the "Health" cluster (higher education institutions dominate here). Higher education institutions, on the other hand, account for 50% of the funding raised in the "Culture, Creativity and Inclusive Society" cluster. Their share in the "Climate, energy and mobility" cluster is relatively low at 13%. The Austrian business enterprise sector is the leading type of organisation in the clusters "Climate, Energy and Mobility" with 41% and "Digitalisation, Industry, Space" with 39% of the funds raised from Austria in this cluster. The share of the business enterprise sector is particularly low in the "Health" cluster at 15% and in the "Culture, Creativity and Inclusive Society" cluster at 14%.

In Pillar 3, "Innovative Europe", the business enterprise sector dominates in terms of funding mobilised. The for-profit sector accounts for around 54% of funding. Higher education institutions hold a share of 29%. At 8%, the share of non-allocable organisations from Austria[144] in terms of acquired funding is also relatively high in this pillar, which can be explained by their particularly active participation in the "European innovation ecosystems" programme track, where these organisations are responsible for around 83% of the funding raised.

In the area of "Widening participation and strengthening the European Research Area", Austrian non-university research institutions dominate in the programme line "reforming and strengthening the European R&I system" with a share of 64%, while in the programme line "Widening participation and spreading excellence", the higher education sector was able to acquire the most funding with 56%, followed by the non-university research sector with 40%.

In the third year of Horizon Europe monitoring, it can be summarised that the research institutions and active researchers based in Austria continue to accept the European Framework Programme for Research and Innovation and perform well in it. Their success rate is above the European average and, in relation to the participation figures, the return flows to Austria in particular have increased compared to Horizon 2020. As in the previous framework programmes for research and innovation, Horizon Europe also shows that the different pillars of the framework programme are received differently by different types of institutions (companies, universities, non-university institutions, other public institutions and others), depending on their strategic orientation. This is manifested in particular by a strong representation of basic research-oriented institutions in Pillar 1, a strikingly active use of Pillar 2 by non-university research institutions, and the active participation of companies in Pillar 3 and Pillar 2. Within the most highly funded Pillar 2, the clusters "Climate, energy and mobility", "Digitalisation, industry, space" and "Culture, creativity and inclusive society" can be identified as Austrian areas of strength in comparison with the European average.

144 Some of these are so-called intermediary organisations.

Excursus

The European Defence Fund (EDF)[145] is a European programme to promote cross-border cooperation in defence research and development. The programme runs from 2021 to 2027 and is part of Horizon Europe as a so-called "specific programme". The general objective is to increase the competitiveness, efficiency and innovative capability of the technological and industrial base of European defence across the Union to contribute to the strategic autonomy of the Union and its freedom of action.[146]

Together with the European Commission, the EU Member States draw up annual work programmes based on coordinated capability requirements, which are published as calls for proposals. Consortia of at least three entities (companies, research institutions, universities, etc.) from at least three countries can apply for these calls with a project proposal. Independent experts evaluate the submitted project proposals and recommend selected projects for funding. In line with Europe's strategic autonomy, non-EU countries are only able to participate in a consortium to a limited extent.

In addition to the Austrian Armed Forces as a technology provider, the Austrian economy and Austria as a location of business and technology should also benefit from the EDF. Small and medium-sized enterprises (SMEs) in particular are to be given greater opportunities to participate in competitive tendering procedures. A total of €7.9 billion will be made available for this purpose by 2027, of which 1/3 for research with 100% funding and 2/3 for development projects with funding of between 20% and 80%, depending on the development phase.

National co-financing for Austrian organisations (companies, research institutions and universities) is required for projects in the development area, which is currently provided from BMLV funds (for the years 2022 and 2023, the BMLV has provided around €4.6 million for EDF development projects).

The funding decision for 2022 was published in June 2023. 31 domestic organisations successfully submitted proposals. The success rate of project awards with Austrian participation increased from 34% (2021 call) to 61% (2022 call). A total of 26 EDF projects from the 2021 and 2022 call cycles are currently running with Austrian consortium participation.

Austria contributes around €25 million per year to the EDF budget in line with the national EU contribution key of 2.5%. The national position is, among other things, to bring at least this contribution back to Austria in the medium term through the successful participation of Austrian stakeholders in EDF projects. An additional goal is to enable a better strategic positioning of the Austrian defence industry in the European context in the medium to long term and to further develop Austria as a business location in selected sectors, such as digitalisation.

2.3.2 Implementation of ERA with a focus on knowledge valorisation and open science

On 9 November 2023, the Austrian ERA Symposium took place under the theme "Unlocking the Value of Knowledge" with a focus on knowledge valorisation and open science, two important and topical areas of research and innovation policy. The event[147] marked

145 https://defence-industry-space.ec.europa.eu/eu-defence-industry/european-defence-fund-edf_en; https://www.ffg.at/europa/edf/calls

146 EU (2021). Regulation (EU) 2021/697 of the European Parliament and of the Council of 29.04.2021 establishing the European Defence Fund and repealing Regulation (EU) 2018/1092. Official Journal of the European Union L170/149 on 12.05.2021.

147 https://www.ffg.at/veranstaltung/era-symposium-2023-summary

the start of a new series of annual symposia in Austria focusing on the European Research Area (ERA). The annual ERA symposia are part of the implementation of the Austrian Action Plan for the European Research Area (2022–2025),[148] which is based on the EU's political agenda for ERA (2022–2024).[149] The topics of Knowledge Valorisation and Open Science are two priorities of the Austrian ERA Action Plan.

The European Commission has developed recommendations on how to deal with knowledge valorisation in the European Research Area, the so-called "Guiding Principles for Knowledge Valorisation", which were adopted by the Council of the European Union on 2 December 2022.[150] Knowledge valorisation is defined as the process of creating social and economic value from knowledge by linking different areas and sectors and by transforming data, expertise and research results into sustainable products, services, solutions and knowledge-based strategies that benefit society. In particular, the aim is to find new solutions for building a greener, cleaner and healthier future. The Recommendation on Guiding Principles for Knowledge Valorisation sets out a common line of policy principles and actions for national, regional and local decision-makers.

The guiding principles address actors in the research and innovation ecosystem, focus on the connections and co-creation of knowledge between actors, emphasise entrepreneurial skills and practices and cover the entire spectrum of knowledge generated by research and innovation activities.[151] They call for the creation of appropriate support structures, emphasise the importance of skills and capabilities, highlight the application of exploitation principles in publicly funded research, and refer to the benefits of open science and open innovation, among other things.[152] More detailed guidance for practitioners and stakeholders can be found in the Code of Practice on the management of intellectual assets for knowledge valorisation[153] and in a Code of Practice on Standardisation.[154] The Commission adopted these specific recommendations on 1 March 2023 to support the implementation of the guiding principles in daily practice.

Based on the government programme, the RTI Strategy 2030 and the RTI Pacts 2021–2023 and 2024–2026,[155] knowledge valorisation is a separate priority in the Austrian ERA Action Plan. The focus here is on technology transfer and the expansion of start-up culture and entrepreneurship at universities, universities of applied sciences and research institutions and increasing the number of spin-offs.

The performance agreements with public universities and research institutions and the funding agreements with research funding institutions are the first central measure in the ERA action plan as a lever for expanding knowledge valorisation measures.

148 BMBWF and BMK (2022). Austrian Action Plan for the European Research Area (ERA-NAP) 2022–2025. Vienna, December 2022. https://era.gv.at/public/documents/4824/ERA-NAP_2022-2025_EN_final.pdf

149 Council of the European Union (2021). COUNCIL CONCLUSIONS of 26 November 2021 on the future governance of the European Research Area (ERA). https://era.gv.at/governance/erac/

150 Council of the European Union (2022). COUNCIL RECOMMENDATION (EU) 2022/2415 of 2 December 2022 on the guiding principles for knowledge valorisation. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H2415; and European Commission, Directorate-General for Research and Innovation, Guiding principles for knowledge valorisation – Council recommendation, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2777/380118

151 See European Commission (2022).

152 https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/guiding-principles-knowledge-valorisation-implementing-codes-practice_en

153 https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:32023H0499&from=EN

154 https://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:32023H0498&from=EN

155 https://www.bmk.gv.at/themen/innovation/fti_politik/FTI-Pakt.html

The main aim is to strengthen and optimise existing structures, processes and instruments. The target indicators anchored in the performance agreements include the number of patent applications and grants as well as revenue from patent exploitation activities, licence agreements and licence revenue, number of spin-offs and invention disclosures.

A second measure in the ERA action plan concerns the continued operation of the National Contact Point for Intellectual Property in Open Knowledge Transfer[156] (NCP-IP) as an interministerial platform. The aws and the FFG have been commissioned with the operational implementation. As part of the above-mentioned Austrian ERA Symposium, the NCP-IP organised two World Cafés on the two European Commission Codes of Practice mentioned above. The first round of discussions dealt with the Code of Practice on Intellectual Asset Management, the second with the Code of Practice on Standardisation.

The third measure set out in the ERA Action Plan for the valorisation of knowledge concerns the promotion of academic spin-offs and start-ups. One goal of the Austrian RTI strategy is to double the number of economically successful academic spin-offs by 2030, with the baseline value as of 1 January 2021 being 93. Model calculations have shown that supporting academic spin-offs is a low-cost but highly effective measure that triggers the highest GDP growth per euro of effective additional expenditure and therefore has the highest GDP multiplier. In addition, spin-offs are often categorised in the "provision of professional, scientific and technical services" sector and are generally more research-intensive than other start-ups. On the one hand, spin-offs benefit from the spillover effects[157] of research-intensive locations, not least through other spin-offs in terms of growth in the number of employees. On the other hand, positive spillover effects are also generated with regard to productivity increases at existing companies.[158]

In the performance agreements with the universities, it was therefore agreed to increase the number of spin-offs by a third, with a total of around 70 spin-offs from universities planned by 2024. To support academic spin-offs, the "Spin-off Fellowships" funding programme was also extended until 2026. In 2018 and 2019, this programme had three submission deadlines as part of an initial call for proposals, resulting in 24 projects being funded with a total of €8.6 million. 67% of the spin-off fellows supported actually founded a company with the help of the funding.[159] As part of the first submission deadline for the second call for proposals of the Spin-off Fellowships programme (20 May 2022 to 14 September 2022), 10 projects were supported with federal funding totalling €4.5 million.[160] During the second submission period of the second call for proposals, which was open throughout the summer of 2023, 34 applications were submitted, 12 of which were recommended for funding with a funding volume of €5.25 million.

The ISTA's early-stage investment fund IST-Cube (since 2023 under the name xista science ventures),[161] which has capital totalling €45 million,[162] also invests in the start-up phase and offers academic founders not only equity capital but also practical

156 https://www.ncp-ip.at/
157 See Keuschnigg et al. (2022); see also Arrow (1962) or Audretsch and Keilbach (2008).
158 See Keuschnigg et al. (2022).
159 Information from Tanja Sovic (TU Vienna) for the ERA Symposium on 9 November 2023.
160 https://www.ffg.at/spin-off-fellowships/Projekte
161 https://xista.vc/
162 Investors include the European Investment Fund, the state of Lower Austria, aws, the Vienna Insurance Group, *Mitterbauer-Beteiligungs-AG* and other private investors.

support. Up to 12 January 2024, 18 spin-offs had been supported, raising a total of €120 million in funding and equity financing.

Outstanding achievements by Austrian start-ups and spin-offs continue to be honoured annually by the BMAW and the BMBWF as part of the PHÖNIX start-up award.[163] In 2023, the winners[164] were Inmox GmbH in the "Start-up" category, which has developed a sensor technology for continuously monitoring the condition of gearboxes in real time. The winner in the "Spin-offs" category was Quantum Technology Laboratories GmbH, a spin-off of the Austrian Academy of Sciences, which designs and manufactures telescopes with quantum receivers and satellite tracking software. The winner in the "Prototype" category was the University of Graz, which was able to demonstrate how bio-based surfactants (the active ingredients in every detergent and cleaning agent) can be produced using green chemistry from used cooking oils and lignin as a waste product from the wood processing industry. The winner in the "Female Entrepreneurs" category was the founder of Sarcura GmbH, who has developed a semiconductor chip that can sort immune cells from blood fully automatically and at high-speed using optical recognition.

In addition to Austria's participation in the development of the European Open Science Cloud,[165] open science is supported as the first priority in the Austrian ERA Action Plan under the title "Towards an open society". This ERA initiative is intended to support and accelerate the transformation process of the Austrian science and research system towards open science within and outside the academic sector by improving framework conditions and providing greater incentives for open science (open access, open data, open educational resources). Open science means that research is conducted with a strongly collaborative approach. This includes the generation, analysis and interpretation of data and results (i. e. the "production process") as well as the reuse and dissemination of methods and research data or the free accessibility of publications and findings (dissemination and [further] use). This co-operative creation and use of research results is not limited to researchers from various disciplines, but also includes companies, authorities, stakeholders and citizens. The idea behind this is to disseminate and apply the latest findings and accelerate the research and innovation process. The desired openness should also increase creativity and trust in science and ultimately strengthen Europe's competitiveness.

Three measures are to be implemented as part of this Austrian ERA priority. The first concerns the development and operation of Open Science Austria (OSA) as an interdisciplinary stakeholder platform under the umbrella of the Austrian University Conference. To this end, firstly numerous information events were held, secondly central publications and Open Science documents were made available on the OSA website with brief explanations, thirdly a blog was initiated for an open and constructive exchange and a large exchange and networking meeting was organised as part of the aforementioned Austrian ERA Symposium.

163 https://www.aws.at/oesterreichischer-gruendungspreis-phoenix/
164 An overview of the award winners from 2023 can be found at https://www.gruendungspreis-phoenix.at/preistraegerinnen
165 Austria's participation in the European Open Science Cloud is another recognised measure in the Austrian ERA Action Plan. It also contributes to the establishment of an open science culture.

The second measure within this ERA priority aims to create and implement concepts to incentivise the application of open science and the use of relevant infrastructures in both the academic and non-academic sectors. One basis for this is the baseline report "Open Access in Transition".[166] The reform of research assessment and the associated recognition of a broader portfolio of academic achievements should play a central role here. Proposals for incentive and control measures are to be developed by April 2024.

The third measure was the preparation of a study on the legal and administrative framework conditions for Open Science in Austria, which also took into account the results of the EU's analysis of the EU legal and regulatory framework for copyright and data in terms of how suitable it is for research. The study, which was discussed at the ERA Symposium, derives proposals for legislative and non-legislative measures to improve the existing legal framework for Open Science in Austria from a comprehensive assessment of the legal and factual situation.[167] Firstly, they concern access to scientific publications and, in particular, recommendations on the legal secondary exploitation right, on the rights retention strategies of institutions, on open educational resources and open licences, and on text and data mining. Secondly, the proposals concern recommendations on rights to research data, data management strategies, access to information for research purposes and research data protection. Finally, cross-thematic recommendations are also formulated with regard to the harmonisation of the legal situation at EU level, the creation of information materials and the implementation of training courses, the development of (advisory) services for researchers and legal protection for researchers in open science practices.

2.3.3 EU Chips Act

Semiconductor chips are considered a central key technology of the 21st century. They are a fundamental building block of all digital devices, from smartphones and cars to critical infrastructure in a variety of areas, such as artificial intelligence (AI), Industry 4.0, energy supply and healthcare. Chips form the basis of many value chains and have a major impact on almost all industrial sectors. Due to their central role for industry and society, as well as the European focus on green growth through digitalisation, the semiconductor industry is becoming the focus of strategic considerations across Europe.

The COVID-19 pandemic led to supply bottlenecks and supply interruptions in semiconductor production and utilisation across Europe, which highlighted the dependencies of European companies. To strengthen security of supply and global competitiveness in chip development and production, the European Parliament and the European Council adopted the EU Chips Act[168] in autumn 2023. This provides a framework to expand existing efforts in the areas (e.g. IPCEI Microelectronics I & II) and to take targeted measures to strengthen the resilience and independence of the European semiconductor ecosystem.

166 Cf. Mayer (2022).
167 Cf. Škorjanc (2023).
168 Regulation (EU) 2023/178 of the European Parliament and of the Council of 13 September 2023 establishing a framework for measures to strengthen the European semiconductor ecosystem and amending Regulation (EU) 2021/694 (Chip Act), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2023.229.01.0001.01.ENG

Specifically, the main areas of action of the EU Chips Act are divided into three pillars:

1. The "Chips for Europe" initiative aims to support the development and expansion of technological capacities and thus close the gap between cutting-edge semiconductor research and industrial utilisation. To this end, a digital design platform is being developed, the expansion of pilot and test facilities is being driven forward, the development of quantum chips is being promoted, an EU-wide network of semiconductor competence centres is being established and a "chip fund" is being set up to facilitate access to debt financing and equity, particularly for start-ups, scale-ups, SMEs and small mid-cap companies in the semiconductor ecosystem. It will be operationalised through a blended finance facility under the InvestEU fund and via the European Innovation Council.[169]
2. The expansion of production facilities is intended to ensure the security of supply and resilience of the European semiconductor industry. A legal framework has been created to specifically promote innovative production facilities that are expected to have positive medium to long-term spillover effects on other companies and Member States. A distinction is made between "open production sites", which offer production capacities to other companies, and "integrated production sites"; the latter are innovative facilities that can also include other stages of the semiconductor supply chain in addition to their own commercial production.
3. To anticipate supply bottlenecks in the semiconductor supply chain and to be able to react collectively to supply bottlenecks and crises in good time, a Europe-wide systematic mapping and monitoring of the sector is planned. A coordination mechanism has been developed both between the countries and with central stakeholders, which offers the opportunity to react promptly and flexibly to market disruptions.

The EU Chips Act is of great importance for Austria: Austria is one of the flourishing microelectronics locations in Europe and ranks fourth in the EU in terms of value added, employment and patent activities in this area, and third in terms of private investment and research and development investments of business enterprises. In an EU comparison, Austria thus has the highest share of microelectronics production in total value added, total employment and research and development of business enterprises.[170] The production value of the electrical and electronics industry in Austria is estimated at around €23 billion in 2022.[171] A total of around 72,000 jobs are attributed to the electronics-based systems sector in Austria, with growth of 15% since 2015. Areas of strength lie in particular in power electronics, smart sensor technology and security technologies.[172] A high density of internationally active and research-intensive companies are located along the entire semiconductor value chain in Austria. More than 280 companies are attributed to the supply and application industry of semiconductor technology.[173]

169 https://digital-strategy.ec.europa.eu/de/factpages/european-chips-act-chips-europe-initiative
170 https://www.feei.at/wp-content/uploads/2023/04/pp-european-chips-act-sicherheit-stabilitaet-nachhaltigkeitv2.pdf
171 https://services.bundeskanzleramt.gv.at/newsletter/bka-medien-newsletter/innenpolitik/20230713.html
172 https://www.feei.at/wp-content/uploads/2023/04/pp-european-chips-act-sicherheit-stabilitaet-nachhaltigkeitv2.pdf
173 https://services.bundeskanzleramt.gv.at/newsletter/bka-medien-newsletter/innenpolitik/20230713.html

Table 2-7: Selected measures in Austria as part of the implementation of the EU Chips Act

Column	Measure	Description	Status
1. Initiative "Chips for Europe"	Competence centres for semi-conductors	The core tasks of the competence centres include raising awareness, publicising services, promoting success stories, facilitating access to design platforms and to the pilot lines, supporting interested users in the development of semiconductor solutions through technology transfer; providing access to expertise in areas such as legal compliance and business development or participating in the organisation of a European network of chip competence centres.	In tender
1. Initiative "Chips for Europe"	Establishment of pilot lines	Involvement of Austrian stakeholders in transnational consortia who wish to actively participate in the following Pilot Lines proposals: • Pilot line on advanced sub 2nm leading-edge system on chip technology • Pilot line on advanced Fully Depleted Silicon On Insulator technologies targeting 7nm • Pilot line on advanced Packaging and Heterogeneous Integration • Pilot line on advanced semiconductor devices based on Wide Band-gap materials	In tender
1. Initiative "Chips for Europe"	Design platforms	Design platforms play an important role in strengthening Europe's innovative power and competitiveness in semiconductor technology. The platforms are designed to facilitate access to advanced design tools and pilot production lines for prototyping, testing and experimenting with cutting-edge chips. They serve as one-stop-shops, pooling resources and expertise to support the development and manufacture of new semiconductor products.	Call for tenders in preparation (exclusively European funds)
1. Initiative "Chips for Europe"	Quantum Chips	Preparatory measures for the design of a quantum technology pilot line.	Preparation of the tender documents
1. Initiative "Chips for Europe"	Chip Fund	The term Chip Fund summarises investment measures by the European Commission, in cooperation with the European Investment Bank Group and promotional banks and institutions from the Member States, which are intended to provide an investment facility for semiconductor projects. The availability of funds is intended in particular to support the growth of start-ups and SMEs as well as investments along the entire value chain.	In planning
2. Development of production capacities	First of a kind production facilities	In autumn 2023, there was a call for expressions of interest from companies for the promotion of a "first of a kind" production facility for chip manufacturing. There was lively interest in this call and the first companies have already been identified and their submissions will be submitted to the Commission for approval.[174] The programme is being handled by aws.	In the authorisation process
Coordination mechanism	Analysing semi-conductor supply chains	The Supply Chain Intelligence Institute Austria (ASCII) analysed the supply chains of the semiconductor industry, with a particular focus on regional dependencies, to identify areas of strength, development potential and further business (re-)locations.[175]	Ongoing

Source: illustration Technopolis.

174 https://www.bmaw.gv.at/dam/jcr:790ceecf-328c-48a8-94e5-cd569fc694d5/Aufruf%20Interessensbekundung%20-%20Chips%20Act.pdf

175 ASCII study report is still in progress (as of May 2024).

The EU Chips Act provides an implementation framework to promote highly innovative projects and products in Austria in the fields of power electronics, communication technology, packaging, processors, process technology and sensors more comprehensively than before. This will be achieved both through research and innovation activities, which will be implemented in the Pillar 1 funding measures and the activities of the so-called Chips Joint Undertaking (Chips-JU). Austria will contribute around €90 million to the Pillar 1 measures for the years 2024–2026. Furthermore, measures to increase production capacities can be implemented as part of Pillar 2. By 2031, €2.8 billion from public funds will be released for investments in chip production,[176] to trigger over €7 billion in private investments.[177] Synergy effects in the field of semiconductor research will also result from an increase in the IPCEI Microelectronics II budget to a total of €225 million.[178] Concrete measures and potential for the implementation of the EU Chips Act were explored with domestic industry and political representatives at the Chips Summit in summer 2023.

Responsibility for implementing the EU Chips Act in Austria is shared between the BMAW (lead responsibility for pillars 2 and 3) and the BMK (lead responsibility for Pillar 1). They represent Austria on the European Semiconductor Board, a steering group that promotes the harmonised implementation of the regulation as well as international cooperation and the exchange of information. Furthermore, an Austrian Chips Forum has been set up, which brings together renowned players and stakeholders (agencies, social partners, industry platforms, market analysts, ministries, etc.) to strengthen the exchange of information.

As part of the EU Chips Act, further measures beyond the Austrian area of responsibility are being implemented throughout Europe. There are three main initiatives here, particularly under Pillar 1, in which national participation/implementation has not yet been decided:

- To strengthen chip design capacities in the EU, a virtual design platform available throughout the EU will be set up at European Commission level. This platform will bring together design companies, start-ups, SMEs, providers of intellectual property and tools as well as research and technology organisations to provide virtual prototype solutions through joint technology development.
- The development and construction of advanced pilot plants will support the development and introduction of next-generation semiconductor technologies. These will take up a significant proportion of the funding provided. Three specific pilot lines have already been defined in the tender text. Ongoing negotiations are intended to support the participation of Austrian partners in these consortia.
- To accelerate innovative developments in the field of quantum chips and the associated semiconductor technologies, the initiative will fund a design library for quantum chips, pilot plants for their manufacture and facilities for testing and validating quantum chips.

176 https://www.parlament.gv.at/fachinfos/budgetdienst/Chip-Gesetz-Vorbelastungs-und-Begleitmassnahmengesetz
177 https://www.ots.at/presseaussendung/OTS_20231020_OTS0027/kocher-rund-3-milliarden-euro-fuer-mikrochips-schaffen-anreiz-fuer-milliardeninvestments-von-unternehmen-und-zusaetzliche-arbeitsplaetze
178 Ibid.

2.3.4 European Innovation Agenda

With the New European Innovation Agenda (NEIA) of 5 July 2022, the European Commission provides guidelines for innovation policy measures in the coming years. The declared aim of the agenda is to position Europe as a leading force in global innovation. This will be achieved by harnessing the new wave of technology-intensive innovation, in which Europe will lead the way with breakthrough innovations and start-ups. Technology-intensive innovations should help address societal challenges, such as green and digital transformation, and achieve the UN Sustainable Development Goals.[179] The NEIA is also based on the recognition that the European Innovation Council (EIC/scale-up element of Horizon Europe) fulfils an important function, but that the necessary impetus cannot be provided by the EIC alone. There is also a need for ecosystemic action in Europe and the Member States.

The New European Innovation Agenda focuses on five key areas, to which 25 specific measures and proposals for action are assigned. The key areas address current weaknesses and future opportunities of the European innovation system:[180]

1. Improving access to finance for European start-ups and growth-stage companies: This includes measures to change the incentive structures between debt and equity financing, to facilitate access to capital markets, to develop the European venture capital market and to increase diversity and the proportion of women in start-ups and venture capital funds.
2. Improving the conditions for experimenting with new ideas: This key area focuses on promoting innovation through improved framework conditions, including experimental regulatory approaches, so-called regulatory sandboxes as well as testbeds, living labs, access to innovation structures and innovative public procurement.
3. Strengthening regional innovation ecosystems regarding deeptech/scale-up: This key area aims to strengthen innovation systems, accelerate innovation and promote excellence across the EU through a range of instruments. The focus is on laying the foundations for the emergence of networked Regional Innovation Valleys (RIVs) across the EU, including in particular regions with lower innovation performance, by building regional strength and specialisation in strategic deeptech/scaleup areas to support key EU priorities.
4. Recruiting and retaining talent in Europe: This includes measures such as a training initiative in the field of deep tech, an internship initiative in start-ups and innovative companies, a programme to promote women in the field of deep tech and a talent platform.
5. Improving policy-making tools: This key area focuses on the development and use of robust, comparable data sets and a common data taxonomy that can serve as a basis for policy action at all levels in the EU, as well as on policy support to Member States.

In terms of implementation, the New European Innovation Agenda has already made significant progress since its adoption in July 2022.[181]

179 https://research-and-innovation.ec.europa.eu/strategy/support-policy-making/shaping-eu-research-and-innovation-policy/new-european-innovation-agenda/new-european-innovation-agenda-roadmap_en
180 https://www.bundeskanzleramt.gv.at/themen/europa-aktuell/2022/neue-europaeische-innovationsagenda.html
181 See European Commission (2024).

Table 2-8: National measures to support the key areas of the European Innovation Agenda

Key area	Measure	Description	Status
1. Access to finance	Flexible Corporation Act	This law creates a new entrepreneurial legal form that combines the advantages of the limited company *(GmbH)* and the Stock Corporation Act and is aimed in particular at young, fast-growing companies.	Realised
	Launch of the aws Start-up Fund II	State-financed venture capital fund for innovative technology companies in the financing and growth phase.	Realised
2. Conditions for experimentation	Establishment of real-world laboratories for 100% renewable energy	The aim of the initiative is to initiate, promote and support five real-world laboratories for different types of regions in Austria, in which prototype system solutions for integrated, regional energy systems are developed, tested and validated.	Realised
	Mobility labs	The mobility laboratories serve as realistic test environments in which new approaches can be tested and optimised with the aim of putting sustainable mobility solutions into practice.	Realised
	PPPI – Public Procurement Promoting Innovation	The aim is to support the public procurement of innovative solutions, thereby promoting economic growth and employment and making public administration more efficient and modern.	Realised
3. Creation of "Regional innovation valleys"	National co-financing funds reserved for "Regional innovation valleys"	The BMAW has reserved a national co-financing budget to facilitate participation at regional level in the European Innovation Ecosystems (EIE) programme's calls for "Regional Innovation Valleys" and to signal support for initiatives at regional level.	Realised
	Showcase region WIVA P&G (hydrogen valley)	The aim of the showcase region is to demonstrate the conversion of the Austrian economy to a largely CO_2-neutral structure with the production and utilisation of renewable hydrogen as an important component.	Realised
4. Recruitment and retention of talent	"Work In Austria" programme of the Austrian (re-)location agency ABA	"Work In Austria" is Austria's competence centre for the search for international talent and supports international skilled workers from all over the world in their search for jobs and in applying for residence permits.	Realised
	Innovators Programme of the FFG *(INNOVATORINNEN)*	Targeted support for highly skilled female specialists in applied research and innovation.	Realised
5. Improvement of the instruments	BMAW Start-up Council *(Startup-Rat)*	The BMAW Start-up Council is a forum of experts from the start-up ecosystem that acts as the voice of the community in order to improve the framework conditions for start-ups and innovative scale-ups in Austria.	Realised
	Startup Landscape Austria (Dealroom)	Development of an online platform that provides a daily updated overview of all Austrian start-ups and investors.	Realised
	BMK mission-oriented and transformative research and innovation programmes	Long-term mission-oriented programmes of transformative innovation policy aimed at climate-neutral cities, energy transition, mobility transition and circular economy.	Realised

Source: https://research-and-innovation.ec.europa.eu/strategy/support-policy-making/shaping-eu-research-and-innovation-policy/new-european-innovation-agenda/new-european-innovation-agenda-roadmap_en

Of 25 measures at European level, 13 have already been successfully implemented and 12 are in the implementation phase. The former include, for example, the adjustment of the state aid regulation for research, development and innovation funding measures of the Member States, the establishment of an Innovation Talent Platform and the launch of the selection process for regional innovation valleys[182] through the first of two calls for proposals.

The success of the New European Innovation Agenda launched by the European Commission depends on the support and participation of the Member States. The "EIC Forum Plenary" was formed as a steering body for the purpose of monitoring all NEIA activities, but also for the purpose of introducing/coordinating national corresponding measures, in which Austria is represented by the BMAW (as well as the BMK in "alternate function"). The Member States implement corresponding measures at their level within the framework of the topics of the five key areas. The key areas at European level have been chosen favourably for Austria, as they lie within the strategic development lines of the Austrian innovation system and are already addressed in the government programme.[183] Austria therefore already has twelve national measures to support the key areas. These are shown in Table 2-8.

Due to the favourable orientation of the New European Innovation Agenda and the accompanying national measures, it is expected that the Austrian innovation system will benefit significantly from this European initiative. Long-term competitive disadvantages, such as a comparatively small venture capital market, can thereby be addressed and the international competitiveness of the Austrian innovation system strengthened.

2.3.5 European Institute of Innovation and Technology

The European Institute of Innovation and Technology (EIT) has been an integral part of the EU's research and innovation programme since 2008. In Horizon Europe, it plays a central role in Pillar 3 for the European Innovation Agenda. It aims to stimulate innovation and develop responses to global challenges by creating an effective network between companies and research organisations. To achieve this goal, the EIT has set up so-called Knowledge and Innovation Communities (KIC) around nine challenges such as energy, climate, mobility, digitalisation, raw materials and health.[184] In the 2021–2027 programme period, a KIC Water, Marine and Maritime Sectors and Ecosystems is to be established (probably in 2026).

The KIC are organised on a transnational basis and are intended to bring together all the key players involved in specific challenges in Europe. Each KIC has its own strategy, business plan and governance structure. Apart from strengthening networks and partnerships, they have in common the support of innovation projects, entrepreneurial education as well as business creation and growth. Each KIC has several regional hubs, also known as Co-Location Centres (CLC), which pool resources in one physical location and serve as hubs for the pan-European network. By pooling resources and expertise in these centres, the KIC can work more efficiently and create synergies between different stakeholders. In addition, they offer services tailored to the respective ecosystems

182 https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/one-year-new-european-innovation-agenda-advancing-and-commission-launches-new-innovation-initiatives-2023-06-01_en?prefLang=de
183 https://www.bundeskanzleramt.gv.at/bundeskanzleramt/die-bundesregierung/regierungsdokumente.html
184 https://eit.europa.eu/sites/default/files/eit_innovation_model.pdf

and different participants such as students, start-ups, venture capital investors and policy makers. In addition to the CLC, Regional Innovation Centres (RICs) have also been set up in some cases.[185] These centres are closely linked to the respective national and regional innovation system and strengthen cooperation between regional, national and European levels.[186]

Austria was successful in obtaining CLC for three of the nine KIC and a RIC for one KIC.[187] The three CLC belong to the KIC EIT Manufacturing – Added Value in Manufacturing, EIT Health – Innovation for Healthy Living and Active Ageing and EIT Culture and Creativity – Culture and Creative Industries. The RIC is part of EIT RawMaterials – Sustainable Exploration, Extraction, Processing, Utilisation and Substitution. The structures established in Austria are described in detail in the following section.

EIT Manufacturing Co-Location Centre East (CLC East)

The Co-Location Centre East (CLC East) is based in the *Seestadt* Technology Centre in Vienna, and is one of the six EIT Manufacturing Co-Location Centres. It serves seven countries in Central and Eastern Europe and aims to promote green and digital transformation in the manufacturing industry. The centre brings together innovators and organisations and offers various services and programmes for the region, including support for start-ups and SMEs, educational initiatives and research projects. In addition, several external strategic projects have been initiated and participation secured, including Gaia-X[188] and the Austrian Innovation Data Space Production.[189]

The organisation was founded under the leadership of TU Wien. The initiation was supported by the BMK and the start-up phase by the BMBWF. The involvement and networking of Austrian stakeholders is promoted by the BMK and BMAW through an innovation lab organised by the FFG.[190] The CLC was opened in March 2022 and serves as a hub for innovation and collaboration between companies, research institutions and universities.

A strategic focus of the CLC is the Regional Innovation Scheme (RIS) – a funding programme of the EIT community for the transfer of best practices and expertise to European countries and regions with moderate innovation activity, which helps to close innovation gaps in Europe. With the exception of Austria, all countries included in CLC East are eligible for RIS funding as they have a comparatively moderate level of innovation activity. RIS hubs have also been set up in some of these countries to act as an interface between the CLC and local stakeholders and improve knowledge transfer.[191]

EIT Health Co-Location Centre EIT Health Austria

With EIT Health Austria as one of seven CLC in EIT Health, another Co-Location Centre was brought to Austria in 2022, also based in Vienna. The Austrian Institute of Technology (AIT) played a leading role in the establishment of this CLC and is one of its 15

185 https://education.ec.europa.eu/sites/default/files/document-library-docs/finalreport_eitinterimevaluation.pdf
186 https://www.researchgate.net/publication/338431065_EIT_Knowledge_and_Innovation_Communities_Collaboration_in_a_RIS3_Context
187 https://www.bmbwf.gv.at/Themen/Forschung/Forschung-in-der-EU/EU-Rahmenprogramme/Horizon-Europe/EIT.html
188 https://www.gaia-x.at/
189 https://www.eitmanufacturing.eu/news-events/activities/amids-austrian-manufacturing-innovation-data-space/
190 https://mitic.at/
191 https://www.eitmanufacturing.eu/in-your-country/

partners. The activities include the development of new products and services in the healthcare sector, support for start-ups and targeted educational programmes in the healthcare sector. The focus is on strengthening the Austrian healthcare system and its integration into the broader European innovation network of EIT Health.[192]

The establishment of EIT Health Austria was accompanied by the launch of HealthGateway.Austria.[193] This is a contact point and information hub for Austrian companies and research partners for stronger networking in the Europe-wide innovation network of EIT Health. In addition, a new Master's programme on entrepreneurship in the field of digital health was established at MedUni Graz and a Europe-wide matchmaking event was organised in Vienna.[194]

EIT Culture & Creativity Co-Location Centre South East Alps Region (CLC SEA)

The EIT KIC call for proposals on cultural and creative industries was successfully completed by *Kreativwirtschaft* Austria in cooperation with the Impact Hub Network, JKU Linz and Ars Electronica 2022.[195] This enabled the third CLC to be brought to Austria.[196] As one of six CLC, this Co-Location Centre for the creative industries in Vienna is part of the EIT Culture & Creativity and aims to strengthen the European cultural and creative industries. It acts as a creative hotspot and regional hub for south-east Europe and the Alpine region. The centre promotes innovation and business models in the creative sector to strengthen its role as a value-adding factor for Europe. It offers a broad network for cooperation between companies, artists, freelancers, social innovators and cultural professionals to tackle pressing social challenges. The centre promotes thematic priorities such as innovation in higher education and building bridges between art and science.[197]

The CLC is currently being set up under the leadership of *Kreativwirtschaft* Austria and is scheduled to begin operations in 2024.

EIT RawMaterials Regional Centre Leoben

The EIT RawMaterials Regional Centre Leoben, operated by the Resources Innovation Centre at *Montanuniversität* Leoben, promotes innovation and sustainability in the raw materials sector. It was Austria's first notable participation in the EIT and has been active since the beginning of 2015. In the meantime, it not only acts as a central regional partner of EIT RawMaterials but also of EIT Climate. The innovation centre focuses specifically on the coordination and promotion of international projects that are developed in collaboration with internal and external stakeholders and university institutes. The topics include the digitalisation of extraction, preparation and processing procedures as well as raw material supply chains, innovative raw materials for digitalisation and the substitution of critical raw materials.

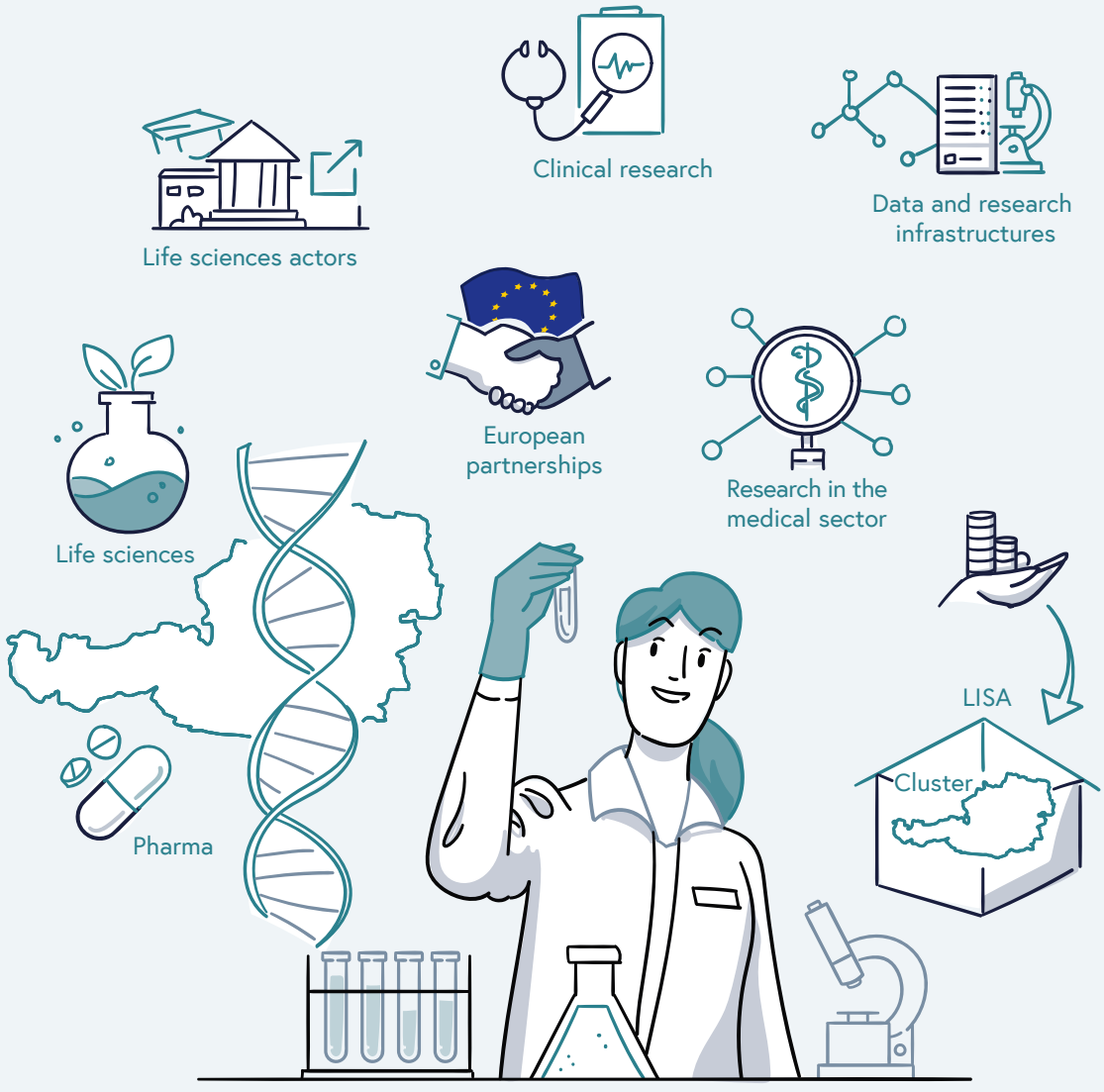
A key aspect of the Innovation Centre's work is its responsibility for the region of Eastern and Southeastern Europe (ESEE region) through outreach,

192 https://eithealth.eu/in-your-region/austria/
193 https://eithealth.eu/healthgatewayaustria/?lang=de
194 https://eithealth.eu/news-article/a-retrospective-look-at-2023/
195 https://eit.europa.eu/sites/default/files/winning_consortium_factsheet.pdf
196 https://www.ots.at/presseaussendung/OTS_20231010_OTS0146/european-culture-creativity-days-bringen-die-europaeische-kreativwirtschaft-zusammen
197 https://www.kreativwirtschaft.at/eit-culture-creativity-grosser-erfolg-fuer-oesterreichs-kreativwirtschaft/

integration and community-building activities, such as the annual ESEE dialogue conferences. In addition, the centre integrates relevant Austrian stakeholders from the raw materials sector and the relevant industries into the community by involving them in relevant projects as well as innovation and entrepreneurship activities. Particularly noteworthy are the Centre's educational projects, which have led to the implementation of an educational platform for the strategic development of this educational sector in the ESEE region. The Centre is currently involved in more than 40 innovation projects and is helping to promote raw materials as one of Europe's strengths by increasing the competitiveness, growth and attractiveness of the European raw materials sector through radical innovation, new educational approaches and entrepreneurship.[198] The Resources Innovation Centre's strategic networking in activities at European level enables it to play an active role in shaping the European agenda in the field of raw materials.

198 https://ric-leoben.at/de/home/eit-raw-materials/uebersicht/

2.4
Excellence and innovation in life sciences and health



Social developments, economic challenges and crises such as the pandemic are affecting large areas of the economy and labour. Innovative industries such as the life sciences sector are characterised by the fact that R&D is carried out on a large scale, thereby creating welfare, added value and jobs. Performance in innovation increases the attractiveness of a location, which is particularly important in international competition. The essential importance of the sector increased once again when the pandemic illustrated the serious consequences of supply bottlenecks for essential medicines and medical products.

Excellent research in the life sciences has been established in Austria in recent years. New knowledge, new products and services are constantly being established, supported by excellence-promoting, technology-open and thematic research funding programmes and the research premium. Major investments in research infrastructures result in additional locational advantages.

Against this background, the following chapter looks at current framework conditions and developments in Europe as a life sciences location, followed by a system view of Austria as a life sciences and pharmaceutical location, including funding measures and an additional focus on clinical research.

The definition of life sciences used here focuses primarily on the health aspect and therefore on research, development and application in medical and molecular biology and biotechnology (red biotechnology), (bio) medicine, pharmacy and medical technology.[199] Other biotechnologies, such as agricultural and industrial biotechnology in connection with sustainable resource availability as well as food and energy security, are not discussed in detail, even though important innovations are being driven forward in Austria in these areas.

2.4.1 Local and regulatory framework conditions in Austria and the EU

The life sciences are among the knowledge- and research-intensive sectors whose importance will continue to grow in the future. According to the European Commission, biotechnology is one of the six "key enabling technologies".[200] The European Commission emphasises that it is essential to invest in this area to become a more attractive location. This is supported by integrative approaches such as "One Health", which aim to sustainably balance and optimise the health of humans, animals and ecosystems.

From a global perspective, the USA, which achieved a global share of 37.39% of patents in the field of biotechnology in 2020, also plays a pioneering role in science. In contrast, the EU as a whole achieved 17.10% in 2020, after holding a share of over 25% between 2006 and 2010; the US share was around 35% in the same period. The lost share of the EU can therefore not only be attributed to the rise of China (2020: 12.67%, 2005: 1.53%). The fact that Austria, as a small country, only accounts for 0.47% of patents is not surprising at first glance, although Switzerland's share is almost four times as high at 1.84%.

199 BMWFW (2016), p. 17.
200 See European Commission (2022), p. 751.

Regulatory framework conditions to strengthen Europe as a pharmaceutical location

Research in the field of life sciences in the European Union and its Member States is characterised by two trends. The first concerns the strategic importance of industrial policy, which is emphasised by the Austrian government in the "RTI Pact 2024–2026" in the context of "strengthening key sectors and value chains in key technologies".[201] The EU also emphasises the importance of this, for example by explicitly naming diversified and secure supply chains and the promotion of competitiveness, innovation and sustainability in the pharmaceutical industry as two of four pillars in its "Pharmaceutical Strategy for Europe".[202] The events of the current decade – the COVID-19 pandemic and the war in Ukraine – highlight the dependence of the supply of strategically important goods on geopolitical relationships, including in (sub)sectors of the life sciences.[203] According to a survey, the overwhelming majority of CEOs in the life sciences sector see problems with supply chains and the associated rising costs.[204]

European legislation in the life sciences sector forms a complex and multi-layered system that regulates various aspects of research, development, production and distribution of medical and pharmaceutical products. A large number of directives and regulations, such as the Clinical Trials Regulation (EU) No. 536/2014, the Regulations (EU) 2017/745 on medical devices and (EU) 2017/746 on in vitro diagnostics, or Directive 2001/18/EC and Regulation (EC) No. 1829/2003, which regulate genetic engineering and biotechnology, are important in this regard. Directive 2010/63/EU of the European Union regulates the use of animal testing. These regulations are intended to guarantee safety, but also take into account other aspects such as ethics, transparency and efficiency. On 26 April 2023, the European Commission also presented its draft for a reform of pharmaceutical legislation, known as the EU Pharma Package. This proposed revision of EU pharmaceutical legislation represents the first significant overhaul of pharmaceutical legislation since 2004. An important aim of the package is to increase the production of medicines in Europe and improve the security of medicine supply.[205] To date, innovation aspects have been given (too) little consideration in pharmaceutical legislation. Work is therefore underway to ensure that the area of innovation is given due consideration in the legislation and that the reform provides positive incentives for R&D&I.[206]

The European Council and the European Parliament also reached a provisional agreement in March 2024 on a regulation for the European Health Data Space (EHDS), which is intended to facilitate data exchange in the healthcare sector within the EU. The EHDS is intended to help realise the full capability of digital health data in Europe by providing clear rules, standards and procedures as well as a corresponding infrastructure and governance structure. This should enable citizens to control their own health data while promoting the use of this data to improve healthcare, research and policy-making. In addition, the EHDS is expected to bring significant economic benefits, including healthcare savings and growth of the digital health market.[207]

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201 RTI Pact 2024–2026 (p. 12) available at: https://www.bundeskanzleramt.gv.at/dam/jcr:92051a80-56e8-428b-9821-d18cbc335af8/032023_FTI-Pakt_en.pdf
202 https://health.ec.europa.eu/medicinal-products/pharmaceutical-strategy-europe_en
203 See European Commission (2022), p. 75.
204 See Deloitte (2023), p. 17.
205 https://www.ots.at/presseaussendung/OTS_20230718_OTS0100/rauchkocher-eu-pharmapaket-soll-medikamentenversorgung-langfristig-sicherstellen
206 https://www.ey.com/en_gr/tax/tax-alerts/ey-law-alert-eu-pharmaceutical-legislation-reform
207 https://www.european-health-data-space.com/

In addition to the legal framework, ethical guidelines also play an important role for life sciences, particularly with regard to medical research and biotechnological developments. At EU level, the European Group on Ethics in Science and New Technologies (EGE) advises the European Commission on ethical issues relating to the life sciences. This includes topics such as the handling of genetic information and biotechnological innovations. All research projects funded by the EU that raise ethical questions must also be subject to an ethical review. In addition to the EU-wide initiatives, many EU countries, including Austria, have national ethics councils that deal with ethical issues at national level and advise the government. The Austrian Bioethics Commission consists of members who are selected on the basis of their expertise and experience in various disciplines.

Recent developments in the EU and Austria as a production and research location

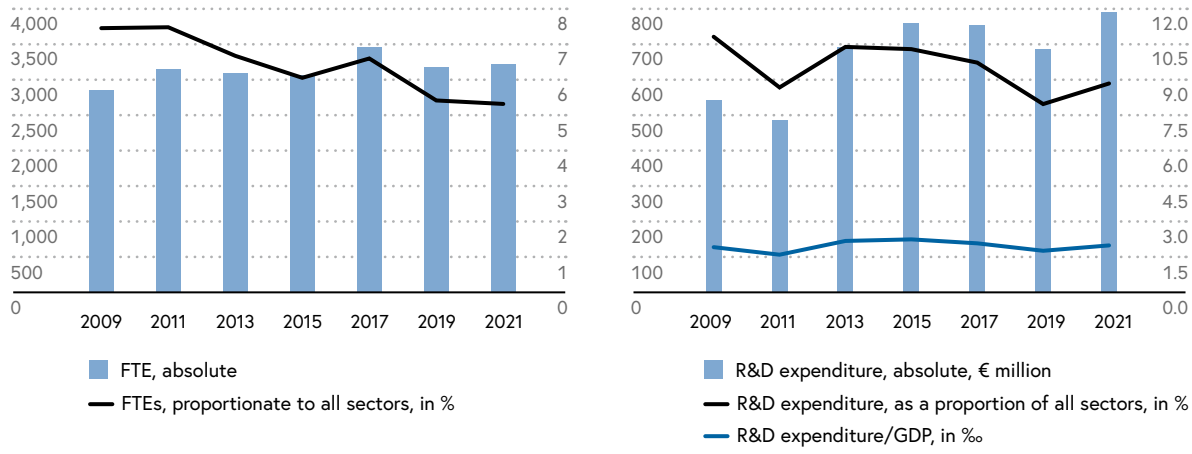
Companies from the USA and increasingly China are competing with European pharmaceutical companies. In terms of both research and production locations, Europe is under pressure to keep up with locations in America and Asia. According to the Austrian Pharmaceutical Industry Association, more pharmaceutical substances have been developed in Europe in recent years than at the beginning of the 2000s, although growth has been even stronger in the USA since then. In terms of certificates for the production of pharmaceutical ingredients, China has already clearly overtaken Europe in 2020. Another observable trend is the geographical concentration of knowledge generation, which is also evident within European biotechnology: 54.5% of all EU patents were registered in just ten regions between 2000 and 2018, 8.60% in North Rhine-Westphalia alone and 8.15% in Bavaria.[208] In a nutshell, "innovations are increasingly consumed globally but produced locally".[209] A regional concentration in the life sciences sector can also be observed within Austria (see chapter 2.4.2).

Securing the last fully integrated penicillin production site in Europe

Due to the outsourcing of process steps in antibiotics production to low-cost countries outside the EU, Europe is increasingly dependent on non-EU countries, mainly China and India, when it comes to the production of antibiotic starting materials and active ingredients. Sandoz GmbH operates the last fully integrated production facility for penicillin at the Kundl site. Due to global cost pressure on the antibiotics market, the relocation of production to Asia was under discussion. This would have meant the loss of autonomous penicillin production in Europe. Against this background, the Federal Government, together with the province of Tyrol, is providing a package of measures of up to €50 million to modernise and consolidate the production facility at the Kundl site, thereby making a significant contribution to the independent security of supply of medicines in Austria and Europe.

208 See European Commission (2022), p. 118.
209 Cf. European Commission (2022), p. 751.

Figure 2-42: Employees (left-hand diagram) and expenditure (right-hand diagram) in the sectors categorised as life sciences in Austria according to absolute values (left-hand axis) and shares (right-hand axis), 2009–2021



Note: The following sectors are taken into account: C21: Manufacture of pharmaceutical products, C32.5: Manufacture of medical and dental equipment and materials, M72.11: Research and development in the field of biotechnology.
Source: R&D surveys 2009, 2011, 2013, 2015, 2017, 2019, 2021; national accounts revision status September 2023.

2.4.2 Austria as a life sciences and pharmaceutical location

In terms of strengthening the life sciences, Austria is confronted with the situation of being directly neighbouring two geographical focal points (Bavaria and Switzerland). On the one hand, Austria can benefit from international interdependencies and spillovers; on the other hand, Austria is competing for investment and human capital. Looking at the development of R&D in Austria over time, the findings are ambivalent. A company will invest where, among other things, skilled personnel can be found; skilled personnel will settle where they find the best conditions, especially attractive employers.

Figure 2-42 shows the development of entrepreneurial R&D in three sectors categorised as life sciences for the period 2009–2021.[210] The graphs illustrate that R&D in these sectors has intensified, but not as much as in other sectors. The number of R&D employees has increased significantly (the number of employees has risen by 12.70% during this period), but total R&D of business enterprises has increased even more and the share of the three sectors considered has fallen by 28.68%. A similar picture emerges for R&D expenditure: R&D expenditure has increased by 46.15% in nominal terms, but has fallen by 18.28% as a proportion of total business R&D. In terms of the share of GDP, expenditure has increased from 1.879‰

210 According to the Austrian classification of economic activities (ÖNACE classification), these are the sectors: C21: Manufacture of pharmaceutical products, C32.5: Manufacture of medical and dental equipment and materials, M72.11: Research and development in the field of biotechnology.

to 1.952‰ over the observation period, although this peaked in 2015 at 2.203 ‰. The life sciences in Austria are therefore showing an upward trend with – in relation to other trends – a lot of upward potential.

2.4.3 Life sciences in Austria's academic and scientific institutions

The Federal Government has initiated the *"Uni-Med-Impuls 2030"* programme to strengthen university medical research and education in Austria. It is based on a 10-point programme for the further development of the Austrian medical universities and the Faculty of Medicine in Linz and the University of Veterinary Medicine Vienna, which make a significant contribution to the overall structure of the science and healthcare system regarding medical research and teaching. Pursued objectives include the expansion of medical study places, making general medicine more attractive and the establishment of new professorships in areas such as infectiology, epidemiology and public health. The medical universities are expected to have €1 billion available for implementation by 2030.[211]

The Medical University of Vienna focuses on five research clusters, which are defined as university-wide priorities, namely i) Immunology/Allergology/Infectiology/Inflammation, ii) Cancer Research/Oncology, iii) Medical Imaging, iv) Medical Neurosciences, and v) Cardiovascular Medicine. To utilise the research potential, the further development of an efficient, modern infrastructure is also essential here. This includes infrastructures in the areas of "omics", data storage and computing power, imaging (high-field MR, Preclinical Imaging Lab/Radiopharmacy) and biobanks (BBMRI), connections to national and international large-scale research infrastructures such as Vienna Biocenter Core Facilities, EuroBioImaging, EMBL, ESRF, as well as Elixir (for "big data" in the life sciences), Vienna Scientific Computing (VSC), Cloud Infrastructure Platform (CLIP) and Vienna Life Science Instruments (VLSI).

To realise further potential, two centres for precision medicine and translational medicine will be established at MedUni Vienna General Hospital Campus. The Eric Kandel Institute for Precision Medicine, which specialises in personalised therapies based on individual genetic dispositions, will be established by 2026. The aim is to develop diagnoses, therapies and preventive measures that are tailored to the individual factors of patients to maximise treatment efficiency and minimise side effects.[212]

Together with the Medical Universities of Graz and Innsbruck, the Medical Faculty in Linz and the University of Veterinary Medicine Vienna, the Medical University of Vienna is establishing the Ignaz Semmelweis Institute for Infection Research (ISI) as a cross-university research institute. In view of the importance of infectiology and public health, the ISI will create professorships in these areas with the aim of strengthening research and scientific cooperation in Austria and opening up innovative areas of research.[213]

The research profile of the Medical University of Innsbruck is in the fields of infection, immunity and transplantation, neurosciences, oncology and genetics-epigenetics-genomics. To strengthen cooperation in the field of life sciences at the location, an institute of excellence in the field of translational life sciences is being planned at the Medical University of Innsbruck and the University of Innsbruck with the involvement of the state of Tyrol. This is to operate as an inter-university organisational unit between the Medical University of Innsbruck and the University of Innsbruck and thus promote areas of potential.

211 https://www.bmbwf.gv.at/Ministerium/Presse/20211201.html
212 https://www.meduniwien.ac.at/web/en/research/eric-kandel-institute-center-for-precision-medicine/
213 https://bauprojekte.meduniwien.ac.at/ignaz-semmelweis-institut/ignaz-semmelweis-institut/

The Medical University of Graz focuses on the research fields of sustainable health research, metabolism and circulation, cancer research, neurosciences as well as microbiome and infection. In addition, BioTechMed-Graz has been established in Graz, an initiative to promote cooperation and networking between the University of Graz, the Medical University of Graz and Graz University of Technology. This co-operation focuses on basic biomedical research, technological developments and medical applications. Biobank Graz, one of the largest of its kind with over 4 million human samples, is a central component of this network. Graz is also home to important competence centres for industrial biotechnology, biomarker research and pharmaceutical technology.

The topic of life sciences is also being strengthened in Salzburg through inter-university cooperation between the University of Salzburg and Paracelsus Medical University as well as in cooperation with the Salzburg regional hospitals. BMBWF-funded projects such as the Austrian NeuroCloud are also making a national contribution to realising the vision of the European Open Science Cloud.

As the projects and plans in the performance agreements show, universities are increasingly cooperating with each other in teaching and research and are also pooling resources in coordination with state and location policy with regard to the establishment and expansion of research infrastructures.

In addition, Austria's universities of applied sciences offer numerous degree programmes in the field of life sciences, including biomedical analysis, which is offered in cities such as Vienna (FH Campus Wien), Wiener Neustadt (FH Wiener Neustadt), Salzburg (Salzburg University of Applied Sciences), Innsbruck (Health University of Applied Sciences Tyrol) and Klagenfurt (Carinthia University of Applied Sciences). The programme content focuses on medical and technological fundamentals, knowledge in the areas of process and quality management as well as aspects of clinical research, creating a good basis for students' future employment in the research and pharmaceutical sector.[214]

Expansion of central non-university players in the life sciences

Austrian Academy of Sciences (OeAW)

450 researchers, 38 ERC grants, three institutes – the Austrian Academy of Sciences is a key player and backbone for the life sciences in Austria. In the life sciences, the Austrian Academy of Sciences has been cultivating the breeding ground for new findings at its research institutes for decades.

Since their establishment in the 2000s, the Institute of Molecular Biotechnology (IMBA), the Research Centre for Molecular Medicine (CeMM) and the Gregor Mendel Institute of Molecular Plant Biology (GMI) have been among the flagships of the life sciences in Austria – and far beyond. This is illustrated not least by the 38 highly endowed grants that the three OeAW institutes have been able to acquire from the European Research Council in highly competitive selection procedures since the awards began in 2007.

Hardly any other institution in the life sciences in Austria has been so successful with the ERC. The OeAW institutes not only attract millions in third-party funding to Austria, they are also important players for completely new ideas that have the potential for ground-breaking findings in basic research. One

214 See Higher Education & Continuing Education Portal Austria, 2024; FH Campus Wien, 2024.

example of this is the research into so-called organoids at IMBA. In just a few years, it has succeeded in cultivating first brain organoids, then blood vessel organoids and recently even heart organoids from pluripotent stem cells. This makes it possible to better understand diseases, test drugs more easily and comprehensively and drastically reduce animal testing. Better therapies for common diseases such as Alzheimer's, diabetes or cardiovascular diseases are also coming a lot closer.

One key to its success is the deep and ever-growing roots of the OeAW Life Sciences in the Austrian research landscape. All sides benefit from academic research partnerships such as those with MedUni Vienna or the partners at the Vienna Biocenter. This enables the Austrian Academy of Sciences to translate its findings from basic research into practical applications more efficiently and comprehensively. CeMM pursues the research strategy of the "from bed to bench and back to bed" principle: patients form the starting point for the scientists' considerations, and the knowledge gained then flows back to the patients in the form of innovative diagnostic and therapeutic procedures. This works best in a university-clinical environment, such as at the Medical University of Vienna-General Hospital Campus in Vienna.

This also benefits the partners of the OeAW institutes, who can utilise the latest knowledge from the front line of research for clinical and pharmaceutical applications. Researchers at the Austrian Academy of Sciences and its co-operation partners also regularly publish their jointly achieved progress in high-ranking journals such as Nature, Science or Cell. Last but not least, basic research at the Austrian Academy of Sciences enables universities to collaborate with highly skilled scientists in teaching to promote the next generation of researchers in the best possible way.

The newly founded Cori Institute for Metabolic Research of the Austrian Academy of Sciences in Graz also plans to follow this successful path – excellent research, optimally networked. Like its sister institutes in Vienna, it is embedded in the research landscape of the Styrian capital and, together with the University of Graz, the Medical University of Graz and Graz University of Technology, will pool expertise for a completely new understanding of highly complex metabolic processes – an area that is becoming increasingly relevant, particularly in connection with the development of diabetes, cardiovascular diseases and cancer. With its combination of experimental and clinical research with mathematical modelling, the Cori Institute already has a unique selling point in the European research landscape.

These efforts are also being recognised by Austria's economy and society. Ten spin-offs have emerged from the three OeAW Life Sciences Institutes alone. They all bring curiosity-driven basic research that is orientated towards the needs of patients into commercial application, thereby creating jobs, added value and prosperity. One successful example is the biotechnology company Proxygen, a spin-off of CeMM. The US pharmaceutical giant Merck is planning to invest up to €2.55 billion in this promising company, thereby strengthening Austria as a business location.

Institute of Science and Technology Austria (ISTA)

While research at ISTA is interdisciplinary from the outset, 25 of the more than 80 professors and their research groups can be categorised as life sciences. They work at the interface of theory and experiment and use multidisciplinary, quantitative approaches in molecular and developmental cell biology, structural biology and biochemistry, genomics, evolutionary biology, ecology and the neurosciences.

For example, research by the Cremer group shows how ants use mutual care and a kind of "triage" to maintain the collective health of the colony, and how fungi, on the other hand, reduce their recognition characteristics to "hide" from the ants' social health measures.

Several study highlights also provide new insights into the function of the brain, such as:

- For example, a developing brain needs the right nutrients at the right time. The Novarino group showed that the lack of large neutral amino acids (LNAAs) in mice in a critical phase after birth leads to a reduction in brain size and to behavioural changes similar to those observed in autism spectrum disorders.
- To gain a better insight into the brain, the Danzl group presented technological advances in brain tissue imaging developed in collaboration with several other research groups at ISTA (Bickel, Jonas, Novarino, Siegert) and the institute's Scientific Service Units. These advances enable, among other things, higher resolution images of living brain tissue.
- Deposits known as amyloid fibrils are frequently found in the brains of Alzheimer's patients. Using NMR spectroscopy, the Schanda group was able to analyse the structure and movement of the fibrils: they consist of a very rigid core and fast-moving side chains on the outside.

To fit into the cell nucleus, DNA, the carrier of the genetic information of every organism, is tightly packed into chromosomes. Despite their high density, chromosomes exhibit dynamic movements. Until now, only a static view was possible, but not how the system develops in real time. A NOMIS fellow and a team of scientists from Princeton University have succeeded in visualising the movement of chromosomes.

In order for immune cells to get to where they are needed, for example to fight an infection, they have to move together through complex environments. Sixt and Hannezo's groups have shown that the immune cells use self-generated gradients to find their way – a biological equivalent of scattering breadcrumbs.

Supporting the translation of scientific findings into medical and technical progress is an important concern for the institute. To this end, an innovation programme has been set up in recent years as part of xista, which includes translational fellowships, its own buildings with laboratory equipment and a venture capital fund. For example, joint research on transmembrane proteins (solute carriers) between ISTA and CeMM was spun off into a new company (Solgate GmbH) and developments in the field of neurodevelopmental disorders by the Novarino Group were transferred to the company Neurolentech. To date, the venture capital fund xista science ventures has financed a total of 20 companies, 13 of them in the life sciences, and thus plays a leading role in the financing of life sciences start-ups in Austria.

It should also be emphasised that ISTA alumni hold top positions at various renowned research institutions, such as the University of Oxford, the European Molecular Biology Laboratory (EMBL) in Heidelberg or the Ludwig Maximilian University of Munich, or that they have successfully founded companies, such as a former postdoc of the Barton Group. His "Ribbon Biolabs" use innovative technologies to produce synthetic DNA for biotechnological and pharmaceutical research.

Ludwig Boltzmann Society (LBG)

In 2020, the Ludwig Boltzmann Society underwent a reorganisation, which is why new Ludwig Boltzmann Institutes (LBI) are now being founded exclusively in the field of medicine and health sciences. Three new LBIs in this field were selected in 2023 as part of the 2022 call; the LBI in Nanovesicular Precision Medicine and in Network Medicine started operations on 1 January 2024, and another in the field of Science Mediation and Pandemic Preparedness will start in mid-2025.

Since 2022, the LBG has also been assigned the Clinical Research Groups (KFG) programme with the aim of enabling Investigator Driven Clinical Studies on a scale necessary for clinical research. In the first round of calls for proposals in 2022/2023, three KFGs were funded with a total volume of €24 million. The second call is planned for 2024/2025.

Vienna BioCenter

The Vienna BioCenter is a life sciences cluster that brings together research institutions, biotech companies and educational establishments. The aim is to conduct cutting-edge research in structural biology, cell biology and evolutionary biology. Research at the Vienna BioCenter is both basic and disease-oriented. The Vienna BioCenter covers a wide range of research fields, including molecular and cellular biology, biochemistry and genomics. Innovative projects are carried out, ranging from basic research to applied science, with the aim of gaining new insights in the life sciences and developing solutions to health challenges. Numerous research institutes and biotechnology companies have settled here, including the Research Institute of Molecular Pathology (IMP), the Max F. Perutz Laboratories (a joint venture between the University of Vienna and the Medical University of Vienna), the Institute of Molecular Biotechnology and the Gregor Mendel Institute. The campus is home to around 1,400 scientists and 700 students from 40 nations.

Austrian Institute of Technology (AIT)

In addition, the Austrian Institute of Technology is an important player in non-university research, particularly with regard to future technologies and infrastructures. The Centre for Health & Bioresources, which focuses on the development of new technologies and methods for the health and life sciences, is recognised in the field of life sciences. This includes, in particular, the research and application of nano and sensor technologies, the integration of systemic approaches and the use of "omics" technologies in molecular biology. These activities aim to improve the early detection of diseases, support healthy ageing and promote the sustainable use of biological resources in agriculture and environmental protection.[215]

Other key players

As far as application-oriented research in Austria is concerned, the Competence Centres for Excellent Technologies (COMET) should also be mentioned. COMET centres are jointly funded by the BMK, BMAW, the participating regional governments, industrial partners and research organisations. The aim is to drive forward research and innovation on certain key topics relevant to the future, whereby the following centres have been established in the life sciences sector:

- The Austrian Center for Medical Innovation and Technology (ACMIT) specialises in the development of mechatronic systems for minimally invasive surgical procedures and image-guided interventions. By combining research and development, prototyping and contract manufacturing of medical devices, ACMIT strives to make medical treatments safer, less invasive and more efficient. It emphasises the integration of new technologies into everyday clinical practice and collaboration with over 60 partners from industry and science to promote innovation from the idea to clinical application.[216]
- The Austrian Centre of Industrial Biotechnology (acib) is a COMET centre for industrial biotechnology. The centre's fields of research include biocatalysis, enzyme technologies and protein engineering, synthetic biology, bioprocess technologies, bioinformatics and simulation as well as bioeconomy technologies. The aim of the centre is to develop new ideas, products, services or business models while supporting spin-offs and start-ups.[217]

215 https://www.ait.ac.at/en/about-the-ait/center/center-for-health-bioresources
216 https://acmit.at/
217 https://acib.at/

- The Research Center Pharmaceutical Engineering (RCPE) is a leading centre for pharmaceutical process engineering that supports innovative drug development and manufacturing. With interdisciplinary expertise in simulation, AI, materials science, process design and quality control, the RCPE offers customised, scientific solutions. It is a non-profit, private company supported by Graz University of Technology, the University of Graz and Joanneum Research GmbH.[218]
- The VASCage is a research and development centre for clinical stroke research that focuses on the prevention, diagnosis, treatment and rehabilitation of strokes. VASCage works closely with several large hospitals, has broad access to patients and its own clinical trial platform. The Medical University of Innsbruck and the University of Innsbruck are involved.[219]
- The Austrian Competence Centre for Feed and Food Quality, Safety & Innovation (FFoQSI), located in Tulln, is a centre for research and innovation that focuses on the safety and quality of feed and food. Based on innovative technologies, FFoQSI develops new strategies and processes in the fields of microbiology, physico-chemical analysis, information technology and bioanalysis, which are applied to critical process steps along the food and feed value chains.[220]

Competence Centre Climate and Health

The Climate and Health Competence Centre[221] at the Austrian National Public Health Institute combines interdisciplinary expertise at the interfaces of climate protection, climate change adaptation, health promotion and healthcare. Since the beginning of January 2024, the Competence Centre has been managed in two departments: the Climate Neutrality and Sustainable Transformation Department and the Climate Resilience and One Health Department. The Climate Neutrality and Sustainable Transformation department develops strategies, innovative projects and measures that support the healthcare sector in becoming climate neutral and systematically integrating climate protection and health promotion into everyday care, such as the "Climate-friendly healthcare facility counselling" project, the training course for climate managers in healthcare facilities, the strategy for climate-neutral healthcare and the initiation of the "Climate-friendly healthcare facilities" best practice award. In its projects, the Climate Resilience and One Health department addresses – in terms of climate resilience – the health effects of climate change and the resulting need for adaptation in the healthcare sector and – in terms of the One Health approach – climate-relevant additional benefits of health promotion in the areas of nutrition systems, housing, urban planning and active mobility, taking into account aspects of justice.

EIT Health Austria

EIT Health Austria, based in Vienna, is one of the nine European Knowledge and Innovation Communities, which has been offering extensive support services for regional innovation players since 2023. A newly established local team supports start-ups and other innovators in the development of cutting-edge technologies for European citizens. Advice is offered on available programmes, assistance with applications and feedback on individual project proposals. In addition, the new centre manages the HealthGateway.Austria project funded by the FFG, which aims to increase the innovative strength of Austrian life sciences companies

218 https://www.rcpe.at/en/en_home/
219 https://vascage.at/
220 https://www.ffoqsi.at/index.php/en-us/
221 https://www.goeg.at/english

and organisations, particularly SMEs and start-ups, by integrating them more closely into the EIT Health network and activities. The umbrella organisation EIT Health, based in Munich, connects 130 partner organisations from different countries and sectors such as research, education and business.[222]

The life sciences business enterprise sector in Austria

The life sciences sector is a key component of the Austrian economy. According to the Life Science Report Austria 2021, a total of 982 companies were active in the life sciences sector in Austria in 2020, which includes biotechnology, pharmaceuticals and medical technology. These companies generated a total turnover of €25.1 billion and provided jobs for over 60,000 people. The biotechnology and pharmaceutical sector alone contributed €16.03 billion to turnover, while medical technology generated €9.03 billion.

Table 2-9 shows the development of the life sciences sector in Austria based on selected key figures. There has been significant growth since 2012 in terms of the number of companies, employees and turnover.

The life sciences sector in Austria can be further subdivided into the biotechnology and pharmaceutical sector as well as the medical device industry and its associated suppliers, distributors and service companies.

In the biotechnology and pharmaceuticals sector, most companies are dedicated biotechnology companies. This sector has a small-scale structure, with no large companies and a share of micro-enterprises (fewer than 10 employees) of around 67%. In terms of employees and turnover, the largest share is accounted for by so-called other biotechnology companies, i. e. companies that carry out less than 70% of their business activities in the life sciences sector. These comprise a significantly higher share of large companies (around 25%) and medium-sized companies (around 47%).

The biotechnology and pharmaceutical sector grew overall between 2014 and 2020. In terms of turnover, particularly high growth was observed among (dedicated and other) biotechnology companies and pharmaceutical companies. A decline in turnover was only recorded in the area of sales and distribution companies.

In the medical device sector, suppliers and also sales and distribution companies play a major role, as can be seen from the illustrations.

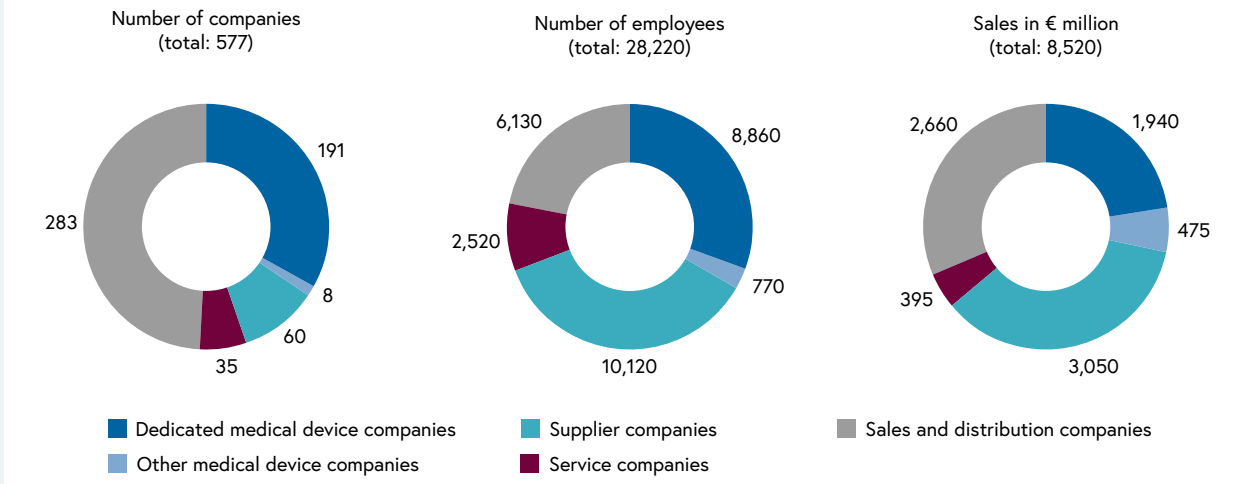
Table 2-9: Overview of the business enterprise sector in life sciences in Austria

	2012	2014	2017	2020
Number of companies	723	823	917	982
Number of employees	50,180	51,660	55,480	60,440
Turnover	€17.73 billion	€19.11 billion	€22.4 billion	€25.1 billion

Source: Life Science Report Austria, 2021.

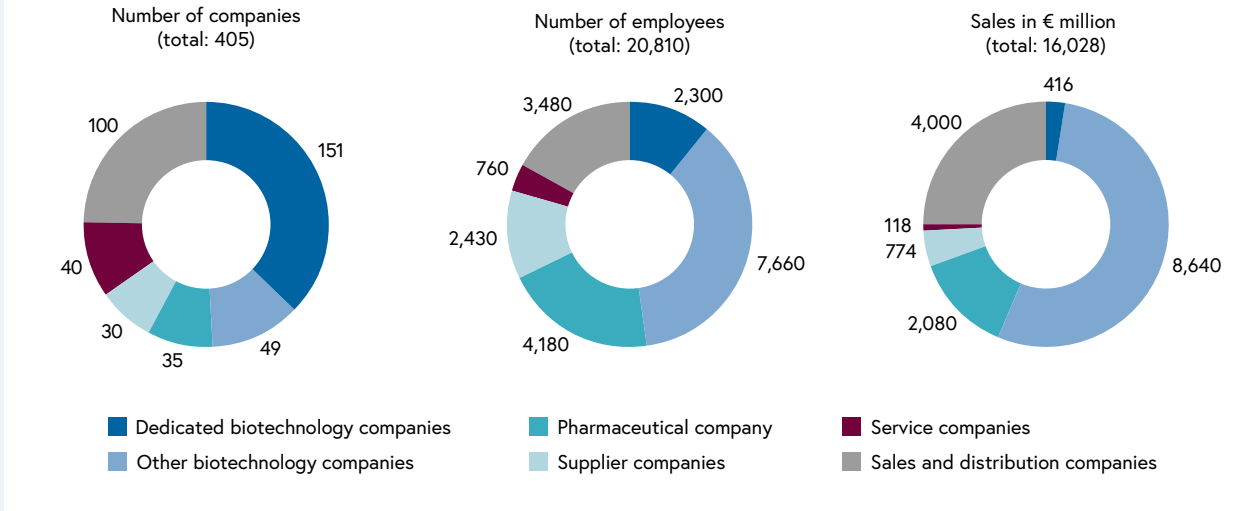
222 https://eithealth.eu/in-your-region/austria/

Figure 2-44: Number of companies, employees and turnover (in € million) in the medical devices sector in Austria, 2020



Note: Number of employees (in headcount) and turnover at other medical device companies in relation to the medical device sector.
Source: Life Science Report Austria 2021; illustration: Austrian Institute for SME Research.

Figure 2-43: Number of companies, employees and turnover (in € million) in the biotechnology and pharmaceuticals sector in Austria, 2020



Note: Number of employees (in headcount) at the other biotechnology companies in relation to the biotechnology sector. Other biotechnology companies comprise the group of companies that use biotechnological techniques to produce goods or services, but also have non-biotechnological business areas. Source: Life Science Report Austria 2021; illustration: Austrian Institute for SME Research.

Table 2-10: Change in the number of companies, employees and turnover in the biotechnology and pharmaceutical sector in Austria, comparison 2014 and 2020 (in %)

	Number of companies	Number of employees	Turnover in € million
Dedicated biotechnology companies	+30	+39	+110
Other biotechnology companies	+81	+28	+95
Pharmaceutical company	+9	+35	+89
Supplier company	+25	+37	+28
Service company	+54	-13	+15
Sales and distribution company	-10	-35	-23
Total	+21	+11	+38

Source: Austrian Life Science Report 2021; graphic: Austrian Institute for SME Research.

This sector also recorded positive development overall from 2014–2020, with high growth in the number of companies, particularly among dedicated medical device and service companies. Although the growth in employees and turnover is less pronounced than for biotechnology and pharmaceutical companies, it is still in the double-digit range (with the exception of other medical device companies and suppliers; see Table 2-11).

Successful life sciences start-ups and companies have been repeatedly acquired by international players in recent years, such as Dutalys in 2014 by the Swiss pharmaceutical group Roche for around $590 million, the Innsbruck-based biotechnology company ViraTherapeutics in 2018 by Boehringer Ingelheim for €210 million and the start-up Allcyte GmbH in 2021 by the UK company Exscientia plc for around $60 million.[223]

Research premium as a locational advantage

Tax incentives for research, in the form of the research premium of 14% in Austria, are particularly decisive for the location in international competition. As an analysis of the reports completed by the FFG shows, the respective share of the reports has remained relatively constant over the last five years, but the amount of the premium applied for has increased – especially in the pharmaceutical, biotechnology and life sciences sectors.

Regional distribution

As the regional distribution of life sciences players shows, the life sciences sector in Austria is rather strongly concentrated in Vienna, both in terms of the number of companies, employees and turnover. Based on the key figures in Figure 2-45, Vienna accounts for around half of the Austrian life sciences sector.

The Austrian federal states Burgenland, Carinthia and Vorarlberg only account for a very small proportion of life sciences activities in Austria. In the other federal states, the life sciences have a specific structure: as can be seen in the key figures presented above, Upper Austria has a relatively strong economic orientation (as can be seen from the high proportion of employees in life sciences companies and the

223 https://www.sn.at/wirtschaft/oesterreich/pharmakonzern-boehringer-ingelheim-uebernimmt-innsbrucker-biotech-company-39970249; https://invivo.citeline.com/IV148661/In-Austrian-Life-Sciences-Sector-Research-Is-King

Table 2-11: Change in the number of companies, employees and turnover in the medical devices sector in Austria, comparison 2014 and 2020 (in %)

	Number of companies	Number of employees	Turnover in € million
Dedicated medical device companies	+54	+11	+10
Other medical device companies	0	-37	-53
Supplier companies	+7	0	+22
Service companies	+59	+11	+25
Sales and distribution companies	+2	+10	+14
Total	+18	+5	+8

Source: Life Science Report Austria 2021; graphic: Austrian Institute for SME Research.

Table 2-12: Number of completed research premium appraisals in all sectors and share of life sciences, including the shares in medicine and healthcare, biotechnology and pharmaceuticals, 2019–2023

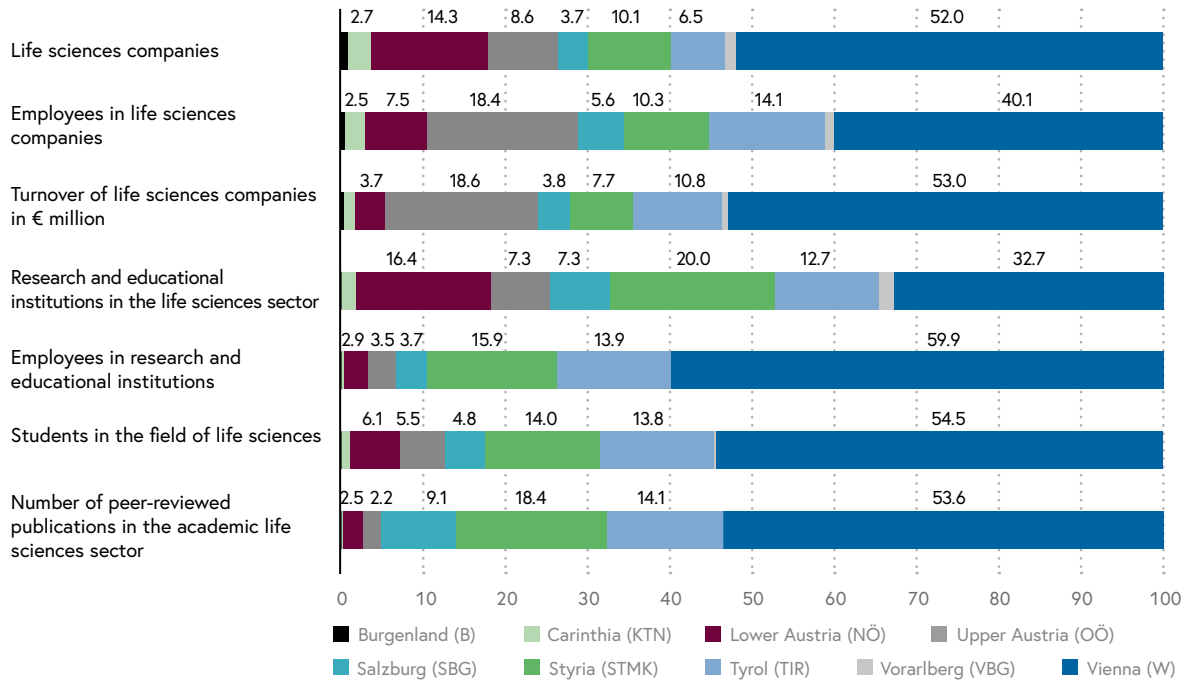
Calendar year	Total		Share of life sciences		Medicine, Health		Biotechnology		Pharmacy	
	completed expert appraisals	Premium assessed	Share % Expert appraisals	Premium applied for	Share % Expert appraisals	Premium applied for	Share % Expert appraisals	Premium applied for	Share % Expert appraisals	Premium applied for
2019	2722	850,732,275	10.3%	107,673,676	6.2%	66,974,890	3.0%	27,319,616	1.1%	13,379,170
2020	2719	1,145,212,850	10.3%	241,612,655	6.0%	80,744,831	3.2%	83,573,199	1.1%	77,294,625
2021	2624	960,449,680	11.1%	147,534,325	6.4%	68,822,784	3.3%	43,611,454	1.4%	35,100,087
2022	2501	1,074,053,471	11.6%	175,434,834	6.7%	60,531,312	3.6%	66,213,690	1.3%	48,689,832
2023	2641	1,293,205,563	11.6%	235,493,014	6.6%	89,653,889	3.7%	82,590,361	1.3%	63,248,764

Source: FFG.

turnover of life sciences companies). In turn, Styria and Tyrol have high shares in research and education (measured by the number of employees in research and educational institutions, students and publications). Lower Austria focuses on both companies and research and educational institutions.

To strengthen the life sciences location regionally, relevant clusters and network initiatives have been established in the federal states. Clusters and cluster platforms primarily pursue the task of networking players in science and industry, setting thematic priorities, developing the strengths of the region in a targeted manner and increasing the international visibility of the location through a joint presence. The initiatives of the individual federal states include the following:

Figure 2-45: Percentage shares of the regional governments in key figures of the life sciences sector (in %), 2020



Note: Provinces shown from left to right: Burgenland, Carinthia, Lower Austria, Upper Austria, Salzburg, Styria, Tyrol, Vorarlberg, Vienna. Employees (headcount) refer to the entire company.
Source: Life Science Report Austria 2021.

LISAvienna, the cluster platform for life sciences in Vienna, focuses on supporting innovative companies, particularly in the fields of biotechnology, pharmaceuticals, medical products and digital health.[224]

HUMAN.TECHNOLOGY.STYRIA is a cluster with around 150 Styrian companies working in the field of human health. The focus is on medical technology, pharmaceuticals and biotechnology, health and sustainability and digitalisation.[225]

The Life Sciences Tirol cluster comprises a network of around 100 companies in the fields of biotechnology, pharmaceuticals, medical technology, services, research and education.[226]

The Medical Technology Cluster is a platform in Upper Austria focusing on networking, cooperation and innovation in the medical technology sector. The cluster focuses on topics such as medical engineering, digital health, medical materials, regulatory affairs and the MedTech incubator.[227]

224 https://www.lisavienna.at/
225 https://www.humantechnology.at/en/
226 https://www.standort-tirol.at/cluster-partners/tyrolean-clusters/cluster-life-sciences-tirol?switchLocale=en_US#focus
227 https://www.medizintechnik-cluster.at/en/

Ecoplus focuses on healthcare technologies and is therefore a contact point for companies and research institutions in the healthcare sector that develop solutions for healthcare facilities in Lower Austria, for example.[228]

Salzburg is implementing a Life Sciences Masterplan as part of its science and innovation strategy to sustainably develop excellence in research and expertise in the life sciences. Oncology and immunology, neurosciences and regenerative medicine have been defined as future fields. Innovation Salzburg is responsible for coordinating the life sciences thematic focus.[229]

Life Science Austria (LISA), operated by the aws on behalf of the BMAW, acts as an umbrella organisation for the various life sciences clusters in Austria. LISA is committed to the development, growth and prosperity of the Austrian life sciences industries and works to raise the profile of the Austrian life sciences sector internationally. LISA's key activities include the organisation of joint international trade fair appearances, delegation trips, fact-finding missions and other international events. In addition, LISA focuses on public relations work to strengthen Austria's position in this field.[230]

2.4.4 Promoting excellence, basic research, applied research, translation and innovation

National funding programmes and initiatives

Various instruments are available to the public sector to support research and innovation activities in the life sciences and to prevent or counteract market or system failure. The activities of the most important research funding actors at federal level are summarised below, focusing on supply-side support services, primarily on direct funding of R&D&I projects through grants. However, the institutions' services comprise a wider array of initiatives (e. g. for networking).

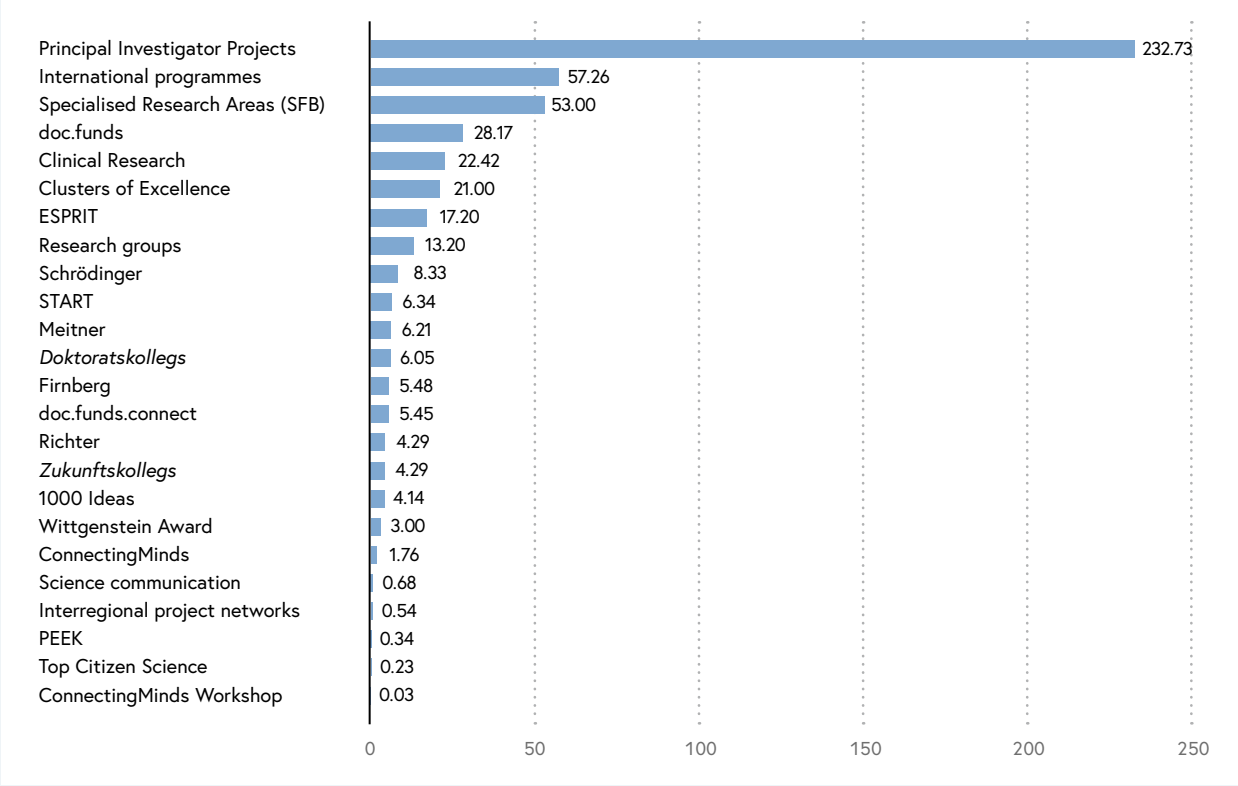
Austrian Science Fund (FWF)

The Austrian Science Fund plays a central role in promoting excellent basic research and supports research activities in the life sciences in a variety of thematically open funding programmes and specific programmes such as the "Clinical Research" funding programme.

Across all programmes and initiatives, a total of around €502 million in funding was approved in the field of life sciences between 2019 and 2023. The largest share of this was allocated to thematically open individual projects (around 46%). The proportion of projects within the respective programmes that can be allocated to the life sciences sector varies depending on the programme, as shown in Figure 2-46. Within the individual projects, for example, around 40% of funding in the period 2019–2023 can be allocated to the life sciences, while the proportion is highest in the "Clinical Research" programme at around 94%. Across the entire programme portfolio, around 37% of the total funding amount was allocated to the life sciences.

228 https://www.ecoplus.at/interessiert-an/cluster-plattformen/plattform-fuer-gesundheitstechnologie/
229 https://www.salzburg.gv.at/forschung_/Documents/Wissenschaftsstrategie-Sbg.2030.pdf
230 Cf. aws and Technopolis (2023).

Figure 2-46: Distribution of funding among life sciences projects in the FWF programme portfolio (in € million), 2019–2023



Source: FWF.

It should be emphasised that the excellence initiative "excellent=austria", which will fund five Clusters of Excellence at eleven locations from summer 2023, will promote cutting-edge research on future topics through cooperation. Among those funded in the first call is a Cluster of Excellence in the life sciences, "Microbiomes Drive Planetary Health", with the aim of understanding the microbiomes for the health of our planet. The cluster is headed by the University of Vienna, with cooperation partners including the Austrian Academy of Sciences (CeMM), the Vienna University of Technology, the Medical University of Graz, the University of Linz, the Institute of Science and Technology Austria (ISTA) and the Austrian Institute of Technology (AIT).

As part of the Emerging Fields programme, the excellence initiative also supports research teams that carry out pioneering work in basic research and pursue particularly innovative, original or high-risk ideas. These are funded with €3–6 million over a period of five years.[231] Funding will start in 2024; three of the five currently funded projects in the Emerging Fields programme are assigned to the life sciences.[232]

231 https://www.fwf.ac.at/en/funding/portfolio/excellentaustria/emerging-fields
232 https://excellentaustria.fwf.ac.at/

Table 2-13: Overview of the projects and organisations funded as part of the FWF's Corona acute funding programme*

	Number of projects	Funding amount in €
University of Vienna	10	3,261,746
Medical University of Vienna	6	2,382,893
Medical University of Innsbruck	5	1,640,862
University of Graz	3	929,679
Johannes Kepler University Linz	2	554,526
18 other organisations once each	18	6,023,686

* Corona acute funding was approved in the period May 2020–March 2022. Source: FWF.

In addition to the programmes described above, the FWF also awarded SARS-CoV-2 acute funding totalling around €14.8 million. A total of 44 projects were funded, most of them at the University of Vienna (10), the Medical University of Vienna (6) and the Medical University of Innsbruck (5).

The "Clinical Research" Programme (KLIF) is thematically focused on funding academically driven clinical research projects. Over the past five years, 72 projects with a total funding volume of €23.8 million have been funded as part of the KLIF programme.

Box 2-1: Success stories from the FWF's life sciences funding programme

In the project "An oncolytic rhabdovirus for the treatment of melanoma", two innovative approaches to cancer therapy were combined, resulting in significantly improved cure rates for malignant melanoma in animal models. The use of a cancer-killing virus (VSV-GP) was combined with cancer vaccination using tumour antigen-presented dendritic cells (DC). In this project, it was possible to demonstrate the significant increase in efficacy of both treatment methods in combination and also to explain the mechanisms behind them. The project thus made an important contribution to the optimisation of combination therapies in the currently promising field of cancer immunotherapy so that they can be used more effectively in patients in the future.

In the project "Inherited predispositions to myeloproliferative neoplasia", the genetic causes of cancer were investigated using myeloproliferative neoplasia (MPN), a blood cancer that occurs more frequently in older people. With the help of modern genetics and a unique collection of DNA sample material, gene mutations were identified that cause MPN or increase the probability of developing MPN. The project identified genetic defects in both familial and sporadic MPN cases and analysed the type of mutation and its distribution in familial and sporadic cases. Due to demographic change and an ageing society, cases of MPN are expected to occur more frequently in the future and targeted diagnoses will become more important.

As part of the project "Tumour progression and therapy-associated changes in glioblastoma", the dynamics and evolution of glioblastoma and the factors that contribute to resistance to therapy and tumour recurrence were investigated. Longitudinal tumour tissue samples were compiled and analysed using interdisciplinary methods. Genome-wide DNA sequencing was combined with clinical data, digital pathology and neuroimaging. Epigenetic factors, in particular DNA methylation, were found to contribute significantly to the spatio-temporal heterogeneity of glioblastoma. In addition, recurrent changes in certain signalling pathways indicated potential therapeutic intervention points for a subgroup of patients. The analysis also opened up the prospect of deriving conclusions about a number of other clinically relevant molecular markers from a single study, potentially eliminating the need for a number of costly individual tests.

The project "A short chemoenzymatic total synthesis of (+)-Scandin" investigated strategies for the transformation of organic compounds using examples in nature and transferred these to the laboratory to artificially produce molecules for certain biological activities. Among other things, a sequence of 16 consecutive chemical reactions was found that enabled the artificial production of the compound casuarinin H for the first time. Casuarinin H serves as a direct precursor for the potential Alzheimer's drug huperzine A, although its production from natural resources is severely restricted. The knowledge gained can therefore be used in future as a basis for the development of new chemical and/or biotechnological production processes and thus contribute to better availability of Alzheimer's drugs such as huperzine A.

In the project "TT virus quantification for the prediction of organ rejection after kidney transplantation", a new innovative instrument, the so-called "immunometer", was developed. This makes it possible to measure the immune activity of kidney transplant recipients to adjust medication more precisely. Our research focused on the Torque Teno virus (TT virus), which occurs naturally in the blood and does not cause disease. The results indicate that low TT virus concentrations in the blood correlate with a strong immune system and an increased risk of organ rejection, while high concentrations indicate a weakened immune system and an increased risk of infection. By determining specific TT virus concentrations, physicians can better assess the risk of rejection and infection and enable individualised treatment, which could improve the success rate of transplants and the long-term prognosis of patients. In addition, low TT virus levels indicate that immunosuppressants are not being taken correctly, which allows medication to be corrected at an early stage.

The project "Training of intramuscular connective tissue in older age" aimed to identify forms of training that can stimulate the connective tissue within the muscles and promote cell regeneration. A two-phase study found that jumping training and myofascial relaxation using the Black Roll were the most effective ways of activating the connective tissue. These findings were integrated into a four-month innovative training programme that combined traditional strength training with special exercises to stimulate the connective tissue. The results showed that this training programme was able to significantly increase muscle strength and also led to structural improvements and increases in muscle mass compared to traditional strength training. Further research is needed to evaluate the long-term effects on tissue structure and composition.

Source: FWF.

The Vienna Science, Research and Technology Fund (WWTF)

The Vienna Science and Technology Fund plays an important role in the promotion of basic research with medium-term commercialisation prospects in the Viennese research landscape. The life sciences focus was established in 2003, making it the fund's longest-running programme. The WWTF's fundamental aim is to promote interdisciplinary and collaborative research. Calls are used to set thematic priorities and address topics such as "Artificial Intelligence/Machine Learning", "Precision Medicine", "Imaging" or "Public Health" in the life sciences.

The WWTF uses three funding instruments: project funding, person-oriented funding and supplementary instruments for smaller projects, including in the translational area or for data generation (Covid, ME/CFS). Between 2019 and 2023, there were a total of five calls for projects in the life sciences area with 374 submissions, of which 39 projects were funded with €26 million. In addition, four junior research groups were funded with a total of €6.3 million during this period. In total, the WWTF invested around €33 million in life sciences research in Vienna between 2019 and 2023. A call for proposals on synthetic biology is currently underway for 2024, for which €6.5 million will be provided.

The funded projects include successes such as the project "Dynamic nanoscale reconstruction of endocytosis with high-throughput superresolution microscopy and machine-learning" (Max Perutz Labs). It combines state-of-the-art microscopy with machine learning methods to understand endocytosis – the process by which many substances such as nutrients, pathogens and drugs enter the cell. Machine learning methods are being developed to assemble the large number of microscopy snapshots into a multi-coloured movie of this fundamental cellular process.

The clinically orientated life sciences project "Validation of a liquid biopsy based molecular diagnostic toolkit for pediatric sarcomas" (CCRI) aims to develop minimally invasive methods for diagnosing and monitoring the treatment of Ewing's sarcoma, a type of bone cancer in children. Instead of tumour samples, new bioinformatic methods are used to analyse small amounts of tumour DNA circulating freely in the blood. This allows the development of the cancer to be better understood and personalised treatment strategies to be developed.

Christian Doppler Research Association (CDG)

With its funded CD Laboratories and JR Centres, the Christian Doppler Research Association offers internationally recognised instruments for cooperation between science and industry. These laboratories and centres concentrate on application-oriented basic research, often focusing on specific challenges and innovation needs that originate directly from industrial partners. Companies participate financially in the laboratories/centres to the extent of the funding. A CD Laboratory or JR Centre can be set up for any topic, but certain thematic clusters have formed over time. For example, there is a "Medicine" cluster with currently 19 active research units and a "Life Sciences and Environment" cluster with 13 active research units. This means that around a quarter of the laboratories/centres are active in the field of life sciences.[233] The focus of the CD Laboratories and JR Centres is diverse and includes biotechnological research and development and drug development. The more medically orientated facilities focus on the development of new diagnostic procedures and therapeutic approaches.

233 As of 1 April 2024, 110 CD Laboratories and 18 JR Centres are active.

Box 2-2: Success stories from the CDG's life sciences funding programme

CD Laboratory for Applied Metabolomics at the Medical University of Vienna with company partner Siemens Medical Solutions USA, Inc.
New, targeted therapies for the treatment of tumours that attack gene mutations or specific receptors require ever better molecular tumour characterisation. The biology of tumour cells is constantly changing due to mutations, so a non-invasive diagnostic method that can precisely map these changes is of eminent importance. In the CD Laboratory, positron emission tomography (PET) is used in combination with fine-tissue tumour analysis to identify the respective metabolic "fingerprint" for relevant genetic changes in the tumour. The AI-based approach is also used to identify prognostic markers and potential therapeutic targets for personalised treatment. The result should be a non-invasive "in vivo pathology" that leads to an individualised therapy algorithm and can continuously monitor its success.

CD Laboratory for liquid biopsies for the early detection of cancer at the Medical University of Graz with company partner PreAnalytiX GmbH
Liquid biopsy is the diagnostic detection of tumour cells or tumour DNA in blood and other body fluids (circulating tumour DNA, ctDNA). Liquid biopsy is used in a variety of ways in cancer treatment and is used for ongoing monitoring of therapy response or to detect resistance in the event of therapy failure and is considered a promising approach for the early detection of cancer. Thanks to modern high-resolution methods, it is now possible to use ctDNA as a diagnostic, predictive or prognostic biomarker. Nevertheless, there are a number of open questions regarding the standardisation of workflows or the biology of cell-free DNA (cfDNA) in general, which are being researched in this CD Laboratory.

CD Laboratory for Knowledge-based Production of Gene Therapy Vectors at the University of Natural Resources and Life Sciences, Vienna with company partner Boehringer Ingelheim International GmbH
Gene therapy can be used to treat or even cure genetically caused diseases. Adenovirus-associated viruses (AAVs) are often used to introduce DNA into cells. However, the modified viral DNA is not incorporated into the human genome, but exists independently in the cells. This CD Laboratory is researching more efficient process development and production of recombinant AAVs to improve the quality and reduce the costs of gene therapies.

CD Laboratory for Microinvasive Cardiac Surgery at the Medical University of Vienna with company partner LSI SOLUTIONS INC.
The CD Laboratory researches innovative techniques for the minimally invasive treatment of heart disease. In particular, it focuses on the construction of an improved heart valve prosthesis from the body's own tissue, microinvasive heart valve repair, microinvasive bypass surgery and the development of specific instruments for catheter-based high-end procedures. The aim is to perform cardiac procedures more gently and precisely to speed up patient recovery and minimise complications.

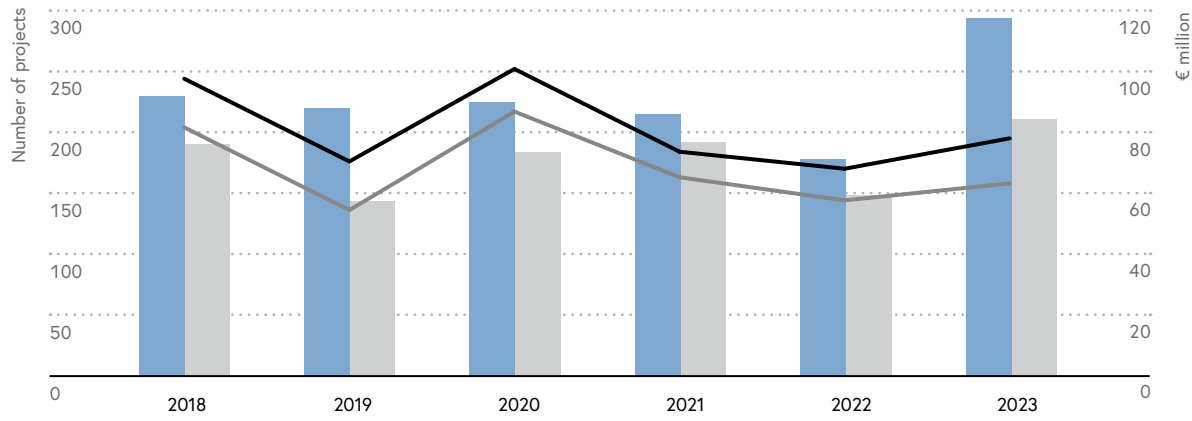
Source: CDG.

wings4innovation GmbH

Founded in 2019 as a subsidiary of the international fund KHAN-1 (in which the BMAW participated as an investor via aws) and based on preliminary work by the Thematic Knowledge Transfer Centre Life Sciences, wings4innovation GmbH (w4i)[234] plays a supporting role in translation. W4i is a national competence centre that is operationally managed by KHAN-1 and supports the fund's proposal process by screening project ideas in Austria, selecting promising projects and

234 https://w4i.org/

Figure 2-47: Funding in the area of life sciences from the FFG, 2018–2023



Source: FFG.

preparing them for further industrial development. By the end of 2023, w4i had recruited and evaluated more than 120 project ideas and invested in ten projects. These projects are currently being further developed according to industry standards with the goal of commercialisation through licensing or spin-offs when the fund is closed.

A joint procedure has been developed for cooperation between the project sponsors and the fund, with the participation of 20 Austrian universities and non-university research organisations active in the field of life sciences. This has created a national project portfolio for commercially viable drug development projects. The original IP holders (scientific organisations) are involved in the further development, transferring industrial know-how to the universities, and in the commercialisation.

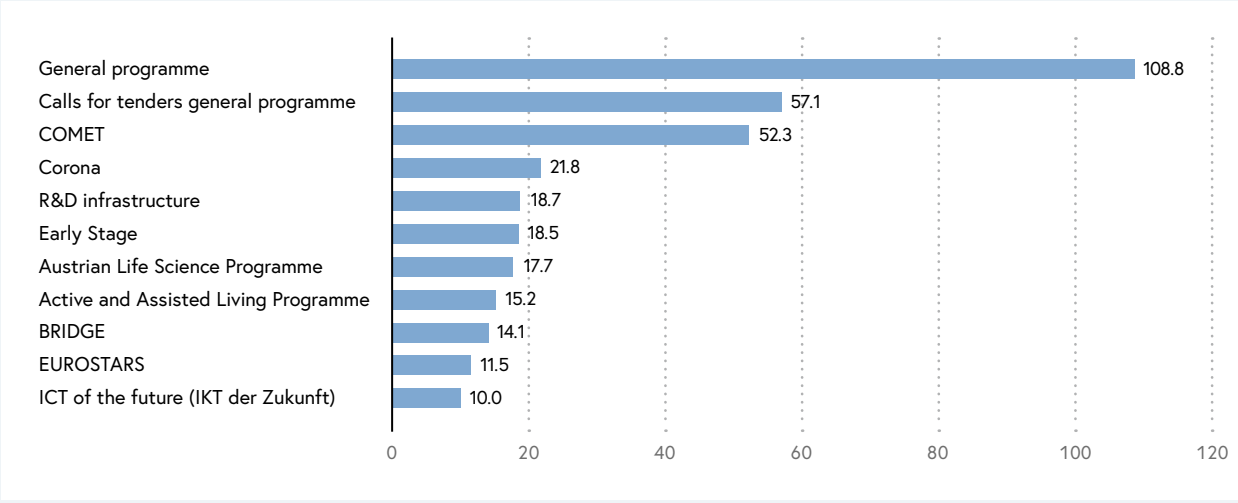
Austrian Research Promotion Agency (FFG)

The Austrian Research Promotion Agency sees itself as a one-stop shop for business-related research and development in Austria. Its overriding goal is to strengthen Austria as a centre of research and innovation and to secure jobs and prosperity in the long term. R&D in the field of life sciences is mainly funded through the general and thematic programmes. The following figure provides an overview of the life sciences projects funded by the FFG from 2018–2023 in the agency's general programmes and thematic programmes.

In total, the FFG supported 1,221 life sciences projects in the period from 2018 to 2023 with a total funding volume of around €544 million. The total project costs of the funded projects amount to around €1.15 billion. Most life sciences projects were funded as part of the general programme (including calls for proposals). Although life sciences projects only make up a relatively small proportion of all funded projects within the general programme (around 7.5% for the years 2018 to 2023) they account for around 17% of the total funding amounts paid out during this period. Most recently, in 2023, the FFG funded a total of 195 projects that could be assigned to the life sciences, 158 of which were from the life sciences sector.

As can be seen in Figure 2-47, projects focusing on medical biotechnology, eHealth, medicine and healthcare make up the majority of the FFG's life

Figure 2-48: FFG programmes and programme lines with the highest funding amounts in the field of life sciences (in € million), 2018–2023



Note: Projects with the SIC codes: "medical biotechnology", "ehealth", "medicine", "healthcare", "ambient assisted living" and the invitation to tender: "KLIPHA-Covid_19".
Source: FFG; illustration: Austrian Institute for SME Research.

sciences projects. These life sciences projects are therefore analysed in more detail below.

In line with the FFG's focus on funding application-oriented research, the largest share of funding in the period 2018–2023 went to companies. Just over a fifth (21%) of the funding went to non-university research institutions and 15% to higher education institutions.

In terms of funding amounts, projects in the fields of medicine, health and medical biotechnology were funded primarily. Substantial funding was also awarded to projects related to ICT applications as well as projects in the field of electronics and microelectronics. On the one hand, this demonstrates the cross-sectional nature of R&D in the life sciences and, on the other, it emphasises the importance of technical developments for the Austrian life sciences sector. Moreover, it shows that the production of medical devices is an important economic sector.

R&D-driving organisations primarily use funding from the general programme to implement their projects, as shown in Figure 2-48. A significant proportion of the funding was also paid out to COMET centres. This is followed by the emergency call in the wake of the COVID-19 pandemic, R&D infrastructure funding and R&D funding for fast-growing companies (early stage). This is closely followed by funding from programmes with a strong thematic focus, such as the Austrian Life Sciences Programme and the AAL Programme.

During the COVID-19 pandemic, the Corona Emergency Call was implemented in three phases in 2020, with a total of €26 million available, most of which went to projects in the life sciences (see Box 2.2). The calls were aimed at research into COVID-19 drugs, the implementation of clinical trials and the promotion of additional measures (e.g. industrial manufacturing strategies in the medically critical area).[235]

235 https://www.ffg.at/corona-support/forschung

Table 2-14: Overview of the FFG's most important thematic programmes and calls for proposals in the field of life sciences by funding amounts, 2018–2023

Thematic tenders	Total subsidies in € million
Emergency call coronavirus 2020	21.8
Austrian Life Sciences Programme total*	17.9
Call for tenders 2023	14.0
Call for tenders 2022	3.7
Clinical studies 2022	0.2
Active and Assisted Living Programme	15.2
benefit/Digital solutions for people and society	8.0
Joint Programming Initiatives total	2.0
"A Healthy Diet for a Healthy Life"	1.5
"Neurodegenerative Disease Research"	0.3
"More Years, Better Lives"	0.1
General programmes: Rare diseases	0.7

* Only life sciences projects according to the selection below based on SIC were considered. Without this restriction, the funding amounts to around €10.8 million for the 2022 call, around €18.2 million for the 2023 call and around €0.25 million for the 2022 call for clinical studies.
Note: Projects with the SIC codes: "medical biotechnology", "ehealth", "medicine", "healthcare", "ambient assisted living" and the call for proposals: "KLIPHA-Covid_19"; only projects for which the contract has already been finalised were taken into account; projects for which a decision on approval will not be made until 2024 were not taken into account.
Source: FFG; illustration and calculation: Austrian Institute for SME Research.

A total budget of €50 million was available for the Austrian Life Sciences Programme in 2022 and 2023,[236] with the aim of supporting R&D along the entire value chain. This is intended to increase both the attractiveness of the life sciences as a research location and Austria's competitiveness for clinical trials. Funding will primarily be provided for digitalisation projects, the development of medicinal products and medical devices, clinical studies and flagship projects in the field of clinical research. A further €45 million is available from the Transformation Initiative for the period 2024–2026, with a call for proposals starting in spring 2024.

The Active and Assisted Living Programme (AAL Programme) and benefit were two other FFG programmes with a strong focus on life sciences. Both programmes had a strong focus on the development of information and communication technologies to improve the quality of life, independence, safety and well-being of older people. From 2022, the benefit programme was integrated thematically into the calls for proposals for "Digital solutions for people and society". In addition, the calls for proposals also aimed to develop innovative solutions to mitigate the health effects of climate change. The AAL programme was transferred to the European Partnership Transforming Health and Care Systems (THCS), in which the BMK participates, and which is co-funded by the European Commission (see below).

236 Some of these budget funds flowed into tenders for the general programme.

Box 2-3: Success stories from the FFG's life sciences funding programme

HeartBeat.bio is a drug discovery company dedicated to the development of a high-throughput human organoid screening platform for cardiac drug discovery. The technology platform is based on the world's first self-assembling, highly scalable cardiac organoids (cardioids) that uniquely mimic the physiology of human heart chambers and enable the modelling of diseases such as drug-induced and genetic cardiomyopathies as well as myocardial infarction and fibrosis. The cardioid-based screening platform will lead to more relevant drug candidates, significantly reducing the time and cost of cardiac drug development.	The start-up company Tridem Bioscience GmbH is using its proprietary WISIT technology to develop a new type of vaccine against psoriasis. In contrast to traditional conjugate vaccines, the WISIT technology will be used to develop peptide-based neoglucoconjugate vaccines that specifically target skin-derived dendritic cells (DCs), thereby avoiding the use of adjuvants required for vaccine efficacy. WISIT vaccines are intended to be administered directly into the skin, an organ rich in dendritic cells and other immune cell types. This intradermal application allows the immunological potential of the skin, which is evolutionarily designed to trigger immune responses, to be maximised.
Evotec GT GmbH is researching efficient and suitable transport solutions for the delivery of gene therapies to specific target tissues, such as the kidney. The research team utilises mRNA-based technology for screening. Evotec is building a modern technology platform with a large number of vehicle variants.	The innovative nasal spray from GS.T Antivirals GmbH, developed on the basis of many years of research into metabolic changes in virus-infected cells, aims to prevent the multiplication of rhinoviruses. It works by disrupting the glucose metabolism of the viruses, which "starves" them. This leads to the spread of the virus being contained and effectively combated.
As part of this project, Myllia Biotechnology GmbH plans to develop a technology platform that enables functional genetic analyses in individual primary human T cells. This will be achieved by using CRISPR/Cas9 technology to specifically modify gene functions and subsequently analyse the effects on the transcriptome of individual cells. This molecular biology technique, also known as genome scissors or genome editing, allows precise cuts and changes in DNA.	The company KinCon biolabs has developed the so-called KinCon biosensor platform, which enables the tracking of drug-induced changes in kinase conformation under physiologically relevant conditions. Using cellular reporters attached to enzymes, reactions that were previously invisible can now be visualised. The project is now focusing on ligases, especially E3 ligases, as it is hoped that target proteins can be reached via PROTACs and degraded very specifically. The degradation can then be tracked via the emission measurement.

Source: FFG

Austria Wirtschaftsservice GmbH (aws)

Austria Wirtschaftsservice Gesellschaft mbH, the Federal Government's promotional bank, offers three funding programmes for companies in the life sciences sector. On the one hand, life sciences form a thematic focus in the promotion of start-ups. A total of 96 funding commitments with a financing volume of around €41 million and total project costs of around €243 million were approved via the Preseed & Seedfinancing funding programme in the period from 2018 to 2023. Established companies in the life sciences can utilise the guarantee instruments for larger projects. From 2019–2023, a total of 20 guarantee commitments were issued with a total guarantee commitment of €59.8 million. The investment premium also included a separate life sciences focus.

As of February 2024, a total of €8.9 million had been paid out via the life sciences investment premium. As already mentioned, aws is also responsible for the Life Science Austria (LISA) initiative on behalf of the BMAW.

A number of successful projects have been realised thanks to aws funding. The following four examples are intended to provide a brief insight.

Box 2-4: Success stories from aws life sciences funding

Rockfish Bio, a start-up funded by aws Preseed, has dedicated itself to the development of innovative drugs for the treatment of age-related diseases. With increasing age, the number of senescent cells, i. e. cells that are no longer able to divide, increases in the body, which, according to current research findings, is a major cause of many serious diseases. "Senolytics" are pharmacological substances that aim to selectively remove these cells and have demonstrated their efficacy in a number of preclinical studies. However, these agents are often adapted anti-cancer drugs that can cause significant side effects and whose effects are often limited to specific organs. Rockfish Bio has identified a new metabolic pathway suitable for the development of senolytic agents with significantly improved properties and very low side effects.

The start-up Enzyan, which is also funded by aws Preseed, uses AI to support chemical and pharmaceutical companies in the use of biocatalysts (enzymes). Enzyan uses cascades to carry out several substance conversions in a single step, which is more efficient and saves costs and time compared to conventional methods of active ingredient production. However, the challenge lies in the mutual influence of certain processes, which makes the analysis complex and costly. The founding team relies on artificial intelligence to identify patterns in the process development and thus optimise the cooperation of the enzymes under mild conditions. With this approach, Enzyan strives to effectively extract valuable products from sustainable raw materials and aims to enable pharmaceutical companies and fine chemical producers in particular to benefit from these advanced production processes.[237]

aws Seedfinancing supported the start-up CellEctric, which is working on an automated platform technology for the electrodynamic manipulation of cells. Diagnosticians are faced with the challenge of searching for pathogens in blood samples with a high proportion of human material. This requires either lengthy cultivation processes to enrich the pathogens or direct, untreated analysis of the sample, which negatively affects the accuracy of the analysis. CellEctric is developing an innovative technology that enables in vitro diagnostics laboratories to isolate the pathogens they are looking for from a ten millilitre blood sample in just 30 minutes, compared to three to five days using conventional methods. The technology is used to isolate pathogens in blood samples for the diagnosis of sepsis.

Valanx Biotech, a start-up supported by aws Seedfinancing, is developing a platform process for pharmaceutical research that uses artificial amino acids to form controlled bonds between protein molecules in drugs. This process is intended to significantly simplify the development of active ingredients in the field of synthetic biology and thus promises to save pharmaceutical research considerable time and resources. The technology is based on an innovative amino acid that is specifically integrated into target proteins using a customised bacterium. This integration creates an artificial binding site on the target protein to which specific molecules can be attached. Valanx's platform technology makes it possible to develop active substances for a variety of different indications.[238]

Source: aws.

237 https://www.aws.at/service/cases/gefoerderte-projekte-auswahl/innovative-solutions/preseed/enzyan/
238 https://www.aws.at/service/cases/gefoerderte-projekte-auswahl/deeptech/seedfinancing/2021/valanx-biotech/

2.4.5 EU funding and ERC grants

Cluster 1 "Health" is particularly relevant for life sciences projects in the current Horizon Europe framework programme. The cluster is intended to cover the entire research and innovation cycle and support the transfer of research results into healthcare. The thematic focus is on research into ecological and social health factors, the development of instruments, technologies and digital solutions for health and care, in the areas of non-communicable diseases and infectious diseases as well as healthcare systems.

A total of 99 Austrian organisations (as of October 2023) were able to raise around €60 million in the Horizon Europe Health Programme. This means that in the third year of the seven-year framework programme, 42% of the total funding volume awarded to Austrian organisations under the predecessor programme Horizon 2020 was acquired. The success rate of Austrian stakeholders (15.4% and 22.5% respectively) has thus remained the same compared to Horizon 2020 and – as in the predecessor programme – is slightly below the average of all other countries participating in Horizon (average of all countries in Horizon 2020 16% and in Horizon Europe 23%).

Since 2007, the European Research Council (ERC) has been awarding grants to excellent researchers to carry out outstanding research projects to expand the frontiers of knowledge (frontier research). The grants are open to all topics, are awarded in highly competitive procedures, are in high demand and are recognised worldwide as a high-quality award. Depending on the career stage, different funding programmes are available.[239]

To date, Austrian researchers have been able to acquire 153 ERC grants in the field of life sciences, with ISTA, the Austrian Academy of Sciences and the University of Vienna proving to be the most successful institutions. In terms of the success rate of 19%, Austria is the most successful EU Member State and is in third place overall behind Switzerland (23%) and Israel (21%), as Figure 2-49 shows.

The EU mission "Beating Cancer – Mission Possible" is also relevant to the healthcare sector. It is one of five EU research and innovation missions whose aim is to save the lives of over 3 million people by 2030 and at the same time improve the lifespan and quality of life of cancer patients.

To this end, a deeper understanding of cancer and improved prevention, diagnosis and treatment methods are intended to improve the quality of life of those affected and ensure fair access to cancer treatment throughout Europe. With this in mind, a Mission Action Group set up for Cancer has formulated six recommendations:

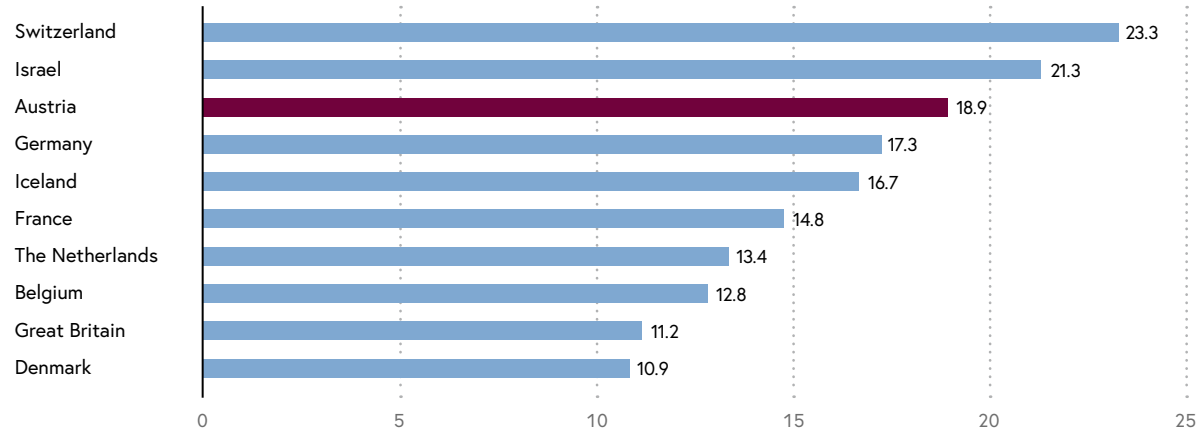
Table 2-15: Overview of selected performance indicators for Austria in the health programme area of the EU framework programmes Horizon 2020 and Horizon Europe

	Horizon 2020 (2014–2020)	Horizon Europe (2021–2027)
Number of projects	202	65
Number of organisations involved	294	99
Number of coordination in projects	34	7
Funding amount in €	141,188,655	59,469,869
Success rate	15.4%	22.5%

Source: EU Performance Monitor; as of October 2023; calculation and presentation: Austrian Institute for SME Research.

239 For more information, see chapter 2.2.

Figure 2-49: The 10 countries with the highest success rates for ERC grants in the field of life sciences



Source: European Research Council; illustration: Austrian Institute for SME Research.

1. Establishment of a national molecular research platform, development of a central research data infrastructure as a contribution to UNCAN.eu
2. Primary and secondary prevention of cancer, lung screening pilot, implementation and healthcare research
3. Networking of national Comprehensive Cancer Centres (CCCs), interoperability of data systems, connection to EU CCI network
4. Establishment of a national clinical cancer registry, including a (molecular) clinical cancer research and care research programme
5. Implementation of a "Survivorship Passport" and healthcare research in the field of paediatric oncological aftercare
6. Co-funding pot for national/EU-funded implementation projects from Horizon Europe and other EU programmes in the field of cancer

Not only are many experts involved (>60), but an attempt is also made to involve as many relevant stakeholders as possible from a wide range of areas (clinics, industry, universities, etc.).

With this in mind, the Austrian Comprehensive Cancer Network (ACCN) was founded at the beginning of February 2024, drawing on the expertise of the three existing CCCs in Graz, Innsbruck and Vienna. CCCs promote interdisciplinary collaboration in clinical practice, research and teaching, ensure that diagnostics and treatment are in line with the latest medical knowledge and are also an important point of contact for patients and their relatives. By founding the ACCN, Austria has taken on a pioneering role by pooling resources and expertise and utilising these for research and the development of new treatment approaches. The ACCN is also intended to take account of the fact that cancer treatment has increasingly developed into precision medicine in recent years, with personalised medicine taking centre stage in many therapies.

European partnerships

In addition to the established research funding programmes and instruments described above, some of which have been newly initiated in response to social and economic challenges, there are a number of other enablers for research, development and innovation.

This includes, for example, Austria's participation in European Partnerships. These are aimed at cooperation between the European Commission, Member States, the private sector and other interest groups. European Partnerships are envisaged as an additional instrument if they can achieve the objectives of Horizon Europe more effectively than other activities in the Framework Programme. In particular, partnerships should also contribute to the United Nations Sustainable Development Goals (SDGs).

The Joint Programming Initiatives (JPI) and ERA-NET initiatives were the precursor initiatives to the European Partnerships. These initiatives follow a structured, strategic process and are implemented by Member States of the European Union. They are primarily financed by the national funding institutions but can be co-financed by European funds. JPIs are characterised by the fact that they address major societal challenges that cannot be solved at national level alone.

European Partnerships in Horizon Europe can be implemented in three ways: co-funded partnerships are based on a joint programme agreed and implemented by the partners. They comprise a mix of EU and national public and other sources of research and innovation funding. Institutionalised partnerships are intended for long-term projects with a high need for integration and are implemented on the basis of a legal act. They include specific legal structures and are only an option if other parts of the Horizon Europe programme cannot achieve the objectives. Co-programmed partnerships are based on memoranda of understanding or contractual agreements and are implemented through the Horizon Europe work programmes. They include joint research agendas that are realised through calls for proposals in the Horizon Europe work programmes. There are currently nine European partnerships in the field of health, which are

- The Innovative Health Initiative (IHI) is a public-private partnership dedicated to funding health research and innovation in the EU. It utilises knowledge from different fields and disciplines, from pharmaceuticals and biotechnology to medical technology and big data, to promote projects that serve public health needs, improve the lives of patients and strengthen the competitiveness of the European healthcare industry.
- The Global Health EDCTP3 Joint Undertaking (Global Health EDCTP3) is a research partnership between African and European countries focused on accelerating the clinical development of health technologies to combat poverty-related and neglected infectious diseases. It builds on the first two EDCTP programmes and aims to reduce the burden of infectious diseases in sub-Saharan Africa and strengthen research capability for preparedness and response to recurrent infectious diseases in this region and globally.
- The Partnership for the Assessment of Risks from Chemicals (PARC) aims to develop the next generation of chemical risk assessment to protect human health and the environment. It supports the European Union's Chemicals Strategy for Sustainability and the Green Deal's zero-pollutant target by providing new data, knowledge, methods, tools, expertise and networks. PARC promotes European co-operation, improves research, increases knowledge on chemical risk assessment and trains in relevant methodological skills to support European and national strategies to reduce health and environmental risks from hazardous chemicals.
- ERA4Health strives for interregional and international cooperation in the field of non-communicable diseases, such as cardiovascular diseases, through transnational calls. The medium-

term goal is to set up and promote transnational, multi-centre, academically driven clinical studies in the field of non-communicable diseases.

- The aim of the Transforming Health and Care Systems (THCS) partnership is to contribute to the transition to more sustainable, efficient, resilient, inclusive and high-quality people-centred health and care systems that are equally accessible to all. To this end, THCS aims to generate new knowledge and scientific insights, co-develop solutions and support their transfer and scaling across countries and regions. THCS focuses on closing knowledge gaps through research, implementing and transferring solutions in different national and regional contexts, and strengthening health and care systems through targeted activities.
- The European Partnership for Personalised Medicine (EP PerMed) aims to research and develop customised prevention, diagnosis and therapy methods based on individual characteristics, thereby making prevention and therapy measures more effective for the benefit of patients and ultimately for healthcare systems. Interregional and international cooperation in research in this field is planned, as well as accompanying measures relating to training and transfer in the European healthcare systems.

The following additional partnerships are also planned for 2024 and 2025: European Partnership on Rare Diseases, European Partnership for One Health/AMR (Antimicrobial Resistance) and the European Partnership Pandemic Preparedness.

2.4.6 Research infrastructures in the life sciences as enablers for research and innovation

In addition to overarching European goals, missions, legislation, networks and partnerships, excellent research infrastructures are a particularly important location factor in the life sciences.

The establishment and expansion, and therefore the availability, of data and research infrastructures are essential for success in research and development as well as in the application of scientific findings and innovation. According to the research infrastructure database,[240] there are currently 2,324 collaborative research infrastructures at 135 R&D institutions in Austria. As Table 2-16 illustrates, a total of around €108 million was invested in research infrastructures in the field of life sciences between 2018 and 2022.

Selected examples of research infrastructures that are particularly relevant for Austria as a life sciences location are listed below:

European research infrastructures of the roadmap of the European Strategy Forum on Research Infrastructures (ESFRI) contribute significantly to the structuring of the European Research Area and are consistently networked infrastructures in the life sciences sector, consisting of national hubs in the Member States and a coordination office in the respective country where the research infrastructure is based. The European Research Infrastructure Consortium (ERIC) is a specific legal form that facilitates the establishment and operation of such networked research infrastructures. BBMRI-ERIC, for example, is a European research infrastructure for biobanks whose task is to facilitate access to samples, data and biomolecular resources to enable high-quality research. BBMRI-ERIC also offers quality

240 https://forschungsinfrastruktur.bmbwf.gv.at/en

Table 2-16: Research infrastructure investments in life sciences (in € million), 2018–2022

	2018	2019	2020	2021	2022	Total 2018–2022
Biology	13.9	11.3	10.6	7.6	10.8	54.2
Medical technology	0.0	0.6	0.1	0.4	0.1	1.2
Medical-theoretical sciences. pharmacy	4.3	3.4	6.6	4.4	4.3	22.9
Clinical medicine	1.9	0.4	3.5	2.8	1.3	9.8
Health sciences	0.1	1.2	0.5	0.2	2.8	4.8
Medical biotechnology	0.7	2.2	1.5	1.4	0.8	6.6
Veterinary medicine	1.7	0.5	0.1	3.5	2.8	8.5
Overall result	22.7	19.4	22.8	20.2	22.9	108.0

Note: n = 559 research infrastructures with a purchase value of over €100,000 in selected ÖFOS 2012 scientific disciplines related to life sciences, excluding ÖFOS 102 Informatics.
Data basis: Annual research infrastructure data collection at the BMBWF and Intellectual Capital Report Ordinance 2016 – WBV 2016), StF: Federal Law Gazette II No. 97/2016). Data description: Investments in research infrastructures with a cumulative acquisition value of over €100,000 in the period: 2018–2022.
Source: Intellectual Capital Report 2023 and BMBWF Research Infrastructure Database 2024, as of 22 February 2024, https://forschungsinfrastruktur.bmbwf.gv.at

management services, assists with ethical, legal and societal issues and provides various online tools and software solutions. Founded in 2013 as one of the first and largest ERICs, the research infrastructure connects over 400 biobanks in Europe and beyond with health and life scientists. A specially developed networked IT platform is used in several innovative EU projects and is utilised beyond the BBMRI-ERIC community. The aim of BBMRI-ERIC is to contribute to the de-fragmentation of the European Research Area and to support EU lighthouse programmes and missions, pandemic preparedness, the European Open Science Cloud and the European Health Data Space with expertise. In the Austrian node of BBMRI-ERIC, the three medical universities (Graz, Vienna, Innsbruck), the JKU, the University of Veterinary Medicine Vienna and the University of Vienna act as network partners.[241]

Euro-BioImaging has also been fully operational since it was recognised as an ERIC in October 2019. Euro-BioImaging provides scientists with open access to imaging technologies, training and data services in the field of biological and biomedical imaging. The different infrastructures of Euro-BioImaging are coordinated by a hub that provides its services to over 35 internationally renowned imaging centres in 18 countries and the European Molecular Biology Laboratory (EMBL).

ELIXIR is also an ESFRI infrastructure focusing on life sciences data, in particular genomic data. It is also based on a model consisting of a central hub and decentralised nodes. Nodes bundle the work of the organisations within the member countries. This infrastructure is intended to make it easier for scientists to find and share data, exchange expertise

241 https://forschungsinfrastruktur.bmbwf.gv.at/de/fi/bbmriat-osterreichische-biobanken-forschungsinfrastruktur_4924

and agree on best practices. The resources include databases, software tools, training material, cloud storage and supercomputers.[242]

Particularly noteworthy inter-institutional life sciences research infrastructures at national level are as follows:

The Vienna BioCenter Core Facilities GmbH (VBCF) is a centrally established research infrastructure at the Vienna BioCenter, which was founded with funding from the Federal Government and the City of Vienna. With state-of-the-art, internationally competitive research infrastructures, provided with scientific services and expertise, the VBCF offers academic and non-academic researchers in the life sciences access to state-of-the-art equipment. Research infrastructures are available in areas such as optical and electron microscopy, histology, mass spectrometry, high-throughput sequencing, phenotyping of model organisms, structural biology, protein production and Drosophila research.[243]

VSC[244] and CLIP[245] are high-performance computers at the Vienna site, supported by several Austrian universities and research institutes, which offer scientists access to HPC resources, among other things.

BioTechMed Graz Shared Infrastructure was financed through the university structure funding calls in 2013 and 2016, and additional funds were also acquired as part of the FFG's R&D infrastructure funding programme. The inter-university cooperation BioTechMed-Graz pursues the goal of jointly acquiring, utilising and operating infrastructures and thus exploiting synergies.[246]

The BOKU Core Facility Mass Spectrometry (CFMS) offers advanced analytics in the fields of proteomics, glycomics, metabolomics as well as elemental and isotope analysis. CFMS offers access to high-end equipment as well as professional training and analytical services.

Austria has already made great progress with register research at national level. Within the meaning of the Research Organisation Act (FOG), this includes all directories, databases or similar applications or processing platforms that are provided for by federal law.[247] The Austrian Micro Data Centre makes register data accessible for research purposes in a secure environment. Transparency and access to scientific data can lead to new insights of great value in terms of innovation.

2.4.7 Strengthening clinical research in Austria

Not least due to corona, but even more so due to the fact that the number of applications for drug and medical device studies in Europe is falling, clinical research has once again become the centre of attention in RTI policy. An active, dynamic clinical research centre and excellent clinical research expertise are essential for a high-quality, modern and efficient healthcare system and for Austria as a dynamic pharmaceutical and medtech location for a number of reasons. Clinical studies play a key role in the implementation of medical innovations in healthcare practice. On the one hand, they ensure better care and earlier access to innovative therapies for patients. On the other hand, clinical investigators can gain direct experience with innovative

242 https://elixir-europe.org/about-us/who-we-are
243 https://www.viennabiocenter.org/vbcf/
244 https://zid.univie.ac.at/en/vsc/
245 https://www.clip.science/
246 https://biotechmedgraz.at/en/programs/shared-infrastructure/
247 https://www.bmbwf.gv.at/Themen/Forschung/Forschung-in-%C3%96sterreich/Strategische-Ausrichtung-und-beratende-Gremien/Leitthemen/Registerforschung.html

therapies or develop them further in follow-up studies. With the awareness that globally active pharmaceutical companies select clinical trial centres on the basis of international competition, expertise, excellence and efficient service provision in clinical research are also decisive for the further development of the pharmaceutical and medtech location in Austria.

While public-private and transnational partnerships (Innovative Health Initiative, ERA4Health) are being promoted at European level, Austria is focusing on a variety of measures to strengthen clinical research. The most important partnerships are described in the following.

In addition to the aforementioned "Uni-Med-Impuls 2030" measures for the Austrian medical universities and the Faculty of Medicine Linz, this programme also includes measures to strengthen clinical research and the necessary (service) structures at the aforementioned universities. These measures include the development of internal services for clinical researchers (training, application support) with regard to the new regulatory requirements concerning the EU Clinical Trial Regulation, the EU Medical Device Regulation and the EU In vitro Diagnostic Regulation, as well as the amendments to the AMG and MPG. Furthermore, as part of the current performance agreement period, a collaboration project between the Medical University and the respective hospital provider is underway at all sites. This collaboration project aims to organise the administrative and operational processes in the triad of the two supporting institutions and the pharmaceutical companies more efficiently and to improve and accelerate the handling of clinical trials at the site.

Uni-Med-Impuls 2030 also supports internal training and further development programmes for physician scientists and clinical scientists. These programmes serve the scientific career development of clinicians by giving them more freedom for research and enabling close collaboration between clinical and basic research.

To do justice to the dynamic nature of the topic, new training programmes are also being offered. These include, for example, training to become a clinical investigator. The focus here is on acquiring knowledge of international standards of the EU and ICH (International Conference on Harmonisation) as well as national laws and the associated preclinical and toxicological expertise. Courses of this type are offered by the Medical University of Innsbruck, the Medical University of Graz (which cooperates with the Graz University of Technology and the University of Graz in the training programme) and in Vienna in a diploma course offered by the Clinical Research Association in cooperation with the Austrian Medical Association.[248]

In addition, the Coordination Centres for Clinical Trials at the medical universities (KKS Graz, KKS Innsbruck, KKS Vienna, CRCS Salzburg and KKS Linz), which see themselves as service institutions for the promotion of clinical research in accordance with legal and ethical requirements, joined forces a few years ago to form a KKS network.[249] Financed by start-up funding from the Higher Education Area Structural Funds, the aim of the network is to continuously develop expertise in the field of clinical trials at Austrian universities and the quality of patient-orientated clinical research.

The further development of the legal framework through the adoption of the EU Clinical Trials Regulation needed the creation of a central EU portal for the authorisation of clinical trials by the authorities. The ethics committees must also be integrated into the digitally organised approval processes. The development of an IT interface between the ethics committees of the medical universities and the EU portal was financed with €1.3 million as part of the 2019–2021 funding programme.

248 See Verein Klinische Forschung (VKF), 2024; Hoffmann-Ammann, 2016; Medical University of Graz, 2024.
249 https://kks-netzwerk.at/

A lot has also happened in the funding landscape for clinical trials in Austria in recent years:

The FWF's Clinical Research Programme (KLIF) has been funding academically driven clinical research that focuses on improving clinical practice, therapy concepts and treatment methods through findings from scientific research for some time now. Projects have a maximum duration of four years, must be dedicated to research in human and veterinary medicine and the results must not be directly linked to commercial interests. The funding volume per project is generally less than €450,000.

A total of 72 projects were funded in the Clinical Research Programme between 2019 and 2023 with a total funding amount of around €23.8 million. In terms of the respective funded organisations, the Medical University of Vienna accounted for the largest share of the approved funding amount, followed by the Medical University of Graz and the Medical University of Innsbruck.

Since 2022, the LBG has also been responsible for the Clinical Research Groups (KFG) programme, thereby closing a funding gap in the area of non-commercial, translational and cooperative clinical research on a scale necessary for the clinical research sector on behalf of the BMBWF. The aim of the KFG is to promote and support clinical research at medical universities within the Austrian healthcare and higher education system and in international competition.

The focus of the funding is on a project with an academic question – i. e. on Investigator Driven Clinical Studies. The embedding of early career researchers in the structure of the KFG is intended to guarantee the development of subsequent managers for key areas of clinical research.

In the first call for proposals in 2022/23, funding totalling €24 million from the BMBWF and the Future Austria Fund (FZÖ) enabled the establishment of a total of three KFGs for a period of eight years. On the other hand, there were 44 applications and a total volume of around €163 million applied for, which shows the enormous need for such a funding programme.

The three funded KFGs, which started work on 1 October 2023, are:

- Personalised targeted glioblastoma therapies by ex vivo drug screening: Advanced brain Tumor TheRApy Clinical Trial (ATTRACT): with the Medical University of Vienna in the lead and the consortium partners CbMed, Meduni Graz, Keppler University Hospital, Karl Landsteiner University, Meduni Innsbruck, Danube Private University and AIT
- Austrian Digital Atrial Fibrillation Screening and Intervention Programme (Austrian Digital Heart Programme: with the Medical University of Innsbruck in the lead and the consortium partners Meduni Graz, AIT and UMIT)
- Disease-driving Mechanisms in patients with pOrtal hyperTensION (MOTION) at the Medical University of Vienna

The aforementioned Austrian Life Sciences Programme of the FFG also supports clinical studies and flagship projects in the field of clinical research with the aim of increasing Austria's competitiveness as a location for clinical studies. This programme is aimed at the business enterprise sector. Among other things, interventional clinical studies of phases I and II and clinical trials of medical devices in accordance with EU regulations are funded under this programme. In the case of clinical trials, a maximum funding volume of €1 million per project with a maximum project duration of two years is available. A total budget of €50 million was available for the call for proposals in 2022–2023 and €45 million for the period 2024–2026, although not all of the budget will be used to fund clinical trials.

All of these initiatives and measures include structural measures and funding opportunities to strengthen clinical research in Austria in particular. Last but not least, with all these measures Austria is making a contribution to making Europe an attractive location for clinical trials again.

2.4.8 Conclusion: Strategically bundled resources for a highly attractive location, especially in the field of clinical research

Factors such as an ageing population, the increase in rare diseases, the risk of pandemic outbreaks, the ever-increasing number of cancer cases, the dependence on supply chains in drug production and the high costs of research infrastructures to be internationally competitive and excellent in research, development and innovation in the life sciences have led the European Commission to consider this area to be strategically relevant for the future of Europe. The aim of major European structural programmes, the research framework programme and the mission-oriented policy approach is to support the life sciences sector in all its diversity, not least to be able to compete with the USA and China.

Austria's RTI policy has long recognised the strategic relevance of this topic and has established a broad research funding portfolio, from basic research and applied research to the translation and utilisation of research findings. In addition, there is extensive investment in research infrastructures and in teaching and research at universities as well as in the expansion of central non-university research institutions that perform excellently in an international context. Clusters and platforms also support networking between stakeholders at different levels, whether as part of regional cluster and network initiatives or at national level via alliances such as LISA or with regard to access to modern infrastructures via core facilities such as at the Vienna BioCenter.

2.5
RTI evaluation culture and practice

Research, technology and innovation policy in Austria has been characterised by a culture of quality and transparency in evaluation for over 25 years. Programmes, and increasingly also institutions and instruments, are regularly examined in terms of the achievement of objectives, impact and efficiency. The vast majority of evaluation reports are available to the public in the repository of the Austrian Platform for Research and Technology Policy Evaluation (fteval). As of 1 January 2023, an amendment to Section 20 of the Federal Constitutional Act (B-VG) requires "all bodies entrusted with federal, provincial and municipal administration tasks (…) to publish studies, expert opinions and surveys that they have commissioned, including their costs, in a manner accessible to everyone, as long as and insofar as their confidentiality is not required in accordance with para. 3."

fteval brings together representatives of institutions that commission evaluations, carry them out, or are the subject of evaluations. In the interests of geographical, methodological and thematic openness and mutual learning, fteval is networked with related initiatives, such as DeGEval – Gesellschaft für Evaluation, the Platform for Register Research and the Vienna Evaluation Network (VEN). Central activities of fteval are the exchange among stakeholders in the sense of a common evaluation culture. Working groups are set up for current topics and common standards are developed. In addition to publishing the fteval Journal, in which important findings from evaluations and current developments are reflected, fteval has also been publishing a podcast since 2022 as a low-threshold exchange format to appeal to younger interested parties in particular. Training courses are held regularly, offering an introduction to RTI policy evaluation or in-depth training on specific issues according to demand. Another focus is the international conference,[250] which takes place every three years and makes Austria the centre of reflection on methods, challenges and the role of evaluations in the RTI sector.

2.5.1 Current developments

The evaluation landscape is characterised by new developments in terms of both content and technology: from a technical and methodological perspective, new possibilities are increasingly arising through analysis tools for large amounts of data or interactive display formats for evaluations (dashboards). The rapid spread of ChatGPT has intensified the debate on artificial intelligence and also raises questions regarding evaluation practice. A working group[251] of the fteval platform has been working on AI in evaluation in three dimensions since 2023: AI-based tools, the development of a relational model of the evaluation system and the creation of a guideline for the use of AI in evaluation.

In terms of content, the topics of digital and green transformation (the so-called "twin transition") characterise political events and therefore also evaluation issues as a whole – accordingly, a new fteval working group on sustainability indicators has been established. The formative character[252] of evaluations is gaining in importance alongside the summative mandate. This can be seen specifically in the following developments:

- Accompanying evaluations are increasingly being carried out: The selection process for the "Emerging Fields" programme is currently being evaluated on behalf of the FWF. The Emerging Fields programme is aimed at teams in basic research who are prepared to depart from established approaches. The evaluation is intended to enable learning loops

250 REvaluation '24 – Navigating Times of Change will take place from 4–6 December 2024 in Vienna, see https://www.revaluation2024.eu/home

251 https://fteval.at/fteval-arbeitsgruppe-zu-kuenstlicher-intelligenz-in-der-evaluierung/

252 Formative here means accompanying.

in the key issue of selecting funded teams. With *"Expedition Zukunft"*, the FFG has also launched a programme with the aim of promoting ground-breaking innovations, which is currently being evaluated.

- In addition to evaluation in the narrower sense, there is also increasing attention to monitoring in connection with transformative governance approaches as well as the demand for expertise in the development of methods and tools that can be used for evaluations of transformative programmes and agendas. Examples include the impact research on the BMK's "Mobility of the Future" programme and a system readiness study by the Climate and Energy Fund (KLIEN). In both cases, new formats for user participation and the involvement of additional stakeholders were developed.
- Transformative governance is also linked to the growing attention being paid to future-oriented evaluation formats such as roadmapping and foresight studies. These are intended to help recognise methodologically sound development trends and thus support transformative governance.

Finally, it can be observed that key evidence, i. e. focusing on a reduced number of essential aspects or indicators, is gaining in importance, while at the same time the implementation of experiences, the exchange of information on processes and conditions for success, is receiving more attention.

2.5.2 Selected evaluations

A total of twelve evaluations that have recently been completed are briefly summarised below. The focus is on the object of the evaluation, the method and the conclusions and recommendations. This shows a lively level of evaluation activity, which concerns programmes as well as regulations and laws that are aimed at a broad spectrum of stakeholders: small and medium-sized enterprises are addressed just as much as higher education institutions, intellectual property rights are addressed just as much as gender equality, participation in the European Research Area just as much as the funding of comprehensively monitored research projects that involve different stakeholders and increasingly society in projects.

Evaluation of the FFG funding programme "Impact Innovation"

Impact innovation promotes the use of innovation methods to solve a problem. A process in which all stakeholders are involved is central to finding new ideas, developing an effective solution and implementing it successfully. Impact innovation pursues three goals: broadening the innovation base, broadening access to FFG funding and more successful innovation projects. After two pilot calls in 2017 and 2018, Impact Innovation was implemented as an ongoing call from June 2019, which was evaluated by inspire research and the Centre for Social Innovation (ZSI) in the period from June 2022 to November 2023.

A participatory approach was also taken in the evaluation.[253] Data and document analyses, online surveys and interviews were used for the ex-post evaluation of completed projects; the evaluation included workshops, focus groups with stakeholders and regular reflections with the FFG.

The evaluation concludes that the programme objectives were achieved to a large extent. It was possible to attract a large number of new applicants and draw the attention of new target groups to the programme. The funded innovation projects differ

253 https://repository.fteval.at/id/eprint/692/

structurally from other innovation projects of the funded institutions and strengthen the importance of innovation processes in the funded institutions. Openness to results, the early involvement of key stakeholders, the use of innovation methods and the flexible project design contribute significantly to the success of the projects.

However, some projects had difficulties in actually implementing their innovations. It is therefore recommended that the projects should also be shown prospects for the medium-term commercialisation and implementation of the innovations, which can be particularly important for non-profit projects. A clear presentation of possible applications of the solution to be developed in the project already in the application could ensure better planning and orientation. This could support a clearer idea of the impact logic, promote the success of the innovation projects and create the conditions for impact monitoring by the FFG.

Overall, applicants are very satisfied with the organisation and implementation of the programme. In order to prepare the reviewers, especially the technical experts, for this new form of innovation funding, it is recommended that the FFG's expertise in innovation methods be further expanded.

Interim evaluation "Laura Bassi 4.0", first call for tenders

In 2018, the FFG launched the Laura Bassi 4.0 programme. The programme's first call for proposals, entitled "Laura Bassi 4.0: Women shape digitalisation for equal opportunities!", was aimed specifically at women who wanted to shape digitalisation. A total of three cooperation networks were funded in which women worked on digitalisation topics with high social relevance in order to contribute to more equal opportunities. "inspire research" was commissioned with the interim evaluation in 2023 and examined the aspects of interdisciplinarity and transdisciplinarity, the involvement of new actors and specifics of the funded networks by means of interviews and document analysis as well as evaluations of a survey from 2022.

The evaluation[254] states a high level of target achievement: the interdisciplinary approach has had a positive influence on the projects. In addition to technical results, aspects relating to women and equal opportunities were also taken into account. New forms of project communication were developed, which were time-consuming but also effective.

Overall, the interviewees from all funded projects emphasised that the mix of participants was very good and suitable for achieving the project objectives: compared to other co-operative projects, the proportion of women was higher and the range of skills in the project teams was greater. This enabled new perspectives and solutions, but the associated coordination processes took longer, meaning that the development of the desired results did not progress as far as hoped.

The FFG network "Digitalisation and Equal Opportunities", managed by Joanneum Research and ÖGUT, succeeded in integrating the coordinators and project partners well. The latter were able to present their projects to the network. The content-related input from ÖGUT and the supervision of the working groups by Joanneum Research also received good ratings. However, the network was utilised to varying degrees, networking taking place primarily within the projects. The mandatory implementation of gender analyses as part of the funded Laura Bassi 4.0 projects was predominantly rated positively: it was not only institutions that carried them out for the first time that benefited, but also organisations that already had established processes and procedures in place.

254 https://repository.fteval.at/id/eprint/681/

"INNOVATORINNEN" – Accompanying research for the 2022–2023 programme

With the INNOVATORINNEN programme, the BMAW has set itself the goal of specifically supporting women in applied, business-related research and development and making them visible. In the framework of the INNOVATORINNEN programme, which took place as a pilot in 2020/21, and has been advertised annually since 2022, inviting 20 women to participate each year, highly skilled women are encouraged to develop their ideas, establish new network contacts and gain more creative freedom and professional development. INNOVATORINNEN offers workshops, events, empowerment training and, since autumn 2022, the new INNOVATORINNEN CLUB as part of a leadership programme (including alumnae networking).

The accompanying research, conducted by WPZ Research, covered two entire leadership rounds (February to December 2022 and February to December 2023) as well as the development of the INNOVATORINNEN Club (from autumn 2022). The evaluators accompanied the development of the INNOVATORINNEN programme by continuously conducting surveys in various forms (online surveys, interviews, reflection workshops, participatory observation as part of interactive group work) among the participants and a larger sample of the programme's target group, as well as always interacting closely with the clients. This ensured that the programme benefited from experience gained from previous programmes (such as w-fFORTE and the w-fFORTE Innovators pilot programme) on the one hand, and that programme management objectives could be quickly aligned with the current needs and challenges of the participants on the other.

Overall, the accompanying research delivered very positive results. This included the observation, that the focus on an individual design mission made the leadership programme particularly attractive for the target group, and that the innovators gained more clarity, self-confidence, motivation and know-how with regard to their design missions as a result of the leadership sessions, which enabled the design missions to be concretised and further developed. Apart from the intensified work on their own mission, the participants reported that their approach to situations or projects, but also their professional roles (in terms of functions and areas of responsibility) had changed as a result of participating in the leadership programme. In addition, the heterogeneity of the participants in the INNOVATORINNEN leadership programmes represented great added value. The networking with the peer group and the outstanding commitment of the programme management are an important unique selling point of the INNOVATORINNEN programme. The formats of the INNOVATORINNEN Club were also largely rated positively in every respect; networking and project platforms as well as mentoring activities were suggested as future focal points.

Evaluation of the "Austrian Cooperative Research (ACR) 2020–2022"

On behalf of the BMAW, Technopolis evaluated ACR – Austrian Cooperative Research, a network of private, non-profit research institutes, between March and August 2023. Based on the impact analysis of the ACR funding for the implementation years 2020–2022, recommendations were formulated for the future organisation of the funding.[255]

A detailed analysis of the monitoring data, case vignettes on the impact pathways based on a written survey of institute management, stakeholder interviews, two focus groups and document analyses, as well as a case study on the German Federation of Industrial Research Associations (AiF), form the

255 https://repository.fteval.at/id/eprint/690/

main pillars of the evaluation. For the first time, the impact of the institutes is analysed according to four groups: in addition to the social science institutes, the technically orientated institutes were assigned to three size groups.

The evaluation confirms the important position of the ACR institutes in the national innovation system, as they develop and bundle relevant knowledge in close dialogue with small and medium-sized enterprises and provide non-profit services to SMEs in their sectors through contract and cooperation projects. More than half of the income from services provided by the ACR institutes is generated by testing, measuring and certifying products, materials, foodstuffs and components. These services are predominantly provided for SMEs and also enable access to them. The complexity of technical processes and the relevance of regulations, which have become even more important as a result of the green transition, require SMEs to adapt and innovate to a high degree, which can only be achieved by pooling infrastructure and expertise in suitable, market-oriented research institutions such as the ACR institutes. The ACR institutes also represent the interests of Austrian companies externally, for example in international standardisation committees. The social science institutes of the ACR contribute significantly to the transformation through interdisciplinary, co-operative projects with the natural science and technology institutes and provide information for decision-makers who shape the framework conditions for SMEs. The relevance of the ACR institutes results, among other things, from their familiarity with the needs of their target groups, especially SMEs. During the period under review, the ACR office successfully improved external communication and networking between the institutes.

The evaluation's recommendations include strengthening the strategic basis of the ACR by increasing funding from the BMAW and monitoring the data. Overall, the evaluation shows that the ACR network stimulates the research activities of SMEs beyond the co-operation projects – some of which were made possible in the first place. The funding can be categorised as efficient in view of the effects recorded.

Evaluation of the "ERA-Dialogue advisory tool"

The ERA Dialogue was established in 2014 as an advisory tool for university and non-university research organisations in Austria. Prepared by the European and International Programmes (EIP) department of the FFG, the discussions take place in a small setting at the universities, between the EIP, the vice rectors for research, the respective persons responsible for the internal research service units and, depending on the institution, other relevant persons. Participation in the ERA dialogues is not mandatory. Since its introduction, a total of 103 ERA dialogues have taken place at 16 Austrian universities (i. e. at all public universities with the exception of universities of the arts) up to 2022. This shows that universities are taking up this offer well and appreciate the direct, customised exchange on European developments.

The evaluation study commissioned by the BMBWF on the ERA-Dialogue advisory instrument, which is implemented as part of the FFG commissions for Horizon 2020 and Horizon Europe, covers the years 2014–2022. It examines the efficiency and effectiveness as well as the general quality and relevance of the ERA-Dialogue, also in conjunction with other ongoing networking activities, in order to formulate recommendations for successful further development on this basis. Technopolis carried out the evaluation in the period from November 2022 to March 2023: Following a kick-off workshop and presentation of the project to the ERA correspondents (committee of university ERA officers at rectorate level), data and documents were systematically analysed. In addition, 39 semi-structured interviews were conducted with representatives of the BMBWF, the FFG and vice-rectors from 14 universities. The

results were discussed in a final evaluation workshop with the BMBWF and FFG.

The function of the ERA dialogues has changed since they were established in 2014, now also used in the course of preparing and implementing the performance agreements. The evaluation could identify the ERA dialogues as an important driver for university activities at EU level, whereby the importance of the dialogues, which generally take place once a year, varies depending on the universities' background and experience. The verifiable effects identified were "a clear focus on the topic of ERA at rectorate level, the resulting established contact between the vice-rectorates for research and the FFG, the provision of tailored information on emerging developments, information on the chances of success for the participating universities in specific funding programmes and an individual participation profile of the universities, including their positioning in an Austrian and European comparison".[256]

It is recommended that the ERA Dialogues continue in their current form. Suggestions for further development include inviting universities and the FFG to prepare self-reports on their activities, as well as improvements with regard to monitoring the ERA dialogue and the provision of information on the participation profiles in the triangle of universities-FFG/EIP-BMBWF.

New paths to a professorship in Austria

The evaluation carried out by Reichert (2023) on behalf of the Federal Ministry of Education, Science and Research (BMBWF) entitled "*Neue Wege zur Professur in Österreich – Chancen der institutionellen Steuerung und individuellen Laufbahnentwicklung mit den neuen Berufungs- und Auswahlverfahren nach §99 Abs. 4 und Abs. 5 Universitätsgesetz*"[257] focuses on the autonomy of universities and the associated management responsibility. The amendment to the law was intended to expand career opportunities in terms of a diverse appointment portfolio and to promote legal equality in organisational terms for associate professors and professors. On the one hand, simplified appointment procedures were established for university lecturers and associate professors in accordance with §99(4), and on the other hand, §99(5) established a career position model ("tenure track" model) based on international examples. The evaluation combines the analysis of relevant documents, 83 semi-structured interviews on procedural practice at 21 universities and an international comparison.

The results show that Austrian universities have gained significant added value for their management capability with the new appointment procedures, as well as international competitiveness and strategic flexibility. The universities have used this new personnel instrument strategically and have organised it differently in view of their autonomy and management capability. For academics in the mid-career phase, the new "career positions" of the §99(5) procedure mean a significant gain in reliability in career planning. Access to the professorial curia and the associated opportunities for participation often (but not always) give the appointees equivalence with the conventional 98 professorships. Still, there are narrow limits to this equivalence due to the mostly inadequate resources of the new professorships.

No need for readjustment is identified at a legal level. The recommendations address an inter-institutional exchange on good practices, transparency in communication with applicants, objectively comprehensible selection criteria and measures to promote equality and participation through onboarding and mentoring. Other points relate to equipment

256 Warta, d'Elloy (2023), p. 24
257 https://pubshop.bmbwf.gv.at/index.php?article_id=9&type=neuerscheinungen&pub=1040

planning and infrastructure investments. Finally, it is pointed out "that the new appointment procedures in accordance with §99(4) and (5) only offer additional reliable career paths for a few outstanding and internationally recognised academics at mid-career level", while the recognition of other necessary achievements remains a systemic challenge.

Evaluation of "Digital Innovation Hubs"

Digital Innovation Hubs (DIH) are an initiative of the BMAW implemented as a funding programme by the FFG. The aim of the programme is to set up and operate national hubs as contact points for SMEs from all sectors on digitalisation issues. The DIH evaluation examined visibility, target achievement and impact, and formulated recommendations for the continuation and future design of the programme. The study[258] refers to six DIHs that were funded as part of two calls for proposals.

The empirical work took place between April and August 2023. It comprised semi-structured interviews with representatives of the DIH, interviews with three experts in the field, an online survey of the respective DIH networks, focus groups with scientific institutions involved in the DIH and a workshop with DIH managers.

The programme continues to close a gap in the support needs of SMEs in Austria, but the evaluation also shows potential for optimisation. The conclusions and recommendations for action are based on the findings on reaching the target group, the design and implementation of the respective DIH and its range of services as well as the observed effects on SMEs and include the following points: The evaluation is in favour of ensuring the continuation of the DIHs, but emphasises the need to coordinate the offerings with other initiatives, such as the recently launched European Digital Innovation Hubs (EDIH), as well as a careful examination of whether there is a need for new DIHs. A major added value lies in the regional anchoring as well as the breadth of content and target group specificity of the hubs. In order to make the DIH's offerings more visible and tangible for SMEs, multipliers should be involved on a mandatory basis in future. The requirements for monitoring should be specified, particularly with regard to the effectiveness of the DIH for SMEs. The informal exchange networks created as part of DIH activities should be strengthened and the "Hub Circle" networking format should be further developed. Finally, it is recommended that the overall "DIH" brand be strengthened in terms of better visibility and prepared for the target group, combined with clear internal communication about the special features of this programme.

Assessment of the Federal Government's membership of the Association "Industry 4.0 Austria"

The platform Industry 4.0 Austria was founded as an association in 2015 by the BMK in cooperation with the Federal Chamber of Labour (*Bundesarbeitskammer*), the Association of the Electrical and Electronics Industry (*Fachverband der Elektro- und Elektronikindustrie*), the Association of the Metalworking Industry (*Fachverband der Metalltechnischen Industrie*), the PRO-GE trade union and the Federation of Austrian Industries (*Industriellenvereinigung*) in order to facilitate the implementation of Industry 4.0 and promote cooperation between the relevant stakeholders. The aim is to ensure highly innovative and sustainable industrial production and increase the quality of employment.[259] In March 2023, inspire research was

258 https://repository.fteval.at/id/eprint/697/
259 https://plattformindustrie40.at/wp-content/uploads/2022/06/WEB_Factsheet-Plattform-Industrie-4.0_2022_DE.pdf

commissioned to examine whether and to what extent the expectations that the BMK had associated with membership of the Industry 4.0 platform have been fulfilled and whether the added value achieved justifies the continuation of the Federal Government's membership with the payment of the increased membership fee of €150 thousand per year.

The assessment[260] is based on interviews with representatives from a total of 21 platform organisations (members and head office), other stakeholders and similarly designed platforms in Germany, the Netherlands and Switzerland. The design, interim and final results were reflected upon in workshops with the BMK.

The report shows that the association has created an organisational framework that successfully brings together the players relevant to the processing of Industry 4.0 topics through membership. The participation of the Federal Government strengthens the visibility and public nature of the topic, making the platform more attractive for important stakeholders. The Federal Government's increased membership fee plays an important role as a basis for the continuation of activities.

The diversity of stakeholders, in particular the involvement of the social partners, stands out in an international comparison. Projects were also successfully developed and implemented at the interfaces between the members and other stakeholders, such as the innovation institutions in the federal states. The Federal Government's objectives are therefore considered to have been achieved. The evaluation concludes that the BMK's use of funds is effective and efficient in view of the scope of the activities, the national and international visibility and the results and impacts achieved by the Platform Industry 4.0 Austria in an international comparison.

Evaluation of "KMU.DIGITAL"

The digitalisation programme KMU.DIGITAL[261] is an initiative of the Federal Ministry of Labour and Economy (BMAW) in cooperation with the Austrian Federal Economic Chamber (WKÖ), refinanced by the European Union from 2020 to 2023. The WKÖ is responsible for the advisory funding, while the aws is responsible for the implementation funding. The programme supports small and medium-sized enterprises in Austria in designing and implementing digitalisation projects and bringing them to market. The funding programme has been running since 2017; the evaluation,[262] carried out by Pöchhacker Innovation Consulting and the Institute of Industrial Research (IWI), covers the period from September 2019 to December 2022. The aim of the evaluation was to assess the impact and scope of the programme and to formulate evidence-based recommendations that will be incorporated into the further design and continuation of the programme.

The evaluation methods include a systematic document analysis, a statistical data analysis, 20 structured qualitative online interviews with funded persons, three semi-structured qualitative interviews with representatives of the commissioning institutions, a focus group with persons with an advisory function in the funding programme and an exemplary presentation and comparison of similar initiatives from other regions. The surveys took place between January and July 2023.

The evaluation confirms that the programme is an important, independent and well-received instrument with a clear funding concept. Across all size categories and sectors, SMEs are using the funding as an opportunity to implement digitalisation projects in their companies. By raising awareness and providing targeted support in strategic planning, KMU.DIGITAL helps to break down existing barriers and enables

260 https://www.bmk.gv.at/themen/innovation/publikationen/evaluierungen/Assessment-Industrie-40.html
261 https://www.kmudigital.at/ueber-kmu-digital/start.html
262 https://repository.fteval.at/id/eprint/687/

SMEs to approach the topic of digitalisation in a needs-oriented manner (and often for the first time).

The evaluation recommends the continuation of the programme and more funding for the implementation module in order to strengthen its impact. Furthermore, an open application process throughout the year is recommended. The advisory support is a key enabler for larger, faster and higher-quality investments – a continuation of the mandatory combination of the advisory and implementation modules is therefore also recommended. The evaluation also sees potential for broader communication of results data and, in connection with this, the need for greater visibility and external communication. It also suggests linking sustainability and digitalisation goals and making even greater use of the data obtained in the course of programme implementation for the strategic further development of the programme.

The evaluation results will be used to prepare a relaunch of the programme with a planned funding start in spring 2024.

Evaluation of "TECTRANS – Programme for the Promotion of Technology Internationalisation"

Technopolis carried out an ex-post evaluation of the TECTRANS funding programme (2020–2021) and its predecessors kit4market (2016–2019) and tec4market (2014–2019) between October 2022 and September 2023.[263] These funding programmes established by the BMK aimed to sustainably position Austrian technologies on international markets, increase the technology share of Austrian exports in the long term, create or secure jobs and generate added value. The concept, programme implementation, contributions to the achievement of objectives, and effects to date were analysed. The programme supported companies in international market studies, international freedom-to-operate analyses and in setting up demonstration plants for innovative technologies to be sold abroad.

The qualitative and quantitative mix of methods included a programme data and programme document analysis, a standardised online survey and interviews with applicants, programme management, the BMK and other stakeholders, indicative case studies and a national and international environment analysis.

The evaluation concludes that the programmes were handled professionally and were perceived by companies as an attractive and coherent offer. The module "Demonstration projects at the interface of experimental development and commercialisation of technologies" supported Austrian companies in acquiring international customers. The same applies to the funding module for international freedom-to-operate analyses, which offered companies support in preparing decisions in the field of intellectual property in a very technical and legal area. The very heterogeneous market studies remained comparatively limited in their impact. The TECTRANS and kit4market programmes only partially met the impact indicators specified by the BMK at the time of the surveys; based on the evidence collected, it is not recommended that the programmes be resumed.

The evaluation recommends ensuring that the possibility of funding similar IP projects in the area of internationalisation for Austrian companies continues to exist in the future and that other funding opportunities in the area of internationalisation continue to be well advertised. The need for support relates more to the selection of the target region than to specific market entries and appearances. For projects with intangible results in particular, it would be important for funding recipients to demonstrate their interest in realisation by making a financial contribution.

263 https://www.bmk.gv.at/themen/innovation/publikationen/evaluierungen/tectrans_kit4market.html

Evaluation of "License.IP and IP.Market"

The funding programmes License.IP and IP.Market, financed by the National Foundation for Research, Technology and Development and implemented by aws, each had a budget of €3 million and focused on in-licensing and out-licensing intellectual property (IP). The programmes were evaluated by the Austrian Institute for SME Research and Inspire Research on behalf of aws between September 2022 and March 2023 with the aim of reviewing the achievement of the programme objectives and gaining insights for future aws funding measures in the IP area. To this end, the experiences of programme management, aws employees, applicants and funding recipients were taken into account. In addition, application and funding data were evaluated and interviews were conducted with experts from Austria and abroad in order to examine the embedding of the programmes and create an international basis for comparison.

License.IP supported 20 in-licensing projects in the 2018–2020 evaluation period, enabling licences to be acquired in most cases. The technology searches and brokerage services offered by aws were an important addition to the grants awarded. IP.Market supported a total of 99 organisations from 2017 to 2020, all of which received a potential analysis in the first phase. In a second phase, around half of them benefited from additional services to support out-licensing and from grants (primarily for property right applications). For most of them, this led to the development of expertise and an increased awareness of the importance of intellectual property for a business enterprise strategy.

Compared to other national and international funding programmes in the IP sector, the high funding rates and sums appear disproportionate in relation to the added value. For the future, the evaluation report recommends that the aws focus more strongly on its core competences in the combination of IP and the business enterprise strategy, reduce the funding amounts per project while increasing the number of beneficiaries and embed the funding more strongly in existing platforms and networks in order to increase the reach of the funding.

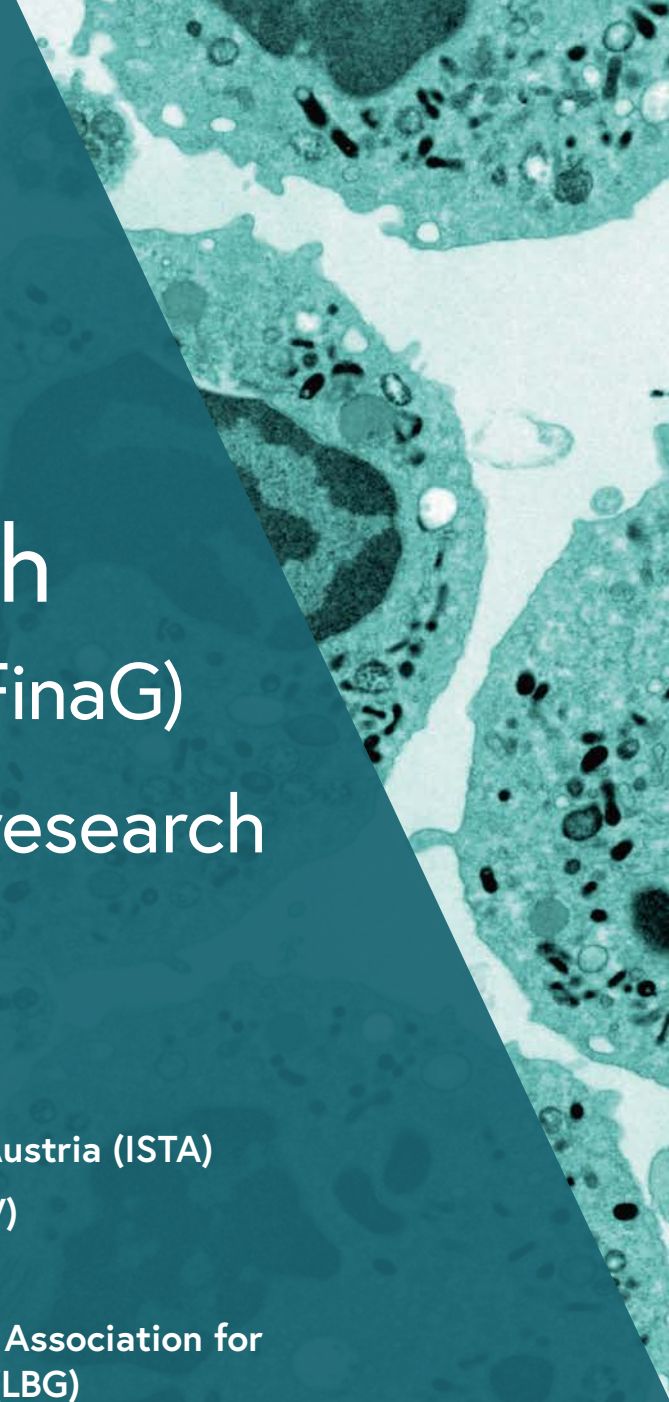
Evaluation of the FFG line "Kleinprojekt"

With the Small Project programme introduced in 2020, the FFG is pursuing the goal of supporting project ideas and small application-oriented R&D projects by start-ups and SMEs, as well as quickly implementing and exploiting these project results on the market. In order to reach a broad impact, the programme design aims to be as low-threshold as possible, both in terms of application and processing. The form of financing through non-repayable grants is also geared towards rapid, uncomplicated support. Applicants are also free to co-operate – either with scientific institutions or with companies. In the case of co-operation, the funding rate increases.

The evaluation carried out by WPZ Research examined the extent to which the programme objectives were achieved and whether the expected impacts indeed materialised. The evaluation utilised various methods and data sets. Both an external and an internal view of the programme were taken. Accordingly, applicants and subsidised companies were compared with regard to various characteristics. To this end, information from company databases and other funding programmes was used, and a company survey was also conducted. In addition, 30 exploratory interviews were conducted to gain detailed insights into the experiences made.

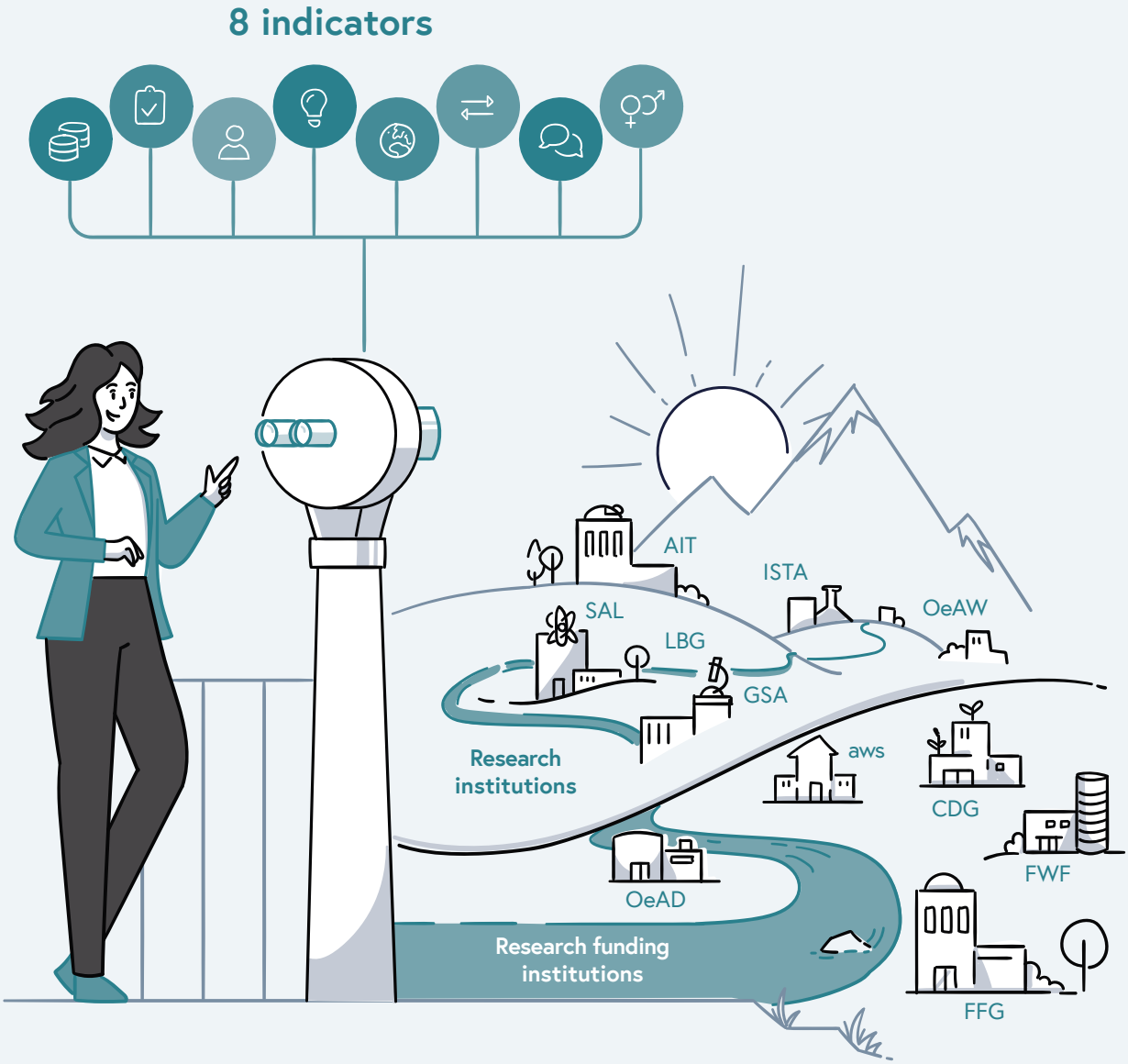
The statistical results on the question of whether the FFG Small Project programme contributes to having a broad impact through a low-threshold design and sometimes addressing companies that have little or no funding experience show that: i) compared to the basic programme of FFG, both the applicant and the funded companies have received fewer projects from the FFG in the past; ii) companies that were funded as part of the Small Project programme line are both younger and smaller than those in the basic programme.

The interviews with the funded companies also revealed that there is a great need for funding for small-scale, application-oriented research projects among start-ups, individual entrepreneurs and SMEs. The Small Project programme is proving to be less complex than the Basic Programme or other thematic and structural programmes. The opportunity to take up smaller projects and project ideas and receive a non-repayable grant for them is seen as an asset. Many of the companies surveyed would not have realised the projects without the small project funding. However, companies, especially sole proprietorships and start-ups that had no previous experience of funding, stated that they would not have been able to submit the application without external support. The interviews also revealed that only a few of those receiving funding succeeded in developing a project (e.g. a prototype) to the point where it was ready for the market during the funding period. Consequently, many interviewees suggested on-top or follow-up funding (to a lesser extent) in order to actually be able to take the step towards the market.



3 Monitoring in accordance with the Research Financing Act (FoFinaG)

Central research and research funding institutions



Chapter 3 covers the monitoring of the central research and research funding organisations in accordance with Section 8 of the Research Financing Act (FoFinaG) and uses a set of indicators to show, for the first time, the development of selected indicators over the last five years. All figures are collected as of 31 December of the respective reporting year. Reference is made to the reporting years 2023 and 2024.

Monitoring of the central institutions in accordance with FoFinaG was introduced for the first time in 2021. The three-year performance and funding agreements that were concluded or will be concluded between the central institutions and the respective responsible Federal Ministries serve as the basis. The contributions to the monitoring are written by the central institutions[264] and are prepared for the report in consultation with the ministries and the authors. In the course of this, comparisons are made with external data from the FWF and the FFG (EU Performance Monitor) for the information on the excellence programmes and the participations in the framework programmes (indicators 4 and 7 for the research institutions); the information on the research infrastructures is checked by the BMBWF.

In accordance with FoFinaG, monitoring was anchored in the annual Austrian Research and Technology Report – with the aim of mapping the development of the central research and research funding organisations. This is intended to provide an overview of the system.

To this end, monitoring in accordance with FoFinaG utilises selected indicators:

- Funding, including third-party funding
- Evaluation systems
- Human capital and qualification
- Output, innovation and excellence
- Internationalisation
- Knowledge and technology transfer
- Communication and interaction with society
- Gender and promotion of equality

Based on the profile of each institution and its positioning in the innovation system, eleven central institutions, research and research funding organisations defined in accordance with FoFinaG, are examined in more detail below.

The central research institutions are:

1. Austrian Institute of Technology GmbH (AIT)
2. Institute of Science and Technology Austria (ISTA)
3. Austrian Academy of Sciences (OeAW)
4. Silicon Austria Labs GmbH (SAL)
5. Ludwig Boltzmann Society – Austrian Association for the Promotion of Scientific Research (LBG)
6. GeoSphere Austria – Federal Agency for Geology, Geophysics, Climatology and Meteorology (GSA)

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264 All figures are collected as of 31 December of the respective reporting year. Monitoring is carried out in February and March of the following year (2024 for this report), although hardly any of the institutions have valid and audited figures for the previous year at this point. In many cases, preliminary figures are therefore published, which are then updated in the following year. For this reason, there are often discrepancies between the annual reports; another reason for discrepancies can be organisational changes or changes in the survey logic. Major changes are explained.

The central research funding institutions are:

1. Austria Wirtschaftsservice Gesellschaft (aws)
2. Christian Doppler Research Association (CDG)
3. Austrian Science Fund (FWF)
4. OeAD-GmbH (OeAD)
5. Austrian Research Promotion Agency (FFG)

Monitoring is developed further every year, partly due to external developments (e.g. changes in legislation, conclusion of new performance and funding agreements) and partly due to further development of the monitoring itself. Accordingly, this Austrian Research and Technology Report 2024 also contains further developments, which can be summarised as follows

At the research institutions:

- The funding and third-party funding indicator:
  - Target values largely correspond to the values in the performance agreements. They relate to 2023 or, in the case of three-year values, to 2021–2023. GeoSphere Austria does not report any target values due to the outstanding performance agreement.
  - The foundation funds from 2022 mainly relate to the Future Austria Fund (FZÖ), but also include remaining funds from the Austrian National Foundation for Research, Technology and Development (NFTE) and the Austrian Fund (Ö-Fonds). This is explained in the definitions.
- Regarding the human capital and qualification indicator, some institutions report on early career researchers (PhD students and postdocs according to defined career stages) and state the proportion of early career researchers as target values accordingly. At ISTA, postdocs are not counted as early career researchers.
- For the output, innovation and excellence indicator, no indices (Web of Science or Scopus) or target values were specified for scientific publications, as the number of publications is not a measure of the quality of a publication and a purely quantitative growth strategy would send the wrong signal here. The survey of grants in ERC and FWF excellence programmes was carried out centrally by the FFG (FFG EU Performance Monitor) and the FWF. The FWF's Clusters of Excellence approved in 2023 correspond to the data in the 2023 Austrian Research and Technology Report. When presenting investments in research infrastructures, only infrastructures that were newly acquired in 2022 and 2023 were taken into account; an explanation can be found in the definitions.
- For the internationalisation indicator, new participations in the EU framework programmes relate exclusively to Horizon Europe; the information provided by the institutions was compared with the FFG figures (EU Performance Monitor) with the cut-off date of 31 December 2023.

- Some institutions (ISTA, OeAW and LBG) use the Glass Ceiling Index (GCI) as a target value for the gender and promotion of equality indicator, while the AIT has developed a female project manager index analogous to the Glass Ceiling Index.

At the research funding organisations:

- Three qualification and management levels are standardised for the human capital and qualification indicator: support (or, in the case of aws, processing and administration), experts and management level. The FFG has also had apprentices since 2023; these are registered separately.
- For the output, innovation and excellence indicator, scientific publications from FWF projects and CDG laboratories/centres are recorded in the same way as publications from research institutions. Target values are shown for consultations, patents (FFG and aws) and SME percentage (FFG and aws).
- The internationalisation indicator reports the proportion of projects with international partners as a percentage of all projects (the FWF is an exception). In addition, the FWF and the FFG report funding in transnational calls (commitments), with the FFG 2023 taking into account the restructuring associated with the implementation of the Horizon Europe partnerships.

3.1 Austrian Institute of Technology (AIT)

3.1.1 Profile and key figures

Profile of the organisation

With over 1,400 employees, the Austrian Institute of Technology (AIT) is Austria's largest research and technology organisation and plays a leading role in innovation at European level – particularly in the areas of decarbonisation, digitalisation and transformation, in which solutions are developed together with universities, companies and the public sector.

The strategic priorities of the AIT include:

- Development of a climate-neutral, digitalised and competitive, resilient industry
- Development and expansion of Austrian technological expertise
- Securing system-critical competences to strengthen European technological sovereignty

The seven AIT centres research and develop methods, algorithms, and technologies for sustainable and resilient infrastructures (energy systems, decarbonisation of industry, transport systems, selected healthcare topics) and for the digital transformation of industry and society (networking, cyber security, data protection, artificial intelligence, automation, human-centred design).

Key figures for 2022 and 2023

	2022	2023
Total income in €1,000	190,926	208,865

Number of employees	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	935	461	1,396	973	480	1,453
Full time equivalents (rounded)	859	382	1,241	878	403	1,281

Source: AIT.

3.1.2 Development of indicators

Indicator 1: Funding, including third-party funding

In contrast to the "central key figures", all indicators in Chapter 3.1.2 relate to AIT without Seibersdorf Labor GmbH and Nuclear Engineering Seibersdorf GmbH.

	2022 in €1,000	2023 in €1,000	Target value 2021–2023 in %**
Total operational income	144,737	159,446	
of which shareholder contributions	53,713	56,081	
of which third-party funding	91,024	103,364	
of which non-EU countries and global organisations	2,633	2,444	
of which public	212	393	
of which private	2,421	2,051	
of which from the EU and European countries or organisations	27,927	36,335	
of which public	21,606	29,144	
of which private	6,321	7,191	
of which national and regional organisations	60,464	64,585	
of which public	34,146	37,477	
of which private	26,317	27,108	
Third-party funding ratio* in %	62.9%	64.8%	63%

* Share of third-party funding in total income in %. ** Due to fluctuations in the disbursement of third-party funding between individual years, average values over three years are given here. Source: AIT.

Indicator 2: Evaluation systems

Evaluations of the thematic and strategic orientation

In addition to compliance with legal and normative requirements, AIT's regulations are based on economic aspects, social aspects as well as safety and environmental factors. The management bears the highest responsibility for this and formulates the company's quality policy and objectives. Compliance with the QM regulations by all employees is monitored by internal and external audits.

The AIT has a Strategic Research Advisory Board made up of internationally recognised personalities from science and research. Its main tasks include commenting and making recommendations on the strategic direction and research programme as well as making recommendations to the Supervisory Board on this programme.

An evaluation is also carried out every three years for the current strategy period: in 2023, the scientific quality, the impact of the research results, the international positioning and

the application relevance of the activities of each centre were assessed by an international evaluation panel. The corresponding statements attested to the AIT's excellent research with a focus on application, as well as its outstanding research infrastructure.

Indicator 3: Human capital and qualification

Number of employees (including LKR Leichtmetallkompetenzzentrum Ranshofen GmbH/Competence Centre "Light Metals Technologies Ranshofen")	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	784	371	1,155	813	390	1,203
of which at management level (management, management of a centre, of a competence unit, administrative area or administrative unit)	34	9	43	35	10	45
Full time equivalents (rounded)	715	308	1,023	726	327	1,053
of which at management level	32	9	41	34	10	44

Source: AIT.

Number of PhD students	2022	2023	Target value 2023
Number of theses completed	18	20	30***
Employees (= headcount)	157	161	
of which employed at AIT	122	123	
of which in structured education (doctoral schools or similar)	35	38	

Early career researchers*	2022	2023	Target value 2023
Employees (= headcount)	200	204	
Share of (scientific) employees**	25.7%	25.3%	25%

* AIT definition: all juniors in the Science and Research Engineer/Expert Advice career models and all PhD students with an AIT contract/permanent position. ** Number of all PhD students with an AIT contract and all students in the Science and Research Engineer/Expert Advice career model, as of 31 December for 2022 and 2023. *** The target value for the number of completed theses could not be achieved for 2023. The main reason for this is that around 50% of PhD students at the AIT are writing their theses part-time (either part-time at the AIT or as external PhDs) and had to postpone the completion of their theses due to work commitments. Source: AIT.

The following staff development measures were implemented in 2022 and 2023:

Recruiting & employer branding activities include international social media recruiting campaigns and specific gender initiatives (female role models, SHEtech cooperation). In addition, administrative improvements and a special onboarding programme for international employees were introduced based on the internal re-evaluation of the onboarding process.

In staff development, the AIT qualification programme was continued and a training support programme for virtual and hybrid management situations was offered as part of the AIT initiative "The Way We Work".

The implementation of the measures resulting from the Work Environment Survey 2022 (e. g. further workshops on critical points from the survey, development of unit/centre-specific improvements such as communication measures, team building) were the focus of organisational development in 2023.

Indicator 4: Output, innovation and excellence

Scientific publications	2022	2023
Monographs and editions*	15	5
Articles/contributions in scientific journals, edited volumes and proceedings	571	655

* Due to the strict separation between books and reports introduced in 2023, the key figure has fallen and now only shows books or book editions published by academic publishers. Source: AIT.

Grants in ERC and FWF excellence programmes

In the FWF Clusters of Excellence approved in March 2023, the AIT is involved in the "Microbiome as a driver of planetary health" cluster with a project share of 3%; the approved funding amounts to €629,000 (FWF funding only). No projects were acquired in the FWF Start and Wittgenstein Prize programmes, nor in the ERC.

Investments in research infrastructure 2022 and 2023

The AIT's research infrastructure is an essential basis for cooperation with partners from research, companies and the public sector. With investments totalling €9.38 million (2023), the AIT is strengthening this infrastructure in forward-looking research topics that are essential for innovation and the transformation of large systems. In 2022 and 2023, a new solid-state battery laboratory and a laboratory for light metal forming technology were put into operation. The opening of the H2 Lab, a test and development infrastructure for hydrogen and hybrid power plant technologies, and the establishment of a laboratory for the development and testing of air-water heat pumps with a thermal output of up to 100 kW are planned for 2024.

Three important Core Facilities* 2022 and 2023

Designation	Research focus	Weblink to the research infrastructure database
Solid state battery laboratory	Development of manufacturing methods for solid-state batteries	Research infrastructure is currently being implemented; database entry will take place in the course of the year
Laboratory for light metal forming technology	Material stress, material functionality and process optimisation with the aim of saving energy in forming processes	https://forschungsinfrastruktur.bmbwf.gv.at/de/fi/forming-laboratory_4893
Laboratory environment/ outdoor test environment for autonomous construction and special vehicles	AI-Enabled Sustainable Automation and Robotics	Research infrastructure is currently being implemented; database entry will take place in the course of the year

* AIT Research Infrastructure Portfolio – Research Infrastructure Database (Open for Collaboration): https://forschungsinfrastruktur.bmbwf.gv.at/en/institution/ait-austrian-institute-of-technology-gmbh_96.
An explanation of investments and acquisition costs for research infrastructures can be found in the definitions. Source: AIT

Indicator 5: Internationalisation

	2022	2023
Share of international co-publications in all publications*	67.8%	68%
Number of newly approved participations in Horizon Europe programmes and initiatives **	64	43
Total funding approved *** in €1,000	36,613	26,892

* The values for 2023 are only provisional values as of 23 January 2024, as not all publications are yet recorded in WoS at this time. For 2023, only high-quality publications from the SCI/SCIE and SSCI were recorded for this key figure in WoS. Proceedings papers that were not published in scientific journals are therefore not (or no longer) included, which is why the key figure for 2022 was also updated accordingly. ** As the Light Metals Centre Ranshofen (LKR) is recorded as a separate entity in the EU Performance Monitor, all projects in which the AIT cooperates with the LKR are counted twice. *** Only EU funds are shown, no own contributions or national co-financing. The year of contract conclusion applies. Source: AIT, FFG EU-Performance Monitor.

Indicator 6: Knowledge and technology transfer

	2022	2023
Share of co-publications with industry and practice partners in all publications listed in WoS*	59%	58%

* The values for 2023 are only provisional values as of 23 January 2024. Not all publications are yet recorded in WoS at this time.
Note: The values indicate the proportion of high-quality SCI/SCIE and SSCI publications (full counting, adjusted for 2022) in which at least one author from the listed organisation types was involved in AIT publications in the Web of Science. Source: AIT.

Patents & exploitation activities	2022	2023
Patent applications	36	26
of which national	8	6
of which EU/EPC	10	9
of which non-EU countries	18	11
Issued patents	73	43
of which national	14	4
of which EU/EPC/UP*	51	34
of which non-EU countries	8	5
Exploitation spin-offs	1	2

* UP stands for Unitary Patent, the European patent with unitary effect, which has been in force since 2023. A patent grant under UP enables protection in 17 countries at the same time.
Note: All patents applied for or granted in the reporting period and all new investments in the reporting period. The number of patents applied for and granted shows a downward trend in the reporting year compared to the previous year. Changes in patent regulations and in the handling of patents (e.g. in the area of microbial strains or biomarkers) as well as a stronger trend towards open source in software development have led to a necessary reassessment of the patent strategy in selected subject areas. Source: AIT.

Indicator 7: Communication and interaction with society

The following activities and formats for the communication and transfer of knowledge and as well as for the inclusion and addressing of civil society actors were implemented in 2022 and 2023

An exemplary list:

- Long Night of Research
- Keynote speeches and panel discussions by AIT Managing Directors with the Club of Rome, at the GEWINN Info Day and at the Austrian Innovation Forum, among others
- Public discussion panel (on the topic of automation) at Berlin Science Week
- Activities on International Women's Day and Daughters' Day
- Creation and presentation of the Austrian Startup Monitor – together with companies from the startup scene
- Organisation of a lab on the topic of Gaia-X (European data sovereignty) at the Forum Alpbach
- International Digital Security Forum Vienna (IDSF 2023)
- AIT Blog: News from AIT research, prepared for the general public
- Digital and social media channels
- Press releases via APA OTS
- Partnership with APA Science
- Appearances at leading international trade fairs in various research areas
- Presence of AIT experts in print media, podcasts, radio or TV
- Selected media co-operations on research topics
- Lectures at (inter)national research institutions
- Numerous research projects in cooperation with stakeholders (e.g. rescue organisations) and civil society communities (e.g. energy communities, regional development, road safety, maker scene)

Indicator 8: Gender and promotion of equality

Proportion of women in management positions by management level	2022	2023	Target value 2023
Managing Directors	0	33%	
Head of Centre/Head of Administrative Area	20%	25%	
Principal Scientist	20%	14%	
Glass Ceiling Index on the basis of management levels*	1.53	1.46	
Percentage of women in project leader functions**	0.99	1.09	1

* Calculated as the proportion of women in all employees/proportion of women in management positions. The explanation of the Glass Ceiling Index can be found in the definitions. Management positions are defined as: Managing Directors, Head of Centre, Head of Administrative Area, Principal Scientist ** Female Project Leader Index: Calculated as the proportion of female project managers among academic-scientific project managers in relation to the proportion of women among academic-scientific staff. This key figure corresponds to the key figures of the AIT monitoring report in accordance with the AIT performance agreement. A value of 1 means that the proportion of women in project management positions corresponds to the proportion of women among academic staff. A value above 1 indicates an underrepresentation, a value below 1 indicates an overrepresentation of women in management positions.

Source: AIT.

The following activities to promote equality were implemented in 2022 and 2023:
In terms of recruiting and employer branding, the external positioning of AIT experts, targeted collaborations (Daughter's Day, Greentech, SHEtech, FEMpowermint-Hagenberg, GirlsTechUp), internal gender information formats and events organised by the AIT Women's Network took place. Winning the SPEKTRUM diversity award from the Federation of Austrian Industries is worthy of special mention.

Training programmes are available to all employees, regardless of gender and extent of employment. There are mandatory further training programmes for different target groups and specific further training measures for women. Flexible working hours, teleworking options and childcare during the school holidays are offered to help reconcile work and family life. Parental leave management has also been revised. Structural measures in 2023 included the improvement of the gender information area on the intranet, the continuation of discussion forums for women and management and the AIT Gender Monitor with a special section on the Work Environment Survey. The re-evaluation of the Gender Equality Plan was also started. In addition, the AIT contributed to exchange formats, for example in the BMK's participation management, in the "FEMtech Expert of the Month" jury and company awards; with practical input in the BMBWF's gender equality plan training and a book contribution in the anthology on gender policy published by the BMBWF and IHS.

3.1.3 Special events in 2023 and outlook

Special events in 2023
The AIT has been able to significantly increase external revenue (co-funded research projects and industry contracts) in recent years. This reflects in particular the strong positioning of the AIT in Horizon Europe – for example in the areas of decarbonisation, automation, battery research and quantum communication. The successful development of the AIT is also reflected in numerous awards. For example, the AIT Mobility Observation Box received the most important European prize for road safety, the Excellence in Road Safety Award (ERSC). The AHEAD project (steam generation without gas) was honoured with the first Net-Zero Industries Award. The series of successful spin-offs of start-ups from the AIT continued – most recently infrared.city and NOSI. Investments in research infrastructure were increased, including in the Large Scale Robotics Lab. A new management team took up its work in 2023.

Outlook
The current AIT Strategy 2024–2026 strengthens the focus on the two core topics of decarbonisation and digitalisation. With its high level of technological expertise and acquired systems knowledge, AIT is able to work with partners to analyse the potential of new technologies, develop them further, use them for innovation and support the sustainable transformation of socio-technical systems at various stages.

For more information, see the AIT annual financial statements.[265]

265 https://www.ait.ac.at/en/media/annual-financial-statement

3.2 Institute of Science and Technology Austria (ISTA)

3.2.1 Profile and key figures

Profile of the organisation

The Institute of Science and Technology Austria (ISTA) was established in 2006 by the Austrian Federal Government and the Government of Lower Austria. The campus in Klosterneuburg was opened in 2009. It serves cutting-edge research in the field of basic research in the natural sciences. ISTA aims to open up new fields of research and ensure high-quality postgraduate education in the form of interdisciplinary PhD and postdoctoral programmes. Research, training and staff selection are internationally orientated, and the working and teaching language is English. By 2036, there will be around 150 research groups and a total of more than 2,000 employees on campus.

Key figures for 2022 and 2023

	2022	2023
Total income in €1,000	78,701	102,500

Number of employees	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	548	451	999	624	482	1,106
Full time equivalents (rounded)	535	414	949	610	442	1,052

Source: ISTA.

3.2.2 Development of indicators

Indicator 1: Funding, including third-party funding

	2022 in €1,000	2023 in €1,000	Target value 2021–2023 in €1,000*
Total income	78,701	102,500	
of which public basic funding from the Federal Government	36,829	56,349	
of which cash-obtained in from eligible third-party funding	23,727	28,145	> 22,000
of which funding from the federal state of Lower Austria	3,924	4,046	
of which other sales and other operating income	12,590	14,336	
of which from the release of investment grants	10,588	11,950	
of which third-party funding	25,358	27,275	
of which non-EU countries and global organisations	4,700	4,634	
of which EU and European countries or organisations	11,505	16,056	
of which national and regional organisations	9,153	6,585	

* Due to the fluctuations in third-party funding disbursement between individual years, average values over three years are given here.

Source: ISTA.

Indicator 2: Evaluation systems

Evaluations of the thematic and strategic orientation

ISTA is subject to the governance of a number of bodies that take on precisely defined tasks. The Board of Trustees and the Executive Committee monitor the development and strategic orientation of the Institute, while the Scientific Council prepares proposals for the scientific orientation and for ensuring high scientific performance. As stipulated in the Federal Act on the Establishment of the Institute of Science and Technology Austria §5 (2), the development of the Institute is regularly evaluated. To date, one economic evaluation (2014–15) and three scientific evaluations (2011, 2015, 2019) have taken place, in which an excellent development of the Institute was noted.

Indicator 3: Human capital and qualification

Number of employees	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	548	451	999	624	482	1,106
of which at management level (faculty (professors and assistant professors), management, division heads, unit heads)	68	23	91	70	28	98
Full time equivalents (rounded)	535	414	949	610	442	1,052
of which at management level	66	23	89	69	27	96

Source: ISTA.

Number of PhD students	2022	2023	Target value 2023
Number of theses completed*	23	32	> 22
Employees (= headcount)	309	345	
of which employed at ISTA	309	345	
of which women	134	137	
of which in structured education (doctoral schools or similar)	309	345	
Early career researchers**	352	345	> 228

* PhDs in the calendar year, target value according to the performance agreement 2021–2023 ** Number of trained early career researchers according to the performance agreement 2021–2023: from 2023 excl. scientific interns. Source: ISTA.

The following staff development measures were implemented in 2022 and 2023:

The Career Development Office offers a range of target group-specific training programmes for academics: These include training in the areas of academic skills, technical skills, career development (both academic and intersectoral career planning), grant application training and training on standards of good scientific practice.

Employees in administration and the Scientific Service Units have access to a comprehensive further education and training programme as well as specific leadership training.

The Employee Assistance Programme (EAP) – a professional psychological counselling service – is available to all employees free of charge.

Indicator 4: Output, innovation and excellence

Number of scientific publications	2022	2023	Target value 2023
Monographs and editions	23	38	
Articles/contributions in scientific journals, edited volumes and proceedings	403	474	
Proportion of publications with at least one co-author with another affiliation	90%	86%	≥ 75%

Source: ISTA.

Grants in ERC and FWF Excellence Programmes		2022	2023
ERC	Number	8	10
	Total funding approved in €1,000	14,699	18,613

For the ERC Starting Grants, Consolidator Grants and Advanced Grants are counted; other grants and co-beneficiaries can be specified in free text. The year in which the contract was concluded applies. Source: FWF, FFG EU-Performance Monitor.

In addition to the projects listed in the table, ISTA signed an ERC Proof of Concept (PoC) in 2022. In 2023, ISTA signed two ERC Synergy Grants (one as coordinator, one as partner) and received two ERC Proof of Concept Grants (contract signed in 2024). There were no approvals in the FWF Start and Wittgenstein Prize programmes in 2022 and 2023.

Project components in the Cluster of Excellence Programme of the FWF 2023	Share in %	Grant amount* in €1,000
ISTA total	22	4,589
Cluster: Materials for energy conversion and storage	8	1,649
Cluster: Microbiomes as a driver of planetary health	3	630
Cluster: Quantum Science Austria	11	2,310

*Only FWF funds without own contributions. Source: FWF.

Investments in research infrastructure 2022 and 2023

From a strategic perspective, the Core Facilities (organised at ISTA in the Scientific Service Units) are a key success factor for the Institute, both in terms of faculty recruitment and the cost-efficient operation of high-end equipment with the broadest possible user base. The organisation of the Core Facilities allows all ISTA research groups access to the equipment under the same conditions. Experts in the Core Facilities support the research groups and thus secure long-term knowledge about methods and applications.

Research infrastructures 2022/2023

- Small angle X-ray scattering (SAXS) – Lab Support Facility
- X-ray photoelectron spectroscopy (XPS) – Lab Support Facility
- Nano 3D Printer – Nanofabrication Facility
- Raman spectrometer – Nanofabrication Facility
- timsTOF high resolution mass spectrometer – Lab Support Facility

Three important Core Facilities* 2022 and 2023

Designation	Research focus	Weblink to the research infrastructure database
Imaging and Optics Facility	Light/laser microscopy and flow cytometry to support researchers in cell biology, neuroscience, physics, chemistry and biochemistry.	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/imaging-facility_2421
Nanofabrication Facility	Micro- and nanofabrication processes for the development of new processes or the development of new nanostructures. Research into quantum phenomena.	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/nanofabrication-facility_3644
Lab Support Facility	General support for all experimental working groups in the fields of biosciences, chemistry and physics. More specialised topics are covered by the service facilities Aquatics, Cleaning and Media Kitchen, Mass Spec, Molecular Biology Service and Plants.	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/lab-support-facility_5411

* Large research infrastructures in particular require a certain amount of preparation time after acquisition to be set up and fully commissioned. It is therefore possible that not all of the new research infrastructures mentioned may already appear in the database at the time of reporting. An explanation of investments and acquisition costs for research infrastructures can be found in the definitions.

Source: ISTA.

Indicator 5: Internationalisation

	2022	2023
Share of international co-publications in all publications in the reporting year	81.6%	79.6%
Number of newly approved participations in Horizon Europe programmes and initiatives	17	19
Total funding approved * in €1,000	16,694	25,604

* Only EU funds are shown, not own contributions or national co-financing. The year of contract conclusion applies.

Source: ISTA, FFG EU-Performance Monitor.

Indicator 6: Knowledge and technology transfer

Patents & exploitation activities	2022	2023
Number of patent applications	9	4
Issued patents	2	1
Exploitation spin-offs	0	1

All patents registered or granted in the reporting period and all new investments in the reporting period. Source: ISTA.

Indicator 7: Communication and interaction with society

The following activities and formats for the communication and transfer of knowledge as well as for the inclusion and addressing civil society actors were implemented in 2022 and 2023:

- ISTA Lectures (internationally recognised top researchers present their work in an easily understandable way)
- bigX 23 (lecture series to promote exchange between industry, start-ups and the research community)
- Long Night of Research
- Official launch of a new website to make ISTA research accessible: www.vistascience.at
- Opening of the VISTA Science Experience Lab at the ISTA Campus with a weekly workshop programme for school classes and interested children and young people.
- STEM looks like me: travelling exhibition with female STEM role models including workshops for schoolgirls throughout Austria and a social media campaign
- Fakehunter project: workshops in youth centres, parks and shopping centres on the topic of fake news on social media, including videos on the topic on TikTok
- Winter wonder science: the first VISTA Christmas Science Show took place on 21 December 2023. 540 students attended the live shows on campus and 100,000 via livestream.
- 3 Science *Heurige*: low-threshold science education formats for adults
- Summer campus for 250 pupils in August
- Further training for 400 teachers on campus and digitally

Indicator 8: Gender and promotion of equality

Proportion of women in management positions by management level	2022	2023	Target value 2023
Management	0%	0%	
Division Heads/Unit Heads	45.5%	47.8%	
Faculty (Professors and Assistant Professors)	19.7%	23.0%	
Glass Ceiling Index on the basis of management levels*	1.79	1.53	1.75

* Calculated as the share of women in all employees/share of women in management positions. Management positions include faculty (professors and assistant professors), management, division heads, unit heads. The explanation of the Glass Ceiling Index can be found in the definitions.

Source: ISTA.

The following activities to promote equality were implemented in 2022 and 2023:

- Continuation of Women Scouting – continuation of a dedicated recruiting committee in the search for suitable female professors (outside the life sciences)
- Continuation of WoMen in Science series – in November 2023 under the motto "Power Relations in Academia"
- Continuation of the Equity, Diversity & Inclusion (EDI) Group: Participants in this group are the President (Chair), faculty members, Head of Human Resources, Good Practice Officer
- Ongoing implementation of the Gender Equality Plan developed in 2022

3.2.3 Special events in 2023 and outlook

Exemplary research findings 2023

The optimisation of pumping processes is still an active area of research. An ISTA group has shown how pulsed pumping can reduce friction and energy consumption during pumping. They were inspired by a pumping system that everyone knows: the heart.

Glaciers are fighting back against climate change – but for how much longer? An ISTA group researched that glaciers in the Himalayas are increasingly cooling the air that comes into contact with the ice surface to counteract rising global temperatures. The resulting cold winds could help to cool the glaciers and preserve the surrounding ecosystems.

The number of qubits in superconducting quantum computers has increased rapidly in recent years. However, further growth is limited by the extremely cold operating temperature required. By connecting processors, larger, more powerful quantum computers could be created. ISTA has demonstrated quantum entanglement between optical and microwave photons for the first time, which could lay the foundation for such a future quantum network.

Outlook

The successful recruitment of top international scientists continues to be at the centre of ISTA's activities. The areas of science education and technology transfer are being continuously expanded. In addition, the Institute's sustainability concept is being implemented.
For more information see the ISTA Annual Report.[266]

266 https://ist.ac.at/en/institute/documents/#Annual-Reports

3.3 Austrian Academy of Sciences (OeAW)

3.3.1 Profile and key data

Profile of the organisation

"To promote science in every respect" is the statutory mission of the Austrian Academy of Sciences (OeAW), Austria's largest and most diverse non-university institution for basic research. As a research organisation with 26 institutes in the humanities, social and cultural sciences as well as in natural, life and technical sciences, the Austrian Academy of Sciences addresses forward-looking research topics, often interdisciplinary, acting in an open-minded manner and preserving cultural heritage.

As a research funding body, the Austrian Academy of Sciences supports promising scientific talent, both intramurally through an attractive career model and throughout the Austrian research area by awarding scholarships and prizes.

As a national academy of sciences, the Austrian Academy of Sciences is both a learned society and a disseminator of knowledge, contributing the latest scientific findings to the public discourse from a multidisciplinary perspective.

The interaction of these areas under one roof creates synergies, dynamism and innovation potential for the benefit of science and society.

Key figures for 2022 and 2023

OeAW total	2022	2023
Total income in €1,000*	209,219	218,961

Number of salaried employees of the Austrian Academy of Sciences (incl. wholly owned subsidiaries); as of 31 December in each case	2022				2023			
	m	f	d	total	m	f	d	total
Employees (= headcount)	995	855	1	1,851	970	834	1	1,805
Full time equivalents (rounded)	848	681	1	1,530	833	662	1	1,496

* Total income corresponds to sales and other operating income in accordance with the Austrian Commercial Code (UGB). The figures for 2023 are preliminary values.
Source: OeAW.

3.3.2 Development of indicators

In contrast to the "key figures" listed above, all of the following indicators, with the exception of indicator 7, relate exclusively to the OeAW research organisation, excluding the learned society, fellowships and the commissioned area.

Indicator 1: Funding, including third-party funding

OeAW research organisations	2022 in €1,000	2023 in €1,000	Target value 2021–2023 in %
Total income*	182,944	190,004	
of which federal funding due to OeAW-BMBWF performance agreement	116,068	116,091	
of which other income	24,729	23,606	
of which third-party funding**	42,147	50,307	
of which global organisations and non-European countries and organisations	360	102	
of which EU and European countries or organisations	11,611	21,097	
of which public	11,611	21,029	
of which private	0	68	
of which national and regional organisations	30,176	29,108	
of which public	30,164	27,778	
of which NFTE, Ö-Fonds and FZÖ	1,572	4,792	
of which private	12	1,330	
Third-party funding ratio *** in %	26.6%	30.2%	> 27%

* Total income excludes extraordinary income from the reversal of provisions, accrued expenses and deferred income and excludes income from the disposal of fixed assets. ** Third-party funds are shown after the allocation of funds and do not include any accruals. The significant increase in third-party funding in 2023 is mainly due to the high volume of prefinancing for EU projects. *** The third-party funding ratio is calculated as: Third-party funds/(funds from the performance agreement + third-party funding), excluding other income. The figures for 2023 are provisional values. Due to fluctuations in the disbursement of third-party funding between the individual years, the target value is given as an average value over three years. Source: OeAW.

Indicator 2: Evaluation systems

Evaluations of the thematic and strategic orientation

Regular or ad hoc evaluations by international teams of high-ranking researchers, whose independence and expertise is the responsibility of the OeAW Research Board, including a Nobel Prize winner, provide important impetus for the further development of the OeAW institutes and initiatives. The results of these procedures, which are carried out according to international standards, are incorporated into the three-year target agreements with the institutes and are the starting point for decisions on the organisation of the OeAW research institution.

A Scientific Advisory Board, consisting of national and international experts, supports the institutes of the Austrian Academy of Sciences. The advisory boards are newly appointed every five years and have the task to continuously contribute to achieving and ensuring the highest possible level of research at the institutes.

Other measures designed in accordance with international standards continuously and transparently ensure scientific quality, e. g. when filling scientific (management) positions, in ex-ante/ex-post project and programme controlling and in the evaluation of employees. All quality assurance processes take into account the special features of the respective research field as well as special institute missions, e. g. the preservation of cultural heritage.

Indicator 3: Human capital and qualification

Number of employees of the OeAW research organisation (incl. wholly-owned subsidiaries)	2022				2023			
	m	f	d	total	m	f	d	total
Employees (= headcount)	944	804	1	1,749	916	783	1	1,700
of which at management level	116	52	0	168	124	58	0	182
Full time equivalents (rounded)	806	637	1	1,444	788	618	1	1,407
of which at management level	105	48	0	153	114	53	0	167

Source: ÖAW.

Early career researchers*	2022	2023	Target value 2023
Employees (= headcount)	768	691	
Share of scientific employees	66%	63%	> 60%

* When defining early career researchers, the OeAW is guided by the European Commission's document "Towards a European Framework for Research Careers" (https://era.gv.at/object/document/1509), which is one of the key foundations for the OeAW's career model and is therefore also reflected in the OeAW's collective agreement. It proposes a four-stage model: R1 – First stage Researcher (up to the point of PhD); R2 – Recognised Researchers (PhD holders or equivalent who are not fully independent); R3 – Established Researchers (researchers who have developed a level of independence); R4 – Leading Researchers (researchers leading their research area or field). In accordance with this model, the career levels R1 and R2 refer to early career researchers. Source: OeAW.

The following staff development measures were implemented in 2022 and 2023

The mentoring programme enabled early career researchers to acquire key qualifications, including career planning, third-party funding, project management and personnel management.

The OeAW launched the process to obtain the Human Resources Excellence in Research Award. Customised training measures (training, workshops, coaching) for OeAW researchers continued to take place to support the acquisition of competitive third-party funded projects.

With the Seal of Excellence Award, the Academy offers – as the first in Austria – the possibility of substitute funding for employees whose application was rated excellent but was not considered for an ERC grant, for example, for budgetary reasons.

The OeAW scholarship programmes were continued extramurally. In 2023, additional funding was acquired from the Future Austria Fund for the DOC and APART programmes.

Indicator 4: Output, innovation and excellence

Number of scientific publications from projects of the OeAW research performing organisation	2022	2023
Monographs and editions	48	49
Articles/contributions in scientific journals, edited volumes and proceedings	1,756	1,662

Source: OeAW.

Grants funded at OeAW research performing institutions in ERC and FWF excellence programmes		2022	2023
ERC	Number	8	6
	Total funding approved in €1,000	11,225	10,626

For the ERC, Starting Grants, Consolidator Grants and Advanced Grants are counted. The year of contract conclusion applies.
Source: FWF, FFG EU-Performance Monitor.

In addition to the projects listed in the table, the Austrian Academy of Sciences was involved in one ERC Consolidator Grant and one ERC Advanced Grant as a co-beneficiary in 2022, and also received approvals for two ERC Proof of Concepts. In 2022, the Austrian Academy of Sciences also acquired an ERC Consolidator Grant, which was transferred to another research institution before the project started. One ERC Starting Grant was transferred from the University of Vienna to the Austrian Academy of Sciences and retroactively allocated to 2022. In addition to the projects listed in the table, two ERC Consolidator Grants were also acquired at the Austrian Academy of Sciences in 2023, for which no final contract had been signed by the end of 2023.

Project components acquired at OeAW research performing institutions in the FWF 2023 Cluster of Excellence Programme	Share in %	Authorisation amount in €1,000
OeAW total	58	7,474
Cluster EurAsia:Transformation processes (EurAsia)	40	3,694
Cluster: Microbiomes as a driver of planetary health	7	1,470
Cluster: Quantum Science Austria	11	2,310

Source: FWF.

Investments in research infrastructure in 2022 and 2023:

In order to meet the steadily increasing demand for computing power of the OeAW institutes and their cooperation partners, the Academy implemented its investment project in High Performance Data Analysis in 2023, specifically through the Cloud Infrastructure Platform CLIP. In the Life Sciences division, the Chemical Screening Facility at CeMM – Research Centre for Molecular Medicine GmbH was significantly expanded.

State-of-the-art laboratory equipment has been installed at the new Vienna site of the Austrian Archaeological Institute (ÖAI) in the former Postal Savings Bank, in order to promote the expansion of excellent scientific research in the field of archaeology.

The Austrian Academy of Sciences also represents Austria in numerous European and international (large-scale) research infrastructures, including those that are part of the ESFRI Roadmap.

Three important investments in core facilities in 2022 and 2023

Designation	Research focus	Weblink to the research infrastructure database
2023		
Chemical Screening at CeMM – Research Centre for Molecular Medicine GmbH	Automated high-throughput screening of active ingredients	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/_5601
Extension regarding EOS Storage to HPDA/CLIP at the Institute for High Energy Physics (HEPHY) and Stefan Meyer Institute for Subatomic Physics (SMI)	High Performance Computing Infrastructure	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/_5602
Laboratory equipment including gas chromatograph at the Austrian Archaeological Institute	Expansion of scientific archaeology and its methods	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/_5600
2022		
Expansion of the core facilities at IMBA – Institute for Molecular Biotechnology GmbH (Vienna): Eppendorf Bioreactor	Bioreactor for use in the field of organoid research	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/_5353
Thermal ice core drill at the Institute of Mountain Research – IGF (Innsbruck)	Sampling to analyse Austria's oldest glacier ice (e.g. as a climate archive)	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/_5350
Expansion of the digitisation centre at the Austrian Centre for Digital Humanities and Cultural Heritage – ACDH-CH (Vienna): Thermography system with IR book scanning table	Use in the ACDH-CH Digitisation Centre to support researchers in the digitisation of research-relevant sources	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/_3894

OeAW research infrastructures can be found at: https://forschungsinfrastruktur.bmbwf.gv.at/de/institution/osterreichische-akademie-der-wissenschaften-oaw_24. An explanation of investments and acquisition costs for research infrastructures can be found in the definitions. Source: OeAW.

Indicator 5: Internationalisation

	2022	2023	Target value 2021–2023*
Share of international co-publications in all publications listed in WoS** in the reporting year	79.5%	81.9%	
Number of newly approved participations of OeAW research performing institutions in Horizon Europe programmes and initiatives	25	21	
Total funding approved in €1,000***	16,879	13,999	
Number of Horizon Europe applications	77	82	> 200

* Number of cumulative applications in three years. ** The following "citable publication types" are taken into account: articles, proceedings papers, review articles, letters. *** Only EU funds are shown, no own contributions or national co-financing. The year of contract conclusion applies. Source: OeAW, FFG EU-Performance Monitor.

Indicator 6: Knowledge and technology transfer

Patents & commercialisation activities	2022	2023
Patent applications	39	41
of which national	0	0
of which EU/EPC	12	13
of which non-EU countries	27	28
Issued patents	10	12
of which national	0	0
of which EU/EPC	1	7
of which non-EU countries	9	5
Exploitation spin-offs	1	0
Licence agreements	3	3
Option contracts	0	0
Sales contracts	0	1
Utilisation partners (companies, non-university research institutions)	2	4

All patents that were registered or granted in the reporting period as well as all new contracts and new participations concluded in the reporting period.
Source: OeAW.

Indicator 7: Communication and interaction with society

The following activities and formats for the communication and transfer of knowledge as well as for the inclusion and addressing civil society actors were implemented in 2022 and 2023:

The importance of communication with the public was once again demonstrated by the OeAW Science Barometer. To further counteract scientific scepticism, the Academy organised exhibitions (e.g. Peyer-Weyprecht polar expedition; Discovering women researchers: Women at the OeAW), a children's university, a memorial day and invited an ESA astronaut to a public Christmas Talk. An OeAW glacier researcher was honoured as Scientist of the Year 2023. The OeAW's educational commitment to green genetic engineering and a study on the coronavirus pandemic attracted media attention.

In 2023, members of the Junge Akademie also provided insights into their research in a standard blog, in an understandable way and in connection with current and socially relevant topics, including sustainable batteries, artificial intelligence and LGBTIQ visibility.

As part of the Young Science initiative "Academy in the Classroom", workshops for primary schools were offered for the first time in 2023 in addition to lectures.

The Austrian Academic Scholarship Foundation of the Austrian Academy of Sciences organised numerous seminars and workshops on scientific topics for talented young people, also in cooperation with the Academic Scholarship Foundations in Germany and Switzerland.

Indicator 8: Gender and promotion of equality

Proportion of women in management positions by management level	2022	2023	Target value 2023
Institute directors	26%	30%	
Scientific Directors	33%	33%	
Group leaders	27%	26%	
Junior group leaders	30%	28%	
Administrative and technical management staff	35%	41%	
Glass Ceiling Index on the basis of management levels*	1.49	1.45	< 1.65**

* Calculated as the share of women in all employees/share of women in management positions. The explanation of the Glass Ceiling Index can be found in the definitions. Management positions are defined as follows: Institute directors, scientific directors, group leaders, junior group leaders, administrative or technical management staff. ** Target value according to the OeAW performance agreement 2021–2023. Source: OeAW.

The following activities to promote equality were implemented in 2022 and 2023:
The OeAW Gender Equality Plan and the Language Guide were revised, as was the "Academy and Family" guideline, which now entitles a larger group of people to receive grants.

In 2023, the Academy conducted a gender pay gap analysis for the first time, which will be conducted regularly in future.

The OeAW Clearing House against Discrimination offered training on protection against discrimination, bullying and harassment.

The Equal Opportunities Working Group supported various recruitment procedures and organised two Gender & Diversity Lectures (Inclusive Learning and Teaching; Gender in Digital Communication) and a panel (Anti-Genderism in Austria and Europe).

To mark the European Day of Languages in 2023, the interactive "Day of Multilingualism" was held at the Austrian Academy of Sciences to raise awareness of linguistic diversity and the opportunities offered by multilingualism.

The OeAW also addressed its own history, for example in a critical and permanently visible artistic examination of the painting by Olga Prager from 1912, which is located in the OeAW main building and shows a meeting of Academy members.

3.3.3 Special events in 2023 and outlook

Exemplary research findings 2023
Using ultraviolet photography, an OeAW researcher discovered fragments of a 1,750-year-old translation of the Gospels into Old Syriac in a manuscript in the Vatican – an important piece of the puzzle in the history of the Bible.

The ESA space probe JUICE began its eight-year research journey into the Jupiter system – with the novel quantum interference magnetometer MAGSCA on board, which was developed in collaboration with OeAW space researchers.

An Austrian Academy of Sciences team has succeeded in developing a human heart organoid that forms atria and ventricles and beats in a coordinated manner – an important contribution to the understanding of heart diseases and malformations.

OeAW researchers demonstrated that photon pairs remain usable even in daylight when they are entangled in several dimensions. This enabled a quantum key to be shared across the rooftops of Vienna with a receiver on the Bisamberg.

Outlook

The OeAW is involved in three of the five Clusters of Excellence of the FWF Excellence Initiative. These are dedicated to the history of Eurasia, mysteries of the quantum world and the role of microorganisms.

A public lecture by Nobel Prize winner Anne L'Huillier will kick off 2024 in the OeAW main building. To mark CERN's anniversary, the Austrian Academy of Sciences High Energy Physics is organising a Science Week in Vienna.

The two OeAW quantum physics institutes in Innsbruck and Vienna are celebrating their 20th anniversary.

An exhibition to mark the 250th birthday of Joseph Hammer-Purgstall sheds light on the life and work of the first President of the Academy.

The academy is also launching the education channel – an innovative video project designed to appeal to young people at eye level and counter fake news.

All strategic guiding documents are published on the website of the Austrian Academy of Sciences.[267]

3.4 Silicon Austria Labs GmbH (SAL)

3.4.1 Profile and key data

Profile of the organisation

Silicon Austria Labs GmbH is an Austrian, non-university research centre for electronics-based systems (EBS). The company is based in Graz. At its three locations in Graz, Villach and Linz, SAL conducts research along the entire EBS value chain in the areas of Microsystems, Sensor Systems, Intelligent Wireless Systems, Power Electronics and Embedded Systems. Research is conducted at both model and hardware level (components, assemblies, and devices with micro- and nanoelectronics) as well as the associated embedded software level, combined

267 The OeAW Development Plan sets out strategic goals, the OeAW Performance Agreement sets out the corresponding measures of the Academy for each three-year period; the Academy's Annual Report provides information and the research highlights of the previous year. All these documents are available at https://www.oeaw.ac.at/en/oeaw/academy/performance-reports-strategy

with the holistic knowledge of comprehensive system integration. In contract and in-house research as well as in cooperative projects, work is carried out on topics such as Industry 4.0, Internet of Things, autonomous driving, cyber-physical systems, AI, Smart City, Smart Energy and Smart Health.

Key figures for 2022 and 2023

	2022	2023
Total income in €1,000	40,992	51,944

Number of employees	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	213	76	289	236	87	323
Full time equivalents (rounded)	199	67	266	217	79	296

Source: SAL.

3.4.2 Development of indicators

Indicator 1: Funding, including third-party funding

	2022 in €1,000	2023 in €1,000	Target value 2021–2023 in %**
Total income	40,992	51,944	
of which payments by shareholders	26,282	35,975	
of which third-party funding	14,710	15,969	
of which non-EU countries and global organisations	126	457	
of which public	126	0	
of which private	0	457	
of which EU and European countries or organisations	2,784	5,363	
of which public	1,659	2,859	
of which private	1,125	2,504	
of which national and regional organisations	11,800	10,149	
of which public	3,746	1,919	
of which private	8,054	8,230	
Third-party funding ratio * in %	35.9%	30.7%	> 37%

* Share of third-party funding in total income in %. ** Due to fluctuations in the disbursement of third-party funding between the individual years, average values over three years are shown here. Source: SAL.

Indicator 2: Evaluation systems

Evaluations of the thematic and strategic orientation

The strategic orientation of SAL is regularly evaluated by the FFG. This involves the quality of the projects, suitability of the project partners, utilisation and exploitation, as well as the topics of internationalisation and human capital. The research programme is in addition regularly discussed with the Scientific Advisory Board, which subsequently forwards its recommendations to the SAL Supervisory Board.

Indicator 3: Human capital and qualification

Number of employees	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	213	76	289	236	87	323
of which at management level	16	4	20	22	4	26
Full time equivalents (rounded)	199	67	266	217	79	296
of which at management level	14	4	18	21	4	25

Source: SAL.

Number of PhD students	2022	2023
Number of theses completed	1	4
Employees (= headcount)	48	57
of which employed at SAL	28	39
of which in structured education (doctoral schools or similar)	20	18

Source: SAL.

Early career researchers	2022	2023	Target value 2023
Employees (= headcount)	101	116	> 110
Share of (scientific) employees	47%	50%	> 47%

* The report's definition of early career researchers is based on the European Commission's document "Towards a European Framework for Research Careers" (https://era.gv.at/object/document/1509). It proposes a four-stage model: R1 – First stage Researcher (up to the point of PhD); R2 – Recognised Researchers (PhD holders or equivalent who are not fully independent); R3 – Established Researchers (researchers who have developed a level of independence); R4 – Leading Researchers (researchers leading their research area or field). In accordance with this model, the career levels R1 and R2 denote early career researchers. Source: SAL.

The following staff development measures were implemented in 2022 and 2023

The various stages of the employee life cycle were further developed, and HR processes were optimised in order to adapt them to the needs of the organisation. The health of employees is influenced by the conditions and stresses of their working environment. With this in mind, SAL has implemented various measures as part of the workplace health promotion project, such as training courses to improve mental health.

In 2023, SAL was recertified with the "Work and Family" certificate, which is valid until 2026. Over the next three years, SAL will implement ten defined measures approved by the "Work and Family" committee to improve working conditions for employees.

Indicator 4: Output, innovation and excellence

Number of scientific publications	2022	2023
Monographs and editions	1	1
Articles/contributions in scientific journals, edited volumes and proceedings	127	183

Source: SAL.

No projects were acquired in the ERC programmes or in the FWF Start and Wittgenstein Prize programmes in the 2022–2023 reporting period. In 2023, one ongoing ERC project and one FWF project were transferred to SAL.

Investments in research infrastructure in 2022 and 2023:

Massive investments have been made at all three SAL locations in the last two years. In particular, the opening of the headquarters in Graz has created larger laboratory space for Power Electronics and Dependable EBS. The development in the areas of validation and testing for carrying out environmental impact tests is continuing. In Linz, research is being conducted on (industrial) Integrated Communication and Sensing (ICAS) in the 5G/6G testbed, where real-time knowledge and active influencing of the radio channel are used to make data transmission more reliable and energy-efficient. The new clean room with 1,100m² of active clean room space was opened in Villach and ten devices have already been put into operation.

Three important Core Facilities 2022 and 2023*

Designation	Research focus	Weblink to the research infrastructure database*
Cleanroom 2 with 1,100m² for EBS prototype series	Micro-nanoelectronics for all areas of SAL for the production of corresponding hardware	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/cleanroom-ii_5649
Industrial 5G/6G radio systems for sensing and communication with reconfigurable radio channels for real-time communication.	Intelligent Wireless Systems	https://forschungsinfrastruktur.bmbwf.gv.at/en/institution/silicon-austria-labs-gmbh-sal_87?id=5517
Validation Lab	Test & validation infrastructure can be used for all areas of the SAL EBS value chain	https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/validation-lab_5648

* For an overview, see also the SAL website: https://silicon-austria-labs.com/en/research/equipment. An explanation of investments and acquisition costs for research infrastructures can be found in the definitions. Source: SAL.

Indicator 5: Internationalisation

To ensure and increase its international visibility, SAL has participated in numerous events and committees and published its findings, which are aimed at both the scientific community and the wider public. This commitment is also reflected in the key figures for internationally funded research projects, in which SAL was extremely successful in 2022/23.

	2022	2023
Share of international co-publications in all publications	40%	51%
Number of newly approved participations in Horizon Europe programmes and initiatives	6	10
Total funding approved in €1,000*	4,913	6,026

*Only EU funds are shown, not own contributions or national co-financing. The year of contract conclusion applies. In addition to the Horizon Europe projects listed in the table, the ERC project CITRES was transferred to SAL in 2023 with a funding contract totalling €76,000.
Source: SAL, FFG EU Performance Monitor.

Indicator 6: Knowledge and technology transfer

Publications	2022	2023
Share of co-publications with industry or practice partners in all publications	19%	15%

In absolute terms, co-publications with industry have risen slightly (from 24 to 26). The proportionally greater increase in the scientific area is due to the focus on strategic projects.
Source: SAL.

Patents & commercialisation activities	2022	2023
Number of patent applications	7	8
of which national	0	0
of which EU/EPC	5	7
of which non-EU countries	1	0
of which international (PCT)	1	1
Issued patents	5	2
of which national	0	0
of which EU/EPC	0	0
of which non-EU countries	5	2
Exploitation spin-offs	0	0

All patents registered or granted in the reporting period and all new investments in the reporting period
Source: SAL.

Indicator 7: Communication and interaction with society

SAL's main communication channels are the SAL website (including information on the research offering, opportunities for collaboration, news, downloads), the SAL LinkedIn account (with over 12,000 followers as of 31 December 2023) and the monthly SAL Science & Stories newsletter. SAL's research findings are also communicated to the public via press releases and media

collaborations (e.g. *Der Standard*, *Austria Innovativ*). In addition, SAL has also had an Instagram account since 2023, which is intended to draw the attention of young people in particular to the SAL topics.

SAL participates in various programmes for school pupils, e.g. "*Berufsspionage*" organised by *BBO Kärnten* or "Future Jobs", where young people are introduced to technical professions. In addition, pupils can complete individual taster days at SAL and accompany the researchers. SAL also offers guided tours for students on request. The video format "Superwomen in Science" (interviews with SAL researchers) is intended to arouse the interest of young women in scientific and technical professions. These are available on the SAL YouTube channel.

Indicator 8: Gender and promotion of equality

Proportion of women in management positions by management level	2022	2023
Management (CEO/CTO/CFO)	0	1
All management levels	20%	33%
Glass Ceiling Index on the basis of management levels*	1.31	1.75

*Calculated as the share of women in all employees/proportion of women in management positions. The explanation of the Glass Ceiling Index can be found in the definitions. Source: SAL.

The following table shows the number of women and men at the various management levels in 2023.

Proportion of women in management positions by management level	ML1	ML2	ME3	Complete management
Women	1	1	2	4
Men	2	3	17	22
Total	3	4	19	26

Management positions are defined as: Management level 1 – CEO and CTO, management level 2 – Division Heads, management level 3 – Unit Heads and Enterprise Heads. Source: SAL.

The following activities to promote equality were implemented in 2022 and 2023:

SAL recognises that diversity enhances creativity, innovation and overall performance and is therefore committed to creating an environment in which all people have equal opportunities to flourish. In an effort to promote an inclusive and diverse work environment, SAL is committed to conducting measurements to assess and promote gender equality within its organisational framework.

The following measures and priorities were set:

- Ongoing (internal) monitoring of the gender-specific composition of the workforce and the salary structure, including reviewing the distribution of training, mentoring and management development opportunities
- Flexible working arrangements (also part-time all-in for people returning to work)
- Redefinition of the term "family" as part of the "Work & Family" re-audit

This commitment to diversity and inclusion is in line with SAL's mission to be a leader in research and development and to promote a culture of gender equality.

3.4.3 Special events in 2023 and outlook

Exemplary research findings 2023

The most important research successes in 2023 included winning the Semikron Innovation Award for the Tiny Power Box, the nomination of the VARIMED project for the Spirit of Styria Women in Science Award and the organisation of the EPoSS (European Association on Smart Systems) Annual Forum in Villach.

Scientific excellence also includes attendance and further training at international conferences, such as nanotech and Transducers in Japan, LOPEC (Large-area, Organic & Printed Electronics Convention) and IEEE MEMS (Micro Electro Mechanical Systems) in Munich, etc. The year ended with the first Austria-wide 6G Symposium in Linz, where over 120 international participants discussed the future of wireless communication.

Outlook

In 2024, SAL will once again be taking part in numerous international conferences, such as MEMS Texas, Photonics West San Francisco, LOPEC and nanotech Japan. Researchers will present their publications and give specialist talks there. To interact with the young population, SAL 2024 will once again take part in the Long Night of Research in the cities of Graz, Klagenfurt and Linz. Events are also planned between various SAL research areas and industry.

Further information can be found in the SAL annual report.[268]

3.5 Ludwig Boltzmann Society – Austrian Association for the Promotion of Scientific Research (LBG)

3.5.1 Profile and key data

Profile of the organisation

The Ludwig Boltzmann Society (LBG) is a non-university research organisation that operates 16 institutes and one research group (as of 03/2024). New Ludwig Boltzmann Institutes (LBI) initiate socially relevant research topics in the fields of health sciences, medicine and life sciences and conduct innovative research at the interface to application and society. The Open Innovation in Science Center and the Career Center use their expertise to support the integration of society into science and the individual development of researchers.

A new tender for the establishment of LBIs was launched in 2023 to ensure the continuous renewal of the LBG; three temporary LBIs were terminated as planned.

268 https://www.silicon-austria-labs.com/en/annual-report

In 2022, the LBG was commissioned to launch Austria's first funding programme in the field of non-commercial disease- and patient-oriented (translational), consortium-based clinical research. The programme opens up new career opportunities for young, clinically active researchers as part of the promotion of junior talents. In 2023, three clinical research groups were established at the Medical Universities of Innsbruck (1) and Vienna (2).

Key figures for 2022 and 2023

	2022	2023
Total budget for the research units in €1,000	31,371	30,828

Number of employees at LBG	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	284	370	654	250	317	567
Full time equivalents (rounded)	147	218	365	127	196	323

Source: LBG.

3.5.2 Development of indicators

Indicator 1: Funding, including third-party funding

	2022 in €1,000	2023 in €1,000	Target value 2021–2023 in %
Total budget for the research units	31,371	30,828	
of which global budget	6,977	6,482	
of which third-party funding*	24,394	24,346	
of which non-EU countries and global organisations	184	91	
of which EU and European countries or organisations	669	3,551	
of which national and regional organisations	23,541	20,704	
of which public	19,349	18,468	
of which NFTE, Ö-Fonds and FZÖ	5,663	9,406	
of which private	4,192	2,236	
Third-party funding ratio ** in %	77.8%	79.0%	72.9%

* Third-party funding includes contributions from partners of the research units. These amount to €6,002,000 in 2022 and €5,629,000 in 2023. ** Share of third-party funding in total income in %

Source: LBG.

Indicator 2: Evaluation systems

The research activities of the Ludwig Boltzmann Institutes are evaluated every three to four years as part of international peer review procedures. Independent external committees with scientific and quality assurance expertise are formed for this purpose. They evaluate the institutes on a nine-point scale; the best three ratings define the area of excellence. The evaluation results form the basis for the LBG management's decisions to continue operating the institutes. In 2023, seven institutes as well as the Career Centre and the Open Innovation in Science Centre were evaluated.

For ongoing accompanying quality assurance, each research unit has a scientific advisory board made up of international experts, supplemented by experts by experience. In 2023, there were 17 advisory boards with 69 members. Two external international selection juries were held in 2023 to select clinical research groups for funding and to establish new Ludwig Boltzmann Institutes on the basis of several independent peer reviews.

Indicator 3: Human capital and qualification

Number of employees	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	284	370	654	250	317	567
of which at management level (institute management, research group management, centre management, department management, executive management, division management*)	30	19	49	24	19	43
FTE	147	218	365	127	196	323
of which at management level	20	13	33	16	15	31

* From 2023, there will no longer be any divisional management. Source: LBG.

Number of PhD students	2022	2023	Target value 2023
Number of completed dissertations	21	20	> 14
Employees (= headcount)	197	133	
of which financed by LBG	81	104	
of which in structured education (doctoral schools or similar)	116	124	

Source: LBG.

The following staff development measures were implemented in 2022 and 2023

The LBG Career Center is the cross-organisational and cross-sector competence centre for individual career orientation and support for (early career) researchers.

In addition to the internal pre- and postdocs, a total of 12 outreach partners benefited from the centre's services for their researchers. In addition to networking and community building, the focus was on peer coaching. The "Peers4Careers" accountability programme was successfully implemented for the first time in 2023.

In 2023, an award for Leadership in Research (LExA – Leadership Excellence Award in Research) was also presented for the first time and was very successfully and positively received. Nominations were open to all researchers in Austria; almost 50 nominations were submitted.

Indicator 4: Output, innovation and excellence

Scientific publications	2022	2023
Monographs and editions	25	18
Articles/contributions in scientific journals, edited volumes and proceedings	673	561

Source: LBG.

There were no approvals in the ERC programmes and the FWF Wittgenstein Award in the 2022–2023 reporting period. In 2022, there was one FWF START project with an approval amount of €1,191 thousand. The winner of the START award is now based at the University of Innsbruck, as reported by the FWF.

Investments in research infrastructure in 2022 and 2023:

The digitalisation of administration and research go hand in hand at LBG to ensure the professionalisation and modernisation of the entire organisation. LBG's goal in the administrative area is an overall IT strategy with a web-based solution for integrating the LBI and connecting all source systems by means of a management information system in order to record the most important organisational key figures and data, e.g. on research output for knowledge management. A comprehensive process has been initiated and is to be finalised in the next few years. In addition, new priorities were set within the IT security strategy to further strengthen integrity, access control and data security.

Three important Core Facilities * 2022 and 2023		
Designation	**Research focus**	**Weblink to the research infrastructure database**
MORE Platform	Tool for conducting comprehensive studies with different data origins	https://dhp.lbg.ac.at/more/?lang=en**

* LBG Research Infrastructure Portfolio – Research Infrastructure Database (Open for Collaboration): https://forschungsinfrastruktur.bmbwf.gv.at/en/institution/ludwig-boltzmann-gesellschaft_26. An explanation of investments and acquisition costs for research infrastructures can be found in the definitions. ** The platform has not yet been finalised and is therefore not yet registered in the research infrastructure database.
Source: LBG.

Indicator 5: Internationalisation

	2022	2023
Share of international co-publications in all publications	62.5%	44.7%
Number of newly approved participations in Horizon Europe programmes and initiatives*	–	3
Total funding approved in €1,000**	–	1,943

* Only those projects are included that are shown in the FFG EU Performance Monitor. In 2022, one DG Justice project and one CERV project were also acquired. These projects are included in the Horizon Framework Programme via the Horizon platform, but are not included in the FFG EU Performance Monitor. ** Only EU funds are shown, no own contributions or national co-financing. The year of contract conclusion applies.
Source: LBG, FFG EU Performance Monitor.

Indicator 6: Knowledge and technology transfer

	2022	2023
Share of co-publications with industry or practice partners in all publications	13.4%	9.8%

Source: LBG.

There were no new patent applications or patents granted in the reporting period.

Indicator 7: Communication and interaction with society

The following activities and formats for the communication and transfer of knowledge as well as for the inclusion and addressing civil society actors were implemented in 2022 and 2023:

The LBG organised numerous public events, including crowdsourcing on research topics, symposia, panel discussions and lectures. Outstanding events included "*Ganz Salzburg Bewegen*", at which the LBI for Digital Health and Prevention collected ideas from the people of Salzburg, as well as a discussion panel organised by the LBI for Fundamental and Human Rights on the topic of "Climate protection and intergenerational justice".

The LBG was also present at science communication events such as the Long Night of Research, the Lower Austria Research Festival and the European Researchers' Night.

The LBG Open Innovation in Science Centre promotes the involvement of civil society in research and has carried out the following projects, among others:

- In cooperation with the Johannes Kepler University Linz, 63 integration projects from Austria were presented at the "*OIS zam*": Forum 2023, in which researchers successfully collaborate with society and where the "*OIS zam*": Prize was awarded for the first time.
- The Patient and Public Involvement and Engagement Exploration Grant funded 19 projects that involve patients and other stakeholders in research processes.

Indicator 8: Gender and promotion of equality

Proportion of women in management positions by management level in %	2022	2023	Target value 2023
All management levels	38.8%	44.2%	
Management	100%	100%	
Institute management and research group management	32.5%	31.3%	
Center management, division management and department management*	57.1%	77.8%	
Glass Ceiling Index on the basis of management levels**	1.46	1.27	< 1.55

* From 2023, there will no longer be any divisional management, so the percentages relate to centre management and department management. ** Calculated as the percentage of women in all employees/percentage of women in management positions. Management positions are defined as: Management and division management (until 2022), institute management and research group management, centre management and department management. An explanation of the Glass Ceiling Index can be found in the definitions.

Source: LBG.

The following activities to promote equality were implemented in 2022 and 2023:
Regular gender monitoring was established in the LBG Gender Equality Plan 2021 as an instrument for gender analysis. This monitoring was carried out for the first time on 30 June 2023 and is now updated at regular intervals. In autumn 2023, a start was made on mapping the monitoring electronically in a management information system. Gender equality measures are derived on the basis of gender monitoring.

3.5.3 Special events in 2023 and outlook

Exemplary research findings 2023 and outlook
In 2023, three submissions were selected for the establishment of Ludwig Boltzmann Institutes at host universities. The Institutes for Network Medicine at the University of Vienna and for Nanovesicular Precision Medicine at the University of Salzburg commenced operations on 1 January 2024. This will be followed in 2025 by the launch of an LBI for pandemic preparedness at the Medical University of Vienna. A further call for proposals is planned.

The first three projects were launched in October 2023 as part of the Clinical Research Groups (KFG) funding programme, Austria's first collaborative research initiative with a clear focus on patient-oriented topics in non-commercial clinical research: the Austrian Digital Heart Programme at the Medical University of Innsbruck is developing smartphone solutions for the early detection of atrial fibrillation. The KFG MOTION at the Medical University of Vienna is dedicated to the detection and correct treatment of portal hypertension. Also based at the Medical University of Vienna is KFG ATTRACT, which focuses on neuroscience and the development of personalised medicine for the treatment of brain tumours (glioblastomas). In May 2024, the LBG will host a stakeholder conference for all those involved in clinical research and the next KFG call for proposals will open in summer 2024.

Further information can be found in the LBG Annual Report.[269]

269 https://lbg.ac.at/download/?lang=en

3.6 GeoSphere Austria (GSA)

With the GeoSphere Austria Establishment Act of April 2022, the "*Zentralanstalt für Meteorologie und Geodynamik*" (ZAMG) and the "*Geologische Bundesanstalt*" (GBA) were merged to form "GeoSphere Austria" on 1 January 2023. GeoSphere Austria only became operational in 2023. For this reason, not all of the required indicators (especially budget values) and no target values have yet been collected; some data result from the aggregation of the two predecessor organisations.

3.6.1 Profile and key data

Profile of the organisation

GeoSphere Austria is the Federal Institute for Geology, Geophysics, Climatology and Meteorology and as such is the central competence centre for data, information and knowledge about the earth system (geosphere). As a research organisation committed to scientific integrity and as a federal institute anchored in law, with its more than 500 experts it pursues an approach that is almost unique in Europe and gives it its name: the holistic consideration and research of the Earth system including its subsystems (atmosphere, lithosphere, hydrosphere, cryosphere and pedosphere) and their interactions. Its range of activities includes analysing and assessing

- of weather conditions,
- of the climate and its changes,
- of the geological subsurface as a basis for targeted 4D spatial planning,
- the availability of groundwater resources,
- the occurrence and dynamics of natural hazards and how they are influenced by climate change,
- potential for alternative forms of energy (solar energy, geothermal energy), and
- of nationally available raw materials to support the environmentally friendly production of products relevant to climate change.

With its services, GeoSphere Austria contributes to solving global challenges and increasing national resilience.

Key figures for 2022 and 2023

Number of employees	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	324	164	488	327	187	514
Full time equivalents (rounded)	292	141	433	307	160	467

Source: GeoSphere Austria.

3.6.2 Development of indicators

Budget figures for the entire organisation will be available from 2024. Accordingly, indicator 1 (financing and third-party funding) for the years 2022 and 2023 is not applicable here.

Indicator 2: Evaluation systems

A large number of processes and committees have been established at GeoSphere Austria with the aim of continuous validation and improvement. In 2022, in accordance with the GeoSphere Austria Establishment Act, a Board of Trustees was set up to oversee the content and organisational development of GeoSphere Austria. In addition, a scientific advisory board is appointed with people from science and research as well as European weather, climate, geological or geophysical services.

A three-year programme has been drawn up for the implementation of the performance agreements, which will be evaluated on an ongoing basis from 2024. A portfolio team evaluates and approves externally funded activities. In the area of raw materials research, project evaluation is carried out in coordination with the mining authority and an external evaluation board (Mineral Resources Initiative).

Since 2022, the risks for GeoSphere Austria have been analysed in detail, assessed and appropriate measures taken.

Internal and external audits, management reviews and assessments, customer satisfaction measurements, complaint analyses, internal employee surveys and process and product conformity assessments are carried out by QM and CIS – Certification Information Security Services GmbH.

Indicator 3: Human capital and qualification

GeoSphere Austria – Number of employees	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	324	164	488	327	187	514
of which at management level	42	7	49	54	19	73
Full time equivalents (rounded)	292	141	433	307	160	467
of which at management level	42	7	49	54	18	72

Source: GeoSphere Austria.

PhD students and theses*	2023
Number of completed dissertations	1
Doctoral candidates (PhD students, heads)	18
of which financed by GeoSphere Austria	18

* Since GeoSphere Austria only became operational in 2023, the data for 2022 is missing

Source: GeoSphere Austria.

The following staff development measures were implemented in 2022 and 2023

The development of employees is a key factor in the success of GeoSphere Austria. The measures in this context include annual employee appraisals, individual training programmes and measures, internal academies, knowledge transfer formats and, especially for the time of the merger of GBA and ZAMG, change management support. In 2022, more than 250 training courses and further training measures as well as special training courses for managers at GeoSphere Austria were organised in the area of change management. Resonance group events were also offered in order to respond to the needs of employees and four change agents were established in the centres by mid-2023. The training programme was continued in 2023.

Indicator 4: Output, innovation and excellence

Number of scientific publications	2022	2023
Monographs and editions	4	1
Articles/contributions in scientific journals, edited volumes and proceedings	184	65*

*This value is probably too low: due to the merger, many authors have named their department in the affiliation instead of just GeoSphere Austria; this has made the search for publications from 2023 very difficult.Source: GeoSphere Austria.

There were no approvals in the FWF START and Wittgenstein Prize programmes in the 2022–2023 reporting period. A scientific project manager at GeoSphere Austria received a Consolidator Grant from the European Research Council in 2022 with an approval amount of €1,999 thousand to further expand research into the practicable prediction of solar storms.

Investments in research infrastructure in 2022 and 2023:

The research infrastructures of GeoSphere Austria include

- Conrad Observatory: Seismic-gravimetric and geomagnetic observatory
- *Sonnblick* Observatory: High-alpine climate, environmental measurement and research station
- ECCINT: ACTRIS European Centre for ambient Cloud INTERComparison
- Geoanalytics laboratory: laboratories for sample preparation, rock geochemical analyses, mineralogical, palaeontological and hydrogeological investigations

GeoSphere Austria is legally obliged to ensure the operation of this research infrastructure, to keep it technologically and digitally up to date and to develop it further. In order to ensure the demand and attractiveness of the research infrastructures in the international research community, future collaborations and activities in current and potential research fields and research programmes are to be intensified.

Indicator 5: Internationalisation

GeoSphere Austria*	2022	2023
Share of international co-publications in all publications in the reporting year		58%
Number of newly approved participations in Horizon Europe programmes and initiatives	6	4
Total funding approved in €1,000**	4,210	870

* No figures are yet available for GeoSphere Austria for 2022. Participation in Horizon Europe can be determined from the data of the two predecessor organisations. ** Only EU funds are shown, no own contributions or national co-financing. The year of contract conclusion applies. Source: GeoSphere Austria, FFG EU-Performance Monitor.

In addition to the publication and project activities listed above, GeoSphere Austria contributes significantly to the internationalisation of research findings and the positioning of Austria as an international science and business location by participating in European and international networks and committees, operating internationally recognised and used observatories and measurement infrastructures and providing high-quality reference data in the fields of weather, climate, geology, geophysics and the environment. GeoSphere Austria is Austria's main international representative at the WMO, ECMWF, EUMETNET, EUMETSAT, EPOS, GCOS, GEO, EGS, UNDRR and the CTBTO. The main networks and programmes to which GeoSphere Austria contributes data include GSEU, EGDI, OneGeology, CGMW, GCOS, GAW, EPOS, ACTRIS, WDC and Intermagnet.

In addition, GeoSphere Austria pursues research and consulting activities in selected countries such as Nepal, Mexico and Kazakhstan, as well as in international development funding mechanisms such as the Systematic Observation Financing Facility (SOFF) of the World Meteorological Organisation (WMO).

Indicator 6: Knowledge and technology transfer

There were no new patent applications or patents granted in the reporting period. ZAMG has been involved in the Earth Observation Data Centre (EODC) for the storage and improved usability of earth observation data since 2014 and GeoSphere Austria as its legal successor since 2023. The capacities of the EODC have been continuously expanded since its foundation and actively utilised by GeoSphere Austria.

Indicator 7: Communication and interaction with society

The following activities and formats for the communication and transfer of knowledge as well as for the inclusion and addressing civil society actors were implemented in 2022 and 2023:

Geosphere Austria has an active press and media relations programme. In 2023, GeoSphere Austria was able to record around 10,000 mentions in its press review. In 2023, 59 press releases were sent out and the presence in social networks is being continuously strengthened. In 2023, GeoSphere Austria's three channels were viewed by 6.9 million people. A revamped website will support communication from 2024. The in-house publishing house enables the supply of high-quality library and publishing products. Knowledge parks are operated to impart knowledge, regular public events are offered, and GeoSphere Austria is part of the Long Night of Research

programme every year. Special events such as the Avalanche Conference or the ASDR Natural Hazards Conference address decision-makers and enable the development of a community of practice. GeoSphere Austria experts also regularly share their knowledge in television and radio programmes.
Using tools and programmes such as wettermelden.at, Trusted Spotter, the Nature Calendar app or Quake Watch Austria, citizens can directly influence the work of GeoSphere Austria.

Indicator 8: Gender and promotion of equality

As the organisational structure was changed with the establishment of GeoSphere Austria and the management levels were redefined, a direct comparison with 2022 is not possible. If the sum of the corresponding figures from GBA and ZAMG is considered, the proportion of women at management level has increased from 17% in 2022 to 26% in 2023. The Glass Ceiling Index has fallen from 2.35 (2022) to 1.4.

Proportion of women in management positions by management level	2022	2023
Management		50%
All management levels*	17%	26%
Glass Ceiling Index on the basis of management levels**	2.35	1.4

* Management positions are defined as: general management, divisional management, department management and competence unit management. ** Calculated as the proportion of women in all employees/proportion of women in management positions. The explanation of the Glass Ceiling Index can be found in the definitions. Source: GeoSphere Austria.

The following activities to promote equality were implemented in 2022 and 2023:
In 2022, gender awareness training was developed for ZAMG and six half-day gender awareness workshops were subsequently held with a total of 93 people. A further 21 people attended another workshop in 2023.

To promote the next generation of women in scientific and technical professions, a female student was employed as part of a one-month FEMtech internship.

At the Hohe Warte site in Vienna, a half-day programme was offered on 28 April 2022 and 27 April 2023 as part of the Daughters' Day to introduce schoolgirls to scientific careers. Employees of GeoSphere Austria act as "STEM Role Models".[270]

In 2022, measures were implemented at the GBA and ZAMG in accordance with the equality plans of the two institutions. In 2023, work began on merging the two documents and a list of the data required for future monitoring was drawn up. A working group was convened by the Directorate General and tasked with drawing up the new equality plan and developing an evaluation concept for the annual monitoring.

270 https://www.mintgirlschallenge.at/mint-in-wirtschaft-und-beruf/

3.6.3 Special events in 2023 and outlook

In the area of weather, the focus continues to be on Destination Earth and the creation of a digital twin of the Earth with a focus on atmospheric processes. Weather forecasts based on artificial intelligence are also becoming increasingly present and will play a role in the future. In the field of climate research, high-resolution climate projections and advice on this data are currently required to carry out climate risk and vulnerability analyses as part of the EU Taxonomy Regulation and sustainability reporting.

In general, the topics of risk and resilience play a central role for GeoSphere Austria. The Austrian Multi-Hazard Impact-Based Advice Service (AMAS) sets new standards in terms of creating a consistent picture of the situation in disaster management that covers all major natural hazards. In 2023, an internationally acclaimed interim report on the national implementation of the UNDRR Sendai Framework and its disaster reduction goals was prepared and presented at the United Nations in New York. In an international context, GeoSphere Austria is supporting eight countries on three continents in setting up weather monitoring networks as a basis for forecasts and warnings as part of the United Nations SOFF programme.

As part of the GSEU project, the cooperation between the European geological services, which has existed for decades, is to be put on a sustainable footing and a "European Geological Service" is to be created.

With the "GeoSphere Maps" (maps.geosphere.at) map service, GeoSphere Austria has developed a map service that is freely accessible to the general public and thus facilitates access to essential basic information for Austria.

In terms of research strategy, the new performance agreement also aims to expand and coordinate cooperation with universities and international organisations, as well as participation in international research projects and development work.
Further information and the latest annual report can be found on the GeoSphere Austria website.[271]

3.7 Austria Wirtschaftsservice Gesellschaft (aws)

3.7.1 Profile and key figures

Profile of the organisation

As a contact point for growth and innovation-oriented companies, the aws supports companies with guarantees, loans, grants, equity and coaching services. The financing volume rose to €3.2 billion in 2023. Since 2020, the aws has contributed to economic stabilisation through the implementation of COVID-19 special programmes and the investment premium and since

271 https://www.geosphere.at/de/ueber-uns; older annual reports of the two predecessor organisations can be found at https://www.zamg.ac.at/cms/de/topmenu/ueber-uns/jahresberichte; https://www.geologie.ac.at/ueber-uns/aufgaben/jahresberichte/

2022 with the special programmes "Ukraine war" (e.g. energy cost subsidy). With the TWIN Transition funding programmes to support digital and ecological change and Start-up Invest as venture capital for technology-oriented start-ups with scaling potential, the "STEM Regions" initiatives and "Sustainable Food Systems" as an important topic for the future, the aws is a reliable partner from the initial idea to market success. In 2023, a very subdued propensity to invest in the business enterprise sector led to declining performance figures in some areas of aws' core business.

Unless otherwise stated, the information on key figures and indicators covers the entire aws promotion and financing portfolio.

Key figures for 2022 and 2023

aws total	**2022**	**2023**
Number of projects	25,040	48,830
Financing performance in €1,000*	1,381,000	3,229,000
Present value in €1,000	542,000	2,490,000
aws core business (without special programmes COVID-19/Ukraine war)	**2022**	**2023**
Number of projects	9,120	6,750
Financing performance in €1,000*	1,054,000	917,000
Present value in €1,000	247,000	178,000
Special programmes COVID-19**	**2022**	**2023**
Number of projects	15,270	1,330
Financing performance in €1,000	311,000	66,000
Special programmes Ukraine war***	**2022**	**2023**
Number of projects	650	40,750
Financing performance in €1,000	16,000	2,246,000

Number of employees	**2022**			**2023**		
	m	**w**	**total**	**m**	**w**	**total**
Employees (= headcount)	168	232	400	173	241	414
Full time equivalents (rounded)	154	192	346	161	212	373

* The financing service is calculated as the guarantee obligation assumed, the volume of the loan granted, the amount of the subsidy granted, the amount of equity provided or as a coaching service. ** These include Investment premium, bridging guarantees, NPO fund, comeback grant for film and TV productions, operational testing. The decrease reflects the planned expiry of some COVID special programmes. *** These include: Energy cost subsidy I + II, gas diversification, electricity cost equalisation, bridging guarantees for energy costs.

Source: aws.

3.7.2 Development of indicators

Indicator 1: Funding, including third-party funding

Source of funds aws total (public funds and third-party funding, without contributions from companies)	Financing service	
	2022 in €1,000	2023 in €1,000
ERP Fund	500,000	499,000
Owner resorts	535,000	2,538,000
BMK	83,000	215,000
BMAW	452,000*	2,323,000
BMLRT	21,000	15,000
BMSGPK	0	9,000
BMKÖS	128,000	20,000
NFTE, Ö-Fonds and FZÖ	11,000	12,000
EU	9,000	18,000
Other**	177,000	118,000
Total	1,381,000	3,229,000

* Includes the entire aws range of services (incl. special programmes); excluding special programmes, BMAW grants amount to €262 million in 2022. ** Others are entirely funds from the BMF (Guarantee Act) Source: aws.

Indicator 2: Evaluation systems

Evaluations are an essential part of the planning and implementation of funding programmes. An evaluation plan is drawn up when programme documents and guidelines are created. Typically, interim evaluations, or at least final evaluations, are carried out before or shortly after the end of a programme. These are usually carried out by external evaluation teams. Internal evaluations are also planned in the multi-year programmes. On the one hand, a systematic survey representative of the monetary funding is carried out every three years ("aws *Wirkungs-Monitoring*"); on the other hand, internal evaluations are carried out on selected topics, issues and programmes.

In addition, aws has been conducting a systematic, electronic survey of customers since 2013. A few weeks after funding is approved or rejected, customers are invited to take part in the feedback process. Semi-annual analyses allow conclusions to be drawn about the quality of the funding services provided in terms of information, advice and processes. The standardised questions are supplemented by verbal comments on experiences made during the funding process and provide valuable information on potential for improvement.

Indicator 3: Human capital and qualification

	Heads									
	total		female				male			
	2022	2023	2022		2023		2022		2023	
	Number	Number	Number	in %	Number	In %	Number	In %	Number	in %
Processing and administration	152	128	100	66	89	70	52	34	39	30
Experts	219	254	119	54	138	54	100	46	116	46
Team management and business unit management	25	28	11	44	12	43	14	56	16	57
Management*	4	4	2	50	2	50	2	50	2	50
Total	400	414	232	58	241	58	168	42	173	42

Note: Data include aws, ERP fund, aws fund management. * 2 persons aws management (in personal union with ERP fund management), 2 persons aws fund management
Source: aws

	FTE (rounded)									
	total		Female				Male			
	2022	2023	2022		2023		2022		2023	
	Number	Number	Number	%	Number	%	Number	%	Number	%
Processing and administration	120	110	77	64	76	69	43	36	34	31
Experts	197	231	101	51	122	53	96	49	109	47
Team management and business unit management	25	28	12	48	12	43	13	52	16	57
Management*	4	4	2	50	2	50	2	50	2	50
Total	346	373	192	55	212	57	154	45	161	43

Note: Data include aws, ERP fund, aws fund management. * 2 persons aws management (in personal union with ERP fund management), 2 persons aws fund management
Source: aws.

The following staff development measures were implemented in 2022 and 2023

In 2023, the focus was on green finance, project management and digital skills, and digital/online training formats were also used. In addition, new employees were trained in operational subsidy processing (overview of funding products, funding guidelines, advising customers, funding processes, AIS funding application). Further training is very important in a service organisation. The internal programme offers suitable further training measures for all target groups. Both professional and personal development topics are offered.

Indicator 4: Output, innovation and excellence

Projects and investments*	2022		2023		Target value 2023
	Number	in %	Number	in %	in %
Funded projects	9,120		6,750		
Supported companies	5,970		4,410		
of which SMEs	5,710	96	4,260	97%	~ 96.5
of which start-ups	2,450	41	1,970	44%	
of which equity investments**	84	1.4	81	1.8%	

* Excluding special COVID-19 and Ukraine war programmes. ** Investments include: Start-up Fund, Start-up Fund II, Business Angels Fund, Venture Capital Initiative and wings4innovation
Source: aws.

Time to contract and consultations	2022	2023	Target value 2023
Time to contract: median in days* (selection of programmes)			
aws guarantee programme	15	14	
aws impulse programme for knowledge and technology transfer	40	28	
Preseed & Seedfinancing (TEC + LIS)	55	67	
PPPI – Toolbox	51	35	
aws Preseed | Seedfinancing – Innovative Solutions	58	26	
aws innovation protection	47	25	
Number of consultations for (potential) funding applicants**	~ 10,300	~ 9,900	~ 10,100

* Excluding special COVID-19 and Ukraine war programmes. ** Internal consultations (incl. special programmes). Slight decrease in funding consultations due to higher no-show rate at events (compared to previous year).
Source: aws.

Patents and licences	2022	2023	Target value 2023
Support with IP consulting and financing	428	499	> 430

Source: aws.

Indicator 5: Internationalisation

Programmes with a special focus on internationalisation	Approvals	
	Present value 2022 in €1,000	Present value 2023 in €1,000
Global Incubator Network	476	672
Green Frontrunner*	10,610	7,757
Guarantees internationalisation**	24,401	7,150

* Decrease due to the available residual budget from the financing agreement 22–23. ** Information on financing performance (= guarantee obligation). The decline is due to the reluctance of companies to invest. Source: aws.

Indicator 6: Knowledge and technology transfer

Funding programmes and awards in the field of knowledge and technology transfer	2022		2023	
	Projects	Present value in €1,000	Projects	Present value in €1,000
Stimulus programme for Austrian knowledge and technology transfer*	29	1,566	27	932
Youth Innovative**	336	69	590	90
aws First	25	1,155	35	1,592
Phoenix – Founder Award**	205	20	181	24
KI Marketplace***	88	0	302	0
Wings4innovation****	35	3,173	9	508

* Decrease due to the expiry of the programme (remaining funds). ** *Jugend Innovativ* and *Phönix Gründerpreis* are competitions with bonus payments. *** *KI-Marktplatz* is a platform for artificial intelligence (AI) that supports networking activities. Services are offered, but no commitment of monetary funding. **** 2023 adjusted for foreign investment activity (comparative figures 2022 adjusted: 7 projects, present value in €1,000: 496). Source: aws.

Indicator 7: Communication and interaction with society

In 2023, the aws further expanded its role as a communication and knowledge broker and as an interface with civil society. In addition to established formats such as *Jugend Innovativ* and aws First, which focus on teaching STEM and start-up skills, aws now also acts as a service hub for the STEM regions. The focus here is on promoting and supporting regional initiatives in the STEM subjects. Networking with local stakeholders creates synergetic effects and intensifies the transfer of knowledge in the regions. In addition, the aws raises public awareness of intellectual property through events such as World IP Day and the Phoenix competition.

Indicator 8: Gender and promotion of equality

aws core business*	2022		2023		Target value 2023
	Number	in %	Number	in %	in %
Women in funded projects	2,609	29	1,936	29	
Women Project managers	2,263	32	1,701	31	> 30
Women Founders	346	20	235	20	
Women on committees and juries					
aws Supervisory Board	9	60	9	60	
ERP Credit Commission**	2	16	2	16	
ERP Expert Commission Tourism**	3	43	3	43	
ERP Expert Commission Agriculture and Forestry**	2	29	2	29	
ERP Transport Commission**	3	43	3	43	
Juries of individual aws programmes					
Processing, marketing and development	5	45	5	45	
FISA – Film Location Austria***	7	64	n. a.	n. a.	
Preseed I Seedfinancing – Innovative Solutions	7	70	7	64	
Seedfinancing I Preseed – Deep Tech	12	50	11	50	
Staatspreis Innovation	4	44	4	44	
Innovative Youth	14	41	14	41	
First Incubator	6	50	7	58	
Green.IP	4	56	4	56	
Agile IP management	4	50	3	50	

* Excluding special programmes COVID-19 and Ukraine war. ** Composition of the bodies not within the area of responsibility of aws. *** Follow-up programme FISAplus is without jury. Source: aws.

Programmes/initiatives with gender or equality as a funding criterion

The criterion of diversity in companies is included in the economic evaluation of all aws-funded projects. The aws multi-year programme 2024–2026 includes the two fields of action female entrepreneurship and diversity. As part of the financing agreement for 2022 and 2023, gender aspects were set as a funding criterion in various programmes by means of a female entrepreneurship bonus.

3.7.3 New initiatives and instruments 2023; outlook

New initiatives and instruments 2023

In a difficult financing environment for companies, the Federal Government set a number of priorities that were subsequently implemented by the aws. The energy cost subsidy, for example,

provided relief for companies against the backdrop of a sharp rise in energy prices. In the core business, the Start-up Fund II and the Start-up Invest programme provided venture capital for innovative start-ups, while the TWIN-Transition funding programme supported companies in their economic transition towards digitalisation and greening. With its programmes, the aws also focused on leveraging the potential of AI in domestic companies (AI Austria Initiative) and on innovations in the area of food systems (Sustainable Food Systems Initiative).

Outlook

Ongoing uncertainties in an international environment burdened by the war in Ukraine mean that the financing of business enterprise investments is expected to remain a major challenge in 2024. The aws will continue to support innovation and growth-orientated companies with guarantees, loans, grants, equity and coaching services. Thematic priorities for 2024 will be in areas such as artificial intelligence, microelectronics, digitalisation and sustainability, but also in the food sector. A special focus in 2024 will also be on strengthening young, innovative entrepreneurship. Initiatives and events such as the "STEM Regions Quality Label" or the "Phoenix Start-up Award" will be used by the aws to put female and male founders centre stage and to promote female entrepreneurs in particular.

Further information can be found in the aws performance report.[272]

3.8 Christian Doppler Research Association (CDG)

3.8.1 Profile and key figures

Profile of the organisation

The Christian Doppler Research Association (CDG) supports Christian Doppler Laboratories (CD Laboratories) at universities and non-university research institutions, as well as Josef Ressel Centres (JR Centres) at universities of applied sciences. Around 50% of the CDG's funding programmes are financed by public funds (BMAW, National Foundation for Research, Technology and Development and the Austrian Science Fund) and a further 50% by the CDG's member companies.

The funding is aimed at application-oriented basic research and strengthens both Austria as a business location and as a centre of science. Due to this essential bridging function from basic research to innovation, the CDG is internationally recognised as a best practice model. In addition, the CDG has a very high benefit for society, as numerous CDG research units contribute to the implementation of the UN 2030 Agenda for Sustainable Development.

272 https://www.aws.at/berichte/

Key figures for 2022 and 2023

	2022	2023
Number of CD Laboratories	90	97
Number of JR Centres	16	18
Funding budget in €1,000 without company contributions	18,003	24,524

CDG Office staff	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	7	13	20	6	13	19
Full time equivalents (rounded)	6	10	16	5	11	16

Budget data for 2023 correspond to the maximum budget framework, as billing data are not yet available. Source: CDG.

3.8.2 Development of indicators

Indicator 1: Funding, including third-party funding

Source of funds (public funds and third-party funding, excluding contributions from companies)	2022 in €1,000	2023 in €1,000
Public funds at federal level	17,904	24,378
of which basic budget (BMAW)	12,476	17,768
of which NFTE, Ö-Fonds and FZÖ	5,428	6,610
Other funds (incl. acquired third-party funding)	99	146
Total	18,003	24,524

Budget data for 2023 corresponds to the maximum budget framework, as billing data are not yet available. Source: CDG.

Indicator 2: Evaluation systems

The impact of the CDG's funding programmes is analysed as part of comprehensive programme evaluations in a multi-year cycle. The results are incorporated into the programme design. In addition, every five years a comprehensive discussion is held involving the universities (uniko), universities of applied sciences (FHK), CDG member companies and the BMAW on the framework conditions for the operation of CD Laboratories and JR Centres and these are adapted accordingly.

An analysis carried out in 2022 (Elsevier SciVal based on Scopus (>50 million publications) and data from five of the world's largest patent offices) confirms that the publications from the CDG research units have the highest international patent relevance (of 1,000 publications, over 250 are cited in patents) and the highest number of joint publications from science and industry.

Indicator 3: Human capital and qualification

Office staff	Heads									
	total		female				male			
	2022	2023	2022		2023		2022		2023	
	Number	Number	Number	in %	Number	in %	Number	in %	Number	in %
Assistance	5	4	4	80	3	75	1	20	1	25
Experts	10	10	6	60	7	70	4	40	3	30
Management level	5	5	3	60	3	60	2	40	2	40
Total	20	19	13	65	13	68	7	35	6	32

Source: CDG.

	Full time equivalents (rounded)									
	total		female				male			
	2022	2023	2022		2023		2022		2023	
	Number	Number	Number	in %	Number	in %	Number	in %	Number	in %
Assistance	3	3	2	67	2	67	1	33	1	33
Experts	9	8	5	56	6	75	4	44	2	25
Management level	4	5	3	75	3	60	1	25	2	40
Total	16	16	10	63	11	69	6	37	5	31

Source: CDG.

The following staff development measures were implemented in 2022 and 2023:

CDG's staff development is subject to a continuous process and includes further training programmes that are important for the development of the organisation (e.g. digitalisation, GDPR, compliance training, IT security training). The measures are defined for the respective function and also customised to the individual person.

Indicator 4: Output, innovation and excellence

Participations and persons	2022		2023	
	Number	in %	Number	in %
Participating companies	191		197	
of which SMEs	43	23	46	23
Participating research institutions	27		28	
of which universities in Austria	14	52	14	50
of which non-university research institutions	1	4	1	4
of which universities of applied sciences	10	37	11	39
of which universities abroad	2	7	2	7
	Number	in %	Number*	in %*
Supported persons	1,244		1,284	
of which women	446	36	523	41
of which men	798	64	761	59

* Preliminary, not yet finalised data. Late registrations by funding recipients are still possible. Source: CDG.

Time to contract and consultations	2022	2023	Target value 2023
Processing time for applications without revision in days	188	194	
Processing time for applications with revision in days	349	366	
Number of consultations for (potential) funding applicants	52	44	~ 51

Source: CDG.

Only individual consultations are included under "Number of consultations". During the same period, several information events were organised at universities and universities of applied sciences, which also provided the opportunity for individual questions. These information events are not included in the above statistics.

Number of scientific publications from the funded projects	2022	2023*
Monographs and editions	5	7
Articles/contributions in scientific journals, edited volumes and proceedings	676	764

* Preliminary, not yet finalised data. Late registrations by funding recipients are still possible. Source: CDG.

Patents and invention disclosures	2022	2023*	Target value 2023
Patents applied for	k. A.	k. A.	k. A.
Patents granted	10	8	> 9
Invention disclosures to the university/university of applied sciences/ research institution	10	21	> 9

* Preliminary, not yet finalised data. Late registrations by funding recipients are still possible. Source: CDG.

Indicator 5: Internationalisation

	2022		2023	
	Number	in %	Number	in %
Projects with international partners	41	39	39	34
Participating companies located abroad	49	26	46	24

Source: CDG.

Indicator 6: Knowledge and technology transfer

	2022	2023*
Total funding volume in €1,000 including company contributions	34,772	46,909
of which cooperation between science and industry	34,772	46,909
Share in %	100%	100%

* Budget data for 2023 correspond to the maximum budget framework, as accounting data are not yet available.Source: CDG.

Indicator 7: Communication and interaction with society

The following activities and formats for the communication and transfer of knowledge as well as for the inclusion and addressing civil society actors were implemented in 2022 and 2023:

Openings of CD Laboratories and JR Centres are used for networking and knowledge communication in close cooperation with the PR departments of the respective universities and universities of applied sciences.

The CDG Prize for Research and Innovation is awarded annually, and the scientific content is shared in a generally understandable way via print and online media.

Success stories are developed and disseminated in close cooperation with the respective companies or researchers from higher education institutions.

Researchers and their fields of work are regularly introduced via LinkedIn and the CDG website.[273]

In the "CDG Future Talks", which are also accessible to the public via streaming, current topics (artificial intelligence, circular economy, etc.) are discussed and illuminated from a scientific, entrepreneurial and political perspective in a panel discussion with people from the specialist field with the involvement of the audience.

In total, the research topics of the CDG 2023 were covered in around 1,000 reports in print and online media and on social media.

The CDG is a member of the Open Science Association and Uni.PR.

273 https://www.cdg.ac.at; https://www.linkedin.com/company/CDGnet

Indicator 8: Gender and promotion of equality

	2022		2023*		Target value 2023
	Number	in %	Number	in %	in %
Funded projects					
Women in CD Laboratories and JR Centres	446	36	523	41	
Heads of CD Laboratories and JR Centres	19	17	16	13	> 16
Evaluation committees and reviews					
Women on permanent evaluation committees and advisory boards	12	27	12	25	> 26
Assessments carried out by women	19	15	21	18	> 14

* Preliminary, not yet finalised data. Late registrations by funding recipients are still possible. Source: CDG.

Programmes/initiatives with gender or equality as a funding criterion:
In order to promote women in the sciences, CDG foundation managements allow the staff costs of female scientists who do not have a permanent employment contract at the respective university to be partially funded. As part of Girls' Day, CD Laboratories convey the fascination of science in an experience-orientated approach.

3.8.3 New initiatives and instruments 2023; outlook

As a result of the CDG's bottom-up funding model, i. e. no thematic restrictions, the research units funded by the CDG always have their finger on the pulse of the times and are usually ahead of mainstream research. In 2023, around 30% of CDG research units dealt with issues relating to transformative RTI topics such as energy and green tech, which contribute to tackling the energy and climate problem. The research topics cover a wide range, from solid-state batteries and sustainable, energy-efficient building materials to intelligent thermal energy systems and new methods for a cross-sector circular economy. Around 40% of CDG research units contribute to EU missions. For example, 14 CD Laboratories are active in the field of cancer research.

In 2024, the CDG has opened a call for dissertations in the field of "Energy Transition and Circular Economy", which will be financed entirely from funds provided by CDG member companies. The CDG Association is thus actively supporting the Federal Government's transformative RTI policy. Overall, the CDG model continues to enjoy great popularity among both science and industry.

Further facts and figures can be found on the CDG website.[274]

274 https://www.cdg.ac.at/en/about-us/facts-and-figures-on-the-christian-doppler-model

3.9 The Austrian Science Fund (FWF)

3.9.1 Profile and key figures

Profile of the organisation

The Austrian Science Fund (FWF) is Austria's leading organisation for open-topic funding of basic research as well as artistic and scientific research. In a selective, international peer-review process, the FWF supports those researchers and ideas that are groundbreaking due to their scientific quality. The knowledge gained strengthens Austria as a research nation and lays a broad foundation to better meet future social challenges.

Investments in basic research awarded by the FWF are efficient and have a major leverage effect in the knowledge and innovation sector. Strongly positioned basic research attracts the most talented minds and thus expertise. This strengthens the Austrian economy in the long term.

Key figures for 2022 and 2023

	2022	2023
Total funding budget in €1,000	286,092	381,504
of which new or extended projects ("Total new grants")	272,969	348,944
Number of approved research projects*	659 (743)	624
Number of persons funded via FWF funds	4,842	4,890

* Changed counting method since 2023: In the Special Research Programmes (SFB) funding programme, sub-projects are not counted, but an entire SFB network counts as one project. The figure for 2022 takes into account the new counting method; the figure in brackets is the value according to the previous counting method.

Personnel FWF Head Office	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	38	108	146	40	108	148
Full time equivalents (rounded)	34	91	125	36	91	127

Source: FWF.

3.9.2 Development of indicators

Indicator 1: Funding, including third-party funding

Source of funds	2022 in €1,000	2023 in €1,000
Public funds at federal level	283,444	377,234
of which basic budget (BMBWF)	273,548	372,534
of which NFTE, Ö-Fonds and FZÖ	9,896	4,700
Regional governments	2,426	3,110
EU	5	25
Other (incl. third-party funding)	216	1,135
Total	286,092	381,504

Source: FWF.

Indicator 2: Evaluation systems

The evaluation system includes surveys of applicants and project managers, evaluations of ongoing funding programmes and the implementation of new funding programmes, as well as statistical analyses of the decision-making process. All analyses are tendered internationally and the results are published in a freely accessible format. Of particular importance in 2023:

- The evaluation of the Clusters of Excellence programme was successfully completed. The results are to be incorporated into the design of a possible second open call.[275] In addition, the accompanying evaluation of the Emerging Fields programme was awarded with the same objective.
- A study was also commissioned to assess the economic impact of FWF projects in recent years. The results of the study are expected in autumn 2024.

Indicator 3: Human capital and qualification

Office staff	Headcount									
	total		female				male			
	2022	2023	2022		2023		2022		2023	
	Number	Number	Number	in %	Number	in %	Number	in %	Number	in %
Assistance	82	85	65	79	67	79	17	21	18	21
Experts	47	45	32	68	29	64	15	32	16	36
Management level*	17	18	11	65	12	67	6	35	6	33
Total	146	148	108	74	108	73	38	26	40	27

Source: FWF.

	Full time equivalents (rounded)									
	total		female				male			
	2022	2023	2022		2023		2022		2023	
	Number	Number	Number	in %	Number	in %	Number	in %	Number	in %
Assistance	68	68	54	79	54	80	14	21	14	20
Experts	41	41	27	66	25	62	14	34	16	38
Management level*	16	18	10	62	12	66	6	38	6	34
Total	125	127	91	73	91	72	34	27	36	28

* The management level includes the executive board and the department heads. Source: FWF.

275 See Langfeldt (2023) and Olteanu (2023).

The following staff development measures were implemented in 2022 and 2023

As an expert organisation and due to its funding activities, the FWF is highly aware of the importance of its employees' qualifications. To ensure that the FWF's quality standards, which are supported by its employees, are practised and further developed, the FWF invests in the training and further education of its staff. The departments have an annual budget for this purpose. Following reduced costs in previous years due to the pandemic, investment in training and development increased by over 100% in 2023. The focus for 2023 and 2024 will be on topics related to the FWF4.0 project (process management, IT, change management) and management development.

Indicator 4: Output, innovation and excellence

Projects and persons	2022		2023	
	Number	in %	Number	in %
Funded projects (Total new grants)*	659 (743)		624	
of which universities**	558 (621)	85 (84)	523	84
of which universities of applied sciences	6	1 (1)	5	1
of which non-university research centres***	95 (116)	14 (16)	96	15
Persons supported (from approvals)	811 (821)		899	
of which women	283 (288)	35	320	36
of which men	522 (527)	64	572	64
of which diverse****	6	1	6	1

* Changed counting method compared to 2022 (see above). ** Including private universities. *** Includes research centres abroad. **** incl. "not specified".
Source: FWF.

Time to contract * and consultations	2022	2023	Target value 2023
Processing time for programmes without deadline** in days	171	156	
Number of counselling events for (potential) funding applicants			
Total	46	56	~ 46
of which coaching workshops	4	17	
of which information events	34	37	
of which Proposers' Days	8	2	

* Period between receipt of the application by the FWF and the funding decision. In the case of approval, it usually only takes a few days for the funding agreement to be issued. ** Programmes without a deadline are Principal Investigator Projects, Clinical Research Programme, ESPRIT Programme and Schrödinger Programme.
Source: FWF.

Scientific publications from the funded projects*	2022	2023
Monographs and editions	42	51
Articles/contributions in scientific journals, edited volumes and proceedings	6,589	5,245

* Data from project final reports received in the respective year.
Source: FWF.

Patents and invention disclosures*	2022	2023
Patents applied for	4	10
Patents granted	16	1
Records of inventions submitted to the university/university of applied sciences/research institution	n. a.	n. a.

* Data from project reports received in the respective year

Source: FWF.

Indicator 5: Internationalisation

	2022		2023		Target values 2023
	Number	in %	Number	in %	in %
Projects with international partners	2,015	74	1,929	75	> 73
Participating persons located abroad	5,652	42	6,105	43	

Source: FWF.

Bilateral and multilateral agreements with foreign research funding organisations (these are existing agreements, which does not mean that projects can be submitted or are funded every year):

		2022	2023
Within Europe	Multilateral	9 ERA-Net investments Weave* (Belgium, Germany, Luxembourg, Poland, Switzerland, Slovenia, Czech Republic) Biodiversa+ European Partnership European partnership Water4All European partnership ERA4Health	9 ERA-Net investments Weave* (Belgium, Germany, Luxembourg, Poland, Switzerland, Slovenia, Czech Republic) Biodiversa+ European Partnership European partnership Water4All European partnership ERA4Health European Partnership Personalised Medicine
	Bilateral	France Italy/South Tyrol Russia (suspended) Hungary	France Italy/South Tyrol Russia (suspended) Hungary
Outside Europe	Multilateral	Belmont Forum	Belmont Forum
	Bilateral	China India Israel Japan South Korea Taiwan USA	China India Israel Japan South Korea Taiwan USA

* Weave is a network of European research funding organisations that aims to jointly fund international research projects.

Source: FWF.

Indicator 6: Knowledge and technology transfer

The FWF promotes bottom-up, application-oriented basic research in all disciplines. In addition to an explicit transfer component in the Clusters of Excellence, knowledge and technology transfer through exchange and cooperation with social and/or economic partners is generally possible in all FWF programmes.

Indicator 7: Communication and interaction with society

The following activities and formats for communicating and imparting knowledge and for involving and addressing civil society stakeholders were implemented in 2022 and 2023

The Austrian Science Fund FWF promotes communication and interaction with society on several levels: on the one hand, at the level of its programme portfolio with specific funding offers that enable researchers to expand their dialogue with society. These include the Science Communication and Top Citizen Science programmes as well as the transdisciplinary #ConnectingMinds programme. In the new Clusters of Excellence programme, communication and transfer measures are an integral part of the funding. In addition, the FWF as an institution implements numerous communication and dialogue measures to communicate the impact of basic research – e. g. the event series "*Am Puls*" or "*Was die Welt zusammenhält*". With the online science magazine "scilog", the FWF provides ongoing information on new findings from basic research. Another new component is the online research radar, a freely accessible database of thousands of FWF-funded research projects and their output.

Indicator 8: Gender and promotion of equality

	2022		2023		Target value 2023
	Number	in %	Number	in %	in %
Women in funded projects					
Women project staff	2,307	48	2,282	47	
Women project managers	227 (253)	34	211	34	> 33
Presidium	3	60	3	60	
Supervisory Board	7	70	6	60	
Assembly of Delegates	26	44	30	50	
Board of Trustees	27	42	32	47	
Women on programme juries					
Jury START Programme and Wittgenstein Prize	5	38	5	45	
Jury Clusters of Excellence	–	–	7	58	
Jury Programme for the Development and Development of the Arts (PEEK)	3	50	3	50	
Jury Science Communication Programme	3	50	2	40	
Jury doc.funds programme	6	43	5	33	
Jury doc.funds.connect programme	1	14	3	43	
Reviews conducted by women	1,316	27	1,197	27	
Difference in approval rate for women vs. men	+ 1.4 percentage points		+ 1.3 percentage points		± 2.0 percentage points

Source: FWF.

Programmes/initiatives with gender or equality as a funding criterion:
With a few exceptions, it is mandatory in all programmes to address gender and gender-relevant aspects in the project description (excerpt from the application guidelines): "*All potential gender and gender-relevant components of the submitted project must be described. To what extent are gender and gender-relevant considerations taken into account in the research project? How are these integrated into the research approach? This topic must be briefly addressed, even if the applicant does not believe that the project contains any such components*".

Isolated exceptions include the Wittgenstein Prize, as no project descriptions are submitted here, but nominations are made by third parties. For research groups and special research areas, as well as doc.funds and doc.funds.connect, balanced gender participation in the consortium is defined as a criterion relevant to decision-making. In the Clusters of Excellence and Emerging Fields programmes, a balanced proportion of women, representative of the specialist discipline, is described as a prerequisite. In the ESPRIT programme, the FWF reserves 50% of the funding for female researchers.

3.9.3 New initiatives and instruments 2023; outlook

With the excellence initiative "excellent=austria", the FWF and the BMBWF opened a new chapter in research funding. In the Clusters of Excellence, 35 consortia submitted applications. Five Clusters of Excellence were able to launch projects at eleven locations in 2023 with an investment volume of €135 million. Researchers from eleven universities and non-university research centres work together in the clusters. Basic research on key topics such as energy storage, quantum technologies, global health, the future of knowledge and the relationship between Europe and Asia will be addressed. This will create long-term structures, attractive framework conditions and international visibility.

In 2023, the FWF also continued the selection process for the Emerging Fields, the second pillar of "excellent=austria", with the aim of helping new transformative scientific approaches to achieve a breakthrough. The final funding decision was made in March 2024.

A highlight of the 2023 funding year was the awarding of the FWF Wittgenstein Prize to a quantum physicist and the awarding of eight FWF START Prizes to outstanding postdocs. Last year brought another special highlight with the awarding of the Nobel Prize in Physics to physicist Ferenc Krausz, whose early scientific career the FWF was already able to support with a START and a Wittgenstein Award.

For further information see FWF Annual Report.[276]

276 https://www.fwf.ac.at/en/about-us/annual-report

3.10 OeAD-GmbH (OeAD)

3.10.1 Profile and key figures

The OeAD-GmbH, Agency for Education and Internationalisation, promotes and connects people and institutions from education, science and research with future-oriented programmes. As an agency of the Republic of Austria, it contributes to inclusive, equal and high-quality education and initiates innovations in education, teaching and research. In addition to mobility and project funding to support the internationalisation of educational institutions and tasks in the school sector, it was commissioned to further develop digital skills in 2023.

The OeAD head office is located in Vienna, there are five regional offices at Austrian university locations, an office in Bregenz for Holocaust Education, five cooperation offices in Eastern and Southeastern Europe with an educational focus, as well as cooperation offices in Lviv and Shanghai with a scientific focus. The OeAD-*Wohnraumverwaltungs-GmbH* provides accommodation for 12,000 international students, researchers and teaching staff.

Key figures for 2022 and 2023

	2022	2023
Total funding budget, disbursements in €1,000	96,444	105,970

Number of employees	2022			2023		
	m	f	total	m	f	total
Employees (= headcount)	98	242	340	112	248	360
Full time equivalents (rounded)	82	191	273	97	196	293

Source: OeAD.

The further increase in the key performance indicator of the funding budget in 2023 is due to the final overcoming of the coronavirus pandemic and the associated increase in the number of study and research visits and projects carried out, particularly in Erasmus+. The new mandate to set up an office for digital skills and expansions in other measures, such as digital learning and extremism prevention, led to an increase in staff resources at the OeAD.

3.10.2 Indicators for 2022 and 2023

In contrast to the key performance indicators, the indicators only relate to the OeAD's research-related activities; for 2023, these also include the measures for Ukraine.

The BMBWF funds are used for research-related activities such as incoming and outgoing scholarship programmes, activities with our neighbouring countries Hungary, the Czech Republic and Slovakia, the lecturing programme, scientific and technical cooperation, international research cooperation and internationalisation measures, support for the university network with Southeast Asia and African countries as well as the Children's and Youth Universities and Sparkling Science programmes.

Indicator 1: Funding, including third-party funding

	2022 in €1,000	2023 in €1,000
Total research-related income	23,505	24,699
of which federal funds BMBWF (approvals incl. Ukraine scholarships)	21,326	21,426
of which other federal funds (Australian Development Agency; disbursements)	1,219	2,487
of which other (third-party funding e.g. Indonesia, Pakistan; disbursements)	960	786

Source: OeAD.

Indicator 2: Evaluation systems

Surveys of (potential) applicants and sponsored persons

Scholarship holders and lecturers are regularly surveyed on the implementation of their study or research project, their lecturing activities and the OeAD services. Among other things, these surveys provide information on satisfaction with the OeAD's handling of the programme. The results of these surveys show values between 1.0 and 1.5 for overall satisfaction on a four-point scale (1: very good; 4: unsatisfactory) for the individual programmes.

Evaluations of funding programmes, impact analyses

In 2023, an externally commissioned evaluation of the OeAD cooperation offices abroad was carried out, which showed consistently positive results in the areas of relevance, effectiveness, efficiency and sustainability and corresponding recommendations derived from the evaluation activities.[277]

Indicator 3: Human capital and qualification

Office staff	Heads									
	total		female				male			
	2022	2023	2022		2023		2022		2023	
	Number	Number	Number	in %	Number	in %	Number	in %	Number	in %
Assistance	5	5	4	80	5	100	1	20	0	0
Experts	45	46	37	82	40	87	8	18	6	13
Management level	3	3	2	67	2	67	1	33	1	33
Total	53	54	43		47		10		7	

277 Cf. pme Consulting (2023).

	FTE (rounded)									
	total		Female				Male			
	2022	2023	2022		2023		2022		2023	
	Number	Number	Number	in %	Number	in %	Number	in %	Number	in %
Assistance	4	5	3	75	5	100	1	25	0	0
Experts	36	37	30	83	32	86	6	17	5	14
Management level	2	2	2	100	2	100	0	0	0	0
Total	42	44	35		39		7		5	

Source: OeAD.

The following staff development measures were implemented in 2022 and 2023

The number of staff for the OeAD's research-related activities has increased only slightly compared to 2022 due to the expansion of measures for Ukraine.

The OeAD's extensive training programme, which focused on IT security awareness, the introduction and implementation of a whistleblowing system at the OeAD and labour law for managers, was carried out partly online and partly in a face-to-face format as planned.

Indicator 4: Output, innovation and excellence

Projects and people	2022		2023	
	Number	in %	Number	in %
Funded projects*	652		621	
of which in universities	542	76%	526	77%
of which in universities of applied sciences	27	4%	42	6%
of which in other facilities	140	20%	112	17%
Persons supported (incl. Ukraine)	3,358		3,973	
of which men	1,410	42%	1,706	43%
of which women	1,948	58%	2,267	57%

* The number of funded projects does not correspond to the sum of the projects in the various organisations, as projects with several partners are only counted once. For the same reason, the shares indicated do not result from a division of the figures given in the table.

Source: OeAD.

The slight decrease in the number of funded projects is due to the lack of a call for proposals in one funding programme. The 18% increase in the number of persons receiving funding compared to 2022 is due to the final overcoming of the coronavirus pandemic and the continuation of the scholarship programme for students and researchers who have fled Ukraine (1,265 people in total).

Time to contract and consultations	2022	2023	Target value 2023
Time to contract in days*	90 to 290	90 to 280	
Answering enquiries	6,134	7,493	> 5,500
of which consultations on immigration law	2,622	2,440	> 2,500

* The processing time is defined from the end of the application period until the contract is signed or the scholarship is awarded. For scholarship programmes, the duration is up to 180 days. In the case of the Sparkling Science programme, which was put out to tender in 2023 and not in 2022, processing times of up to 280 days are required due to the complex review process for project submissions, the jury meetings, the submission of the funding offer and the final signing of the contract. Source: OeAD.

Indicator 5: Internationalisation

Most of the programmes reported here are internationalisation programmes in the field of science and research per se. This applies both to mobility programmes (3,973 mobile persons who studied or conducted research in another country in 2023) and 621 cooperation projects, in each of which the focus was on international cooperation.

Indicator 6: Knowledge and technology transfer

In the OeAD's scholarship and cooperation programmes, knowledge and technology transfer takes place both on an individual and institutional level, even if this is not explicitly stated as an objective of the funding programme in many programmes.

Indicator 7: Communication and interaction with society

The following activities and formats for the communication and transfer of knowledge as well as for the inclusion and addressing civil society actors were implemented in 2022 and 2023:
In the area of public science, various measures are being implemented to communicate science (outside of schools) and to build up expertise in the area of citizen science.

To build up expertise, the OeAD holds lectures on the topic and offers networking and peer learning opportunities. The second call for proposals for the Sparkling Science 2.0. research funding programme was open from 1 June to 25 September 2023, with projects starting in 2024. Extracurricular science education was funded with 21 initiatives from children's and youth universities.

The focus in the area of science education in schools was on measures to build trust in science: over 200 researchers also agreed to visit schools as "science ambassadors" in 2023, with over 310 visits taking place. The opportunity to take part in the "Citizen Science Award" research competition was utilised by 3,438 participants, 3,383 of whom were pupils. In addition, the "Collection of offers for science and democracy education" created in 2023 provides teachers with an overview of the wide range of offers in this area. The second Young Science Congress was attended by over 600 pupils from all over Austria.

Participants in the following projects	2022	2023	Target value 2023
Children's and youth universities (subsidised initiatives)	20	21	20
Sparkling Science (funded partnerships between institutions; funding only from 2022)	225	Call for tenders at the end of 2023, projects will not be confirmed until 2024	
Citizen Science Award (persons involved)	2,046	3,438	2,500

Source: OeAD.

Indicator 8: Gender and promotion of equality

Women on evaluation committees and reviews	2022		2023		Target value 2023
	Number	in %	Number	in %	Number
Juries, evaluation committees	21	47%	9	30%	
Assessments	407	36%	278	45%	
Supervisory Board	5	42%	5	42%	5
Strategy Advisory Board	3	43%	3	4 %	3

Source: OeAD.

3.10.3 New initiatives and instruments 2023; outlook

In 2023, the coronavirus pandemic was finally overcome in terms of international mobility and cooperation, but also for activities in the school sector. This is confirmed by the very high number of applications and projects actually realised as well as study and research visits.

The world's major trouble spots had an impact on the OeAD's programmes and led to a financial expansion of the funding agreement concluded between the BMBWF and the OeAD. The scholarship programme for refugee students and researchers from Ukraine was continued on behalf of the BMBWF and reached a new high of over 1,200 scholarship holders in 2023. The crisis in the Middle East led to a significant increase in demand for the OeAD workshops on conflict management and violence prevention organised at schools.

A funding programme is being developed for 2024 which, for the first time, will explicitly counteract the shortage of skilled workers by training Master's students with a focus on STEM subjects. The OeAD's measures for the BMBWF's focus on strengthening trust in science and democracy DNAustria[278] will also be expanded.

Further information can be found in the OEAD annual financial statements.[279]

278 https://dnaustria.at/
279 https://oead.at/en//the-oead/publications

3.11 Austrian Research Promotion Agency (FFG)

3.11.1 Profile and key figures

Profile of the organisation

The FFG sees itself as the central agency for the promotion of applied research, development and innovation. It is the Federal Government's implementation partner for its strategies to strengthen the research and innovation location and to tackle current challenges in the context of the ecological and digital transformation. In addition, the FFG supports the majority of the regional governments in the implementation of strategic funding initiatives.

In this function, the FFG offers a differentiated portfolio of support programmes. In addition to funding RTI projects and research infrastructures, the FFG addresses the need for highly skilled staff in research and development. The FFG also promotes investments in digital infrastructure (broadband) and investments in the expansion of e-mobility (charging infrastructure, fleet conversion).

Finally, the FFG supports companies and research institutions in participating in European programmes and assesses applications for the research premium (*Forschungsprämie*).

Key figures for 2022 and 2023

R&D funding	2022	2023
Projects	5,367	7,503
Participations	7,906	9,944
Stakeholders	4,643	5,227
Subsidies incl. liabilities in €1,000	693,385	773,116
Present value in €1,000	559,810	683,618
Payments in €1,000	607,500	617,663

Infrastructure funding (broadband, EBIN, ENIN)*	2022	2023
Projects	258	233
Present value in €1,000	218,847	991,591
Payments in €1,000	79,630	301,756

* As numerous projects are being funded with well above-average amounts as part of the broadband subsidies, there will be a significant increase in the present value in 2023.

Number of employees (R&D funding and infrastructure funding)	2022			2023			
	m	f	total	m	f	d	total
Employees (= headcount)	170	239	409	175	265	1	441
Full time equivalents (rounded)	157	203	360	163	226	1	390

Source: FFG.

3.11.2 Indicators for 2022 and 2023

Indicator 1: Funding, including third-party funding

Source of funds for R&D funding, excluding commissions (public funds and third-party funding, excluding contributions from companies)	Present values as part of contractual commitments in €1,000	
	2022	2023
Federal Ministries acting as owners	398,067	523,508
BMK	339,048	369,689
BMAW	59,019	153,818
BMBWF	50,788	26,687
BML	15,565*	9,215
BMF	13,801	21,331
NFTE, Ö-Fonds, FZÖ	8,548	37,105
Climate and Energy Fund	50,856	46,952
Regional governments	13,861	16,288
EU	4,903	2,532
Other	3,422	1,328
Total	559,811	683,618

The table was updated due to a corrected programme allocation, which is why there are deviations from the information in the report 2023.
Source: FFG.

Indicator 2: Evaluation systems

FFG funding is evaluated externally according to pre-defined indicators. In the delegated area of activity, the responsible ministries commission the evaluations; in its own area of activity, the FFG also commissions the evaluations itself.

The evaluation results are discussed at the FFG's internal evaluation jour fixe. In 2023, for example, the evaluations of City of Tomorrow and the IEA research cooperation – both commissioned by the BMK; Ideas Lab 4.0 and Laura Bassi – both commissioned by the FFG; and M-ERA.NET 2 – commissioned by RCN – were on the agenda of jours fixes.

Four years after completion of the funded RTI projects, the funded organisations are surveyed on the utilisation of the project results and the effectiveness of the funding. The results are published at.[280]

Feedback from applicants is obtained on a regular basis:

- Annual telephone survey on satisfaction with FFG services and new requirements
- Online surveys on satisfaction with project support, application or contract preparation, focus questions on user-friendliness of the processing systems, effort, traceability of requirements
- If required: focus groups in the context of specific improvement projects

280 https://www.ffg.at/content/evaluierung-der-foerderung

Indicator 3: Human capital and qualification

Employees	Headcount											
	total		female				male				diverse	
	2022	2023	2022		2023		2022		2023		2022	2023
	Number	Number	Number	in %	Number	in %	Number	in %	Number	in %	Number	Number
Assistants	63	73	49	78	59	81	14	22	14	19	0	0
Experts	294	314	164	56	179	57	130	44	134	43	0	1
Team management and division management	50	50	25	50	23	46	25	50	27	54	0	0
General Management	2	2	1	50	2	100	1	50	0	0	0	0
Apprentices	0	2	0	0	2	100	0	0	0	0	0	0
Total	409	441	239	58	265	60	170	42	175	40	0	1

Source: FFG.

	Full time equivalents (rounded)											
	total		female				male				diverse	
	2022	2023	2022		2023		2022		2023		2022	2023
	Number	Number	Number	in %	Number	in %	Number	in %	Number	in %	Number	Number
Assistants	50	59	40	80	49	83	10	20	10	17	0	0
Experts	262	280	140	53	152	54	122	47	128	46	0	1
Team management and divisional management	46	47	22	48	21	45	24	52	26	55	0	0
General Management	2	2	1	50	2	100	1	50	0	0	0	0
Apprentices	0	2	0	0	2	100	0	0	0	0	0	0
Total	360	390	203	56	226	58	157	44	163	42	0	1

Source: FFG.

The following staff development measures were implemented in 2022 and 2023:

- Monthly survey of employees via “Robin Mood”
- Employer branding project: 2023 Implementation as part of the recruiting process – new job advertisements, new “brand” and a new careers page in future
- Apprentice training: two office clerk apprentices were accepted in 2023
- Continuing education: The digitalisation of learning opportunities was driven forward in the internal continuing education programme and new exchange formats (e.g. “communities of practice” and learning cafés) were established

Indicator 4: Output, innovation and excellence

Projects, investments and organisations	2022		2023		Target value 2023 in %
	Number	in %	Number	in %	
Funded projects	5,367		7,503		
Total participation in projects	7,906		9,944		
Total organisations	4,643	100	5,227	100	
of which company	3,882	84	4,427	85	
of which SMEs (SMEs of companies)	3,265	84	3,755	85	~ 75
of which research institutions	159	3	167	3	
of which universities (institutes)	424	9	443	8	
of which intermediaries and others	178	4	190	4	

Source: FFG.

Time to contract, median values in days

Processing time: median in days	2022	2023
FFG total	7	5
of which as examples		
Bottom up programmes*	83	72
Small-scale programmes**	3	3
Research premium	39	40

* Includes all funding offers that are implemented as part of the basic programmes: Basic Programme Classic, Early Stage, Impact Innovation. ** Includes mainly the internships for pupils and students, internships for female students, the eco-cheque, the continuing education cheque, the patent cheque and the innovation cheque.
Source: FFG.

Number of consultations for (potential) funding applicants	2022	2023	Target value 2023
Through the FFG National Funding Service	12,307	14,214	~ 10,000*
Consultations as part of the EIP mandate	6,238	5,915	~ 6,000*

* Both the advisory activities of the funding service and those within the scope of the EIP mandate are demand-driven. The aim is to provide guidance on funding opportunities and concrete support during the application phase. The monitoring of implementation performance is primarily based on the feedback regularly obtained from the counsellors on the quality and accessibility of counselling.
Source: FFG.

Patents and licences	2022	2023	Target value 2023
Patents applied for*	597	651	> 500
Patents granted	n. a.	n. a.	
Licensing agreements	n. a.	n. a.	

* Data basis: Impact monitoring (survey 4 years after the end of the project); patent cheque monitoring (cleared cheques).
Source: FFG, Austrian Institute for SME Research (impact monitoring).

Indicator 5: Internationalisation

	2022		2023	
	Number	in %	Number	in %
Projects with international partners*	157	13	203	16
Participating companies based abroad**	149	3	148	2

* When counting projects with international partners, all projects are counted that either have foreign partners documented in the consortium or that are labelled as transnational collaborations. ** Company participations are used to calculate the share.

Source: FFG.

Funding in transnational calls for proposals (commitments)	2022
	Present value in €1,000
Article 185: Eel	1,390
Article 185: Eurostars	4,641
Eranet EU co-financed	1,967
Eranet not EU co-financed	3,867
Eureka	4,749
Joint Programming Initiatives	3,635
Joint Technology Initiatives	–
Other transnational projects	3,429
Total	23,678

Source: FFG.

Funding in transnational tenders (commitments)	2023
	Present value in €1,000
Horizon Europe Partnerships	21,810
Digital Europe	9,206
ERANET (with and without co-financing)	4,827
EUREKA	4,101
Other transnational projects	9,588*
Total	49,532

* Others are co-operations with China, Germany and Switzerland, an Africa-oriented activity, individual labelled projects in BIG data in production and Nano-EHS, a former JPI.

Source: FFG.

Transnational cooperation is largely determined by activities at European level (Horizon Europe, Digital Europe). With the implementation of the partnerships from Horizon Europe, new structuring elements have become effective, which are now also included in calls for proposals and play an important role through the use of national funds. Previous co-operation instruments have been partially replaced as a result.

Participation in Horizon Europe pillars and instruments	Instrument	Number of projects 2022	Number of projects 2023
Global Challenges and European Industrial Competitiveness	HORIZON-COFUND	3	
	HORIZON-CSA	5	1
	HORIZON-FPA		1
	HORIZON-IA		1
	HORIZON-RIA		3
Innovative Europe	HORIZON-COFUND	1	
	HORIZON-CSA	1	
Widening Participation and Strengthening the European Research Area	HORIZON-CSA	1	2
Total		11	8

Source: FFG.

Indicator 6: Knowledge and technology transfer

Funding activities in the area of knowledge and technology transfer	2022		2023	
Topics and programmes*	Projects	Present value in €1,000	Projects	Present value in €1,000
Innovation, competitiveness and internationalisation (FinV)	196	49,422	171	48,454
Digital technologies (FinV)	40	23,151	79	38,335
Mobility system (FinV)	54	30,926	64	36,449
Energy and environmental technologies (FinV)	64	32,620	46	22,286
Co-operation structures (FinV)	182	61,569	43	71,652
Production technologies (FinV)	24	18,100	30	24,249
Human capital (FinV)	25	3,866	28	3,533
Space (FinV)	17	6,484	17	5,111
Life Sciences (FinV)	1	2,111	3	5,662
Energy research (KLIEN)	34	34,179	21	25,358
KIRAS (BMF)	17	7,988	28	14,856
Smart Cities (KLIEN)	11	4,371	18	5,743
eMobility lighthouses (KLIEN)	11	4,338	7	7,960
THINK.WOOD (BML)	15	11,559	10	7,015
FORTE (BMF)	10	4,303	9	4,972
Quantum Austria (BMBWF)	5	10,270	1	1,901

* The allocation listed follows the topics of the 2022/23 funding agreement on the one hand and the programmes commissioned by other funding bodies not included in the funding agreement (e.g. BML, KLIEN, FZÖ) on the other. The list shows topics/programmes with the highest amounts in projects with cooperation between science and industry. For the project count, projects are taken into account for which the additional restriction applies that they received more than €10,000 in funding. Topics of the 2022/23 funding agreement are marked with (FinV)

Source: FFG.

	2022		2023	
	Present value in €1,000	Share of total present value	Present value in €1,000	Share of total present value
All funding of the science/industry cooperation	318,446	57%	342,540	50%

* The majority of FFG funding programmes promote cooperation at the interface between science and industry Source: FFG.

Indicator 7: Communication and interaction with society

The following activities and formats for communicating and imparting knowledge and for involving and addressing civil society stakeholders were implemented in 2022 and 2023

- proEthics: Pilot as part of the EU-funded proEthics project:[281] Development of the call for proposals "Digital solutions for people and society: climate change and health" based on a multi-stage process involving stakeholders and civil society.[282]
- Citizens Observatory: Involvement of civil society in the implementation of EU missions through the establishment of a Citizens Observatory, supported by Citizens Engagement Workshops.[283]
- Rural innovation systems: Support and accompanying measures to activate and involve broad sections of society in a region specific offers are: Sketchbook "Innovation in rural areas"; handbook "Step by step to an innovation network"; "Rural designers."[284]
- Co-creation spaces: A further four funded co-creation spaces on the topic of climate and energy are expanding the range of innovative learning spaces across Austria as part of the "Young talents for the energy transition" programme.[285]
- *Wirksam Werden – Soziale Innovationen gegen Kinder- und Jugendarmut*: A new funding programme financed by the Ministry of Social Affairs supports non-profit organisations in the development and testing of innovative measures to combat child and youth poverty.

281 https://pro-ethics.eu/
282 https://www.ffg.at/digitale-loesungen-Call2023
283 https://www.linkedin.com/posts/trami5missions_makingmissionswork-eumissions-horizoneurope-activity-7151241697094488066-SaVu
284 https://www.ffg.at/ausschreibung/laendliche-innovationssysteme-im-rahmen-der-europaeischen-innovationspartnerschaft-77
285 https://www.ffg.at/ausschreibungen/CoCreationSpacesKlimaundEnergie2022

Indicator 8: Gender and promotion of equality

	2021		2022		Target value 2023
	Number	In %	Number	In %	
Women in funded projects					
Full time equivalents based on audited reports	1,272	18%	1,357	19%	
Project managers*	1,764	23%	2,574	27%	> 25%
Women on committees and juries					
FFG Supervisory Board	10	59%	9	53%	
Bridge Advisory Board	4	27%	3	21%	
Basic programmes Advisory Board	11	50%	11	50%	
Reviews conducted by women**	1,633	35%	1,415	35%	> 35%

* Refers to the total number of participations with personal names. If no project management function is specified, the data are analysed according to the gender of the technical contact person. ** Excluding broadband, EBIN and ENIN Source: FFG.

Programmes/initiatives with gender or equality as a funding criterion:

In almost all funding programmes implemented by the FFG, gender is anchored in the funding criteria – in relation to the composition of the project team and with regard to the content of the project.

Specific funding programmes with a gender focus are also managed:

- The "*Talente*" funding programme (BMK) promotes equal opportunities in companies and applied research, people in research and development throughout their careers as well as gender-equitable research projects and innovation.
- INNOVATORINNEN (BMAW) supports women for or in creative roles in RTI and strengthens the career skills of female researchers. Specific programmes are: leadership programme, alumnae exchange and events for women in the applied research and innovation sector.[286]
- Laura Bassi 4.0 is aimed specifically at organisations (especially SMEs) that want to shape a digital future that offers equal opportunities.
- Doctoral candidates for future topics of the economy 2023 (BMK).

3.11.3 New initiatives and instruments 2023; outlook

The following new impulses were set:

- Transformative Industry: A total of €540 million is available until 2026 to fund innovative projects that support the transformation of industry. Funding: BMAW Transformation Initiative and the KLIEN initiative "Transformation of Industry".

286 https://www.ffg.at/innovatorinnen

- Expedition Future: The first calls for proposals were launched in 2023. The aim is to initiate radical innovation approaches with high disruptive potential and actively support them throughout the entire innovation cycle.
- Cybernet Passport (K-PASS): The first national cyber security research programme was launched with a call for proposals worth €5 million. K-PASS complements the research programmes KIRAS (for civil security) and FORTE (for defence) of the "Austrian Security Cluster" of the Federal Ministry of Finance.
- Artificial Intelligence: As part of the cross-agency initiative Artificial Intelligence Mission Austria (AIM AT), a lead project and an endowed professorship were advertised. Under the AI4Green brand, the application of AI solutions was promoted in specific BMK priority areas. At an institutional level, the FFG supported the implementation of the National Cybersecurity Coordination Centre (NCC-AT).
- Transnational calls for proposals: The importance of co-financed, transnational funding programmes increased. Highlights 2023: "Driving Urban Transitions Partnerships" (DUT) and "Clean Energy Transition Partnership" (CETP) – as well as four new "European Digital Innovation Hubs" co-financed by national funds (FZÖ).

Outlook

Financing agreements 2024–2026 with BMAW and BMK: Established focal points will be further developed and new thematic brackets set: circular economy and production on the one hand, digital and key technologies on the other. This will further promote the interaction of previously separately addressed areas of expertise. "People in RTI" will be anchored as a cross-cutting topic and upgraded in terms of budget. New impetus can be provided through participation in the European Chips Act (FZÖ, BMK).

Further information can be found in the FFG annual report.[287]

Development of selected indicators over the years

This section shows for the first time selected indicators over time (2018 to 2023). GeoSphere Austria is not yet included, and SAL is only included from 2019 (as SAL was only founded in 2018, data are only available from 2019). Some data is also missing for LBG for 2018, as LBG was still defined as a research funding institution and not as a research institution in the Austrian Research and Technology Report 2020. Without exception, the data come from the Austrian Research and Technology Reports for the years 2020 to 2024. If data for a year from the reports for different years deviate from each other, the most recent report is always used as reference.

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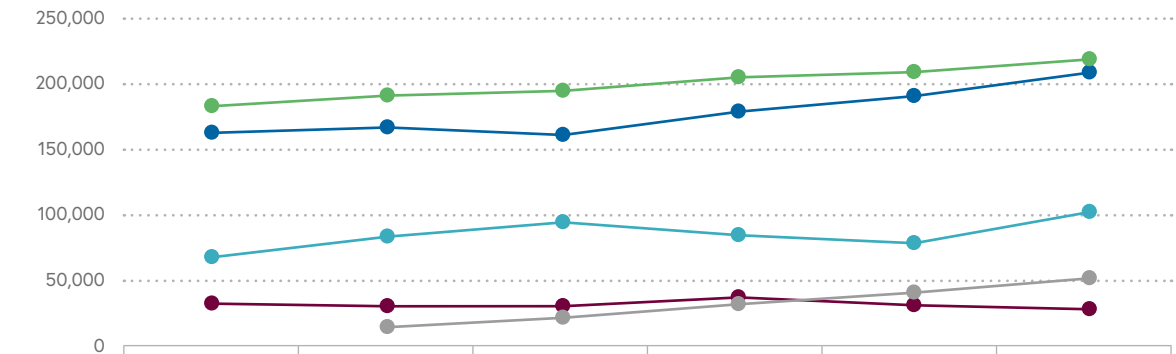
Research institutions

For the five central research institutions AIT, OeAW, ISTA, SAL and LBG, the development of income, the third-party funding ratios, the approvals in the framework programmes and the Glass Ceiling Index are presented.

Development of income

The development of income shows that, with the exception of the LBG, all institutions are growing, in some cases very significantly: SAL grew by an average of over 60% annually from 2019 to 2023, ISTA by an average of 10% from 2018 to 2023. In contrast to AIT and OeAW, which grew by an average of 6% and 4% respectively, SAL and ISTA are still in the process of being established. Due to the closure of research groups in 2022 and 2023, the LBG recorded declining income, but is expected to grow significantly again from 2024 due to recent new tenders and the three new institutes in the field of health science.

Figure 3-1: Income of the research institutions (in €1,000), 2018–2023

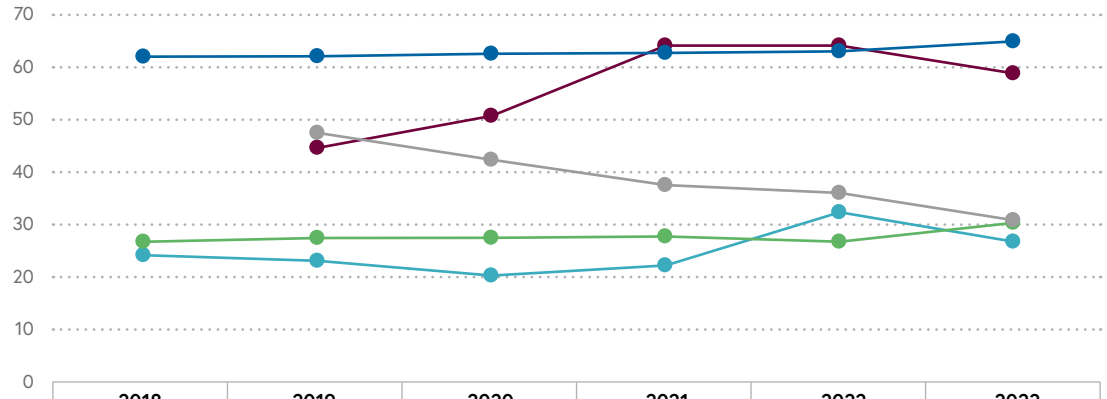


	2018	2019	2020	2021	2022	2023
AIT	162,900	167,000	161,252	179,059	190,926	208,865
OeAW	183,222	191,312	194,922	205,233	209,219	218,961
ISTA	68,013	83,720	94,648	84,802	78,701	102,500
SAL		14,655	21,840	32,163	40,992	51,944
LBG	32,610	30,610	30,660	37,368	31,371	28,316

Source: Austrian Research and Technology Report 2020, 2021, 2022, 2023, 2024.

The third-party funding ratios are calculated as the ratio of all third-party funding and the total income, for the OeAW as: Third-party funding/(funds from the performance agreement + third-party funding), excluding other income. The ratios vary to a large extent, ranging from 27% at ISTA to 65% at AIT in 2023. As very basic research-orientated institutions, OeAW and ISTA naturally have lower third-party funding ratios, although the slightly different calculation of the OeAW must be taken into account here. The AIT and LBG have significantly higher third-party funding ratios. With the exception of SAL, the third-party funding ratios are trending upwards. The low and declining ratio at SAL is probably due to the rapid growth of the institution.

Figure 3-2: Third-party funding ratios of research institutions (in percent), 2018–2023

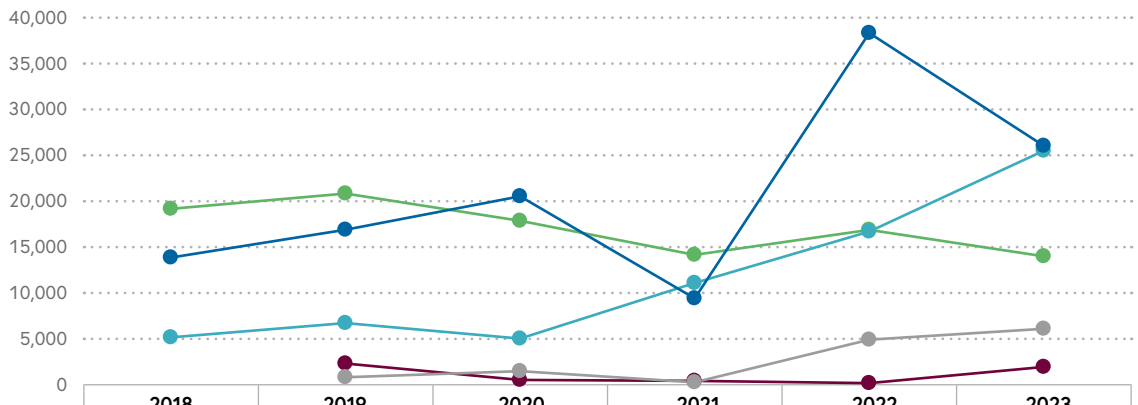


	2018	2019	2020	2021	2022	2023
AIT	61.9%	62.0%	62.4%	62.6%	62.9%	64.8%
OeAW	26.6%	27.3%	27.3%	27.6%	26.6%	30.2%
ISTA	24.0%	23.0%	20.1%	22.1%	32.2%	26.6%
SAL		47.3%	42.2%	37.4%	35.9%	30.7%
LBG		44.5%	50.6%	64.0%	64.0%	58.7%

*The third-party funding ratio at the OAW is calculated as: Third-party funds/(funds from the performance agreement + third-party funding), excluding other Income. At LBG, third-party funding does not include contributions from partners.

Source: Austrian Research and Technology Report 2020, 2021, 2022, 2023, 2024.

Figure 3-3: Approvals by research institutions in the EU framework programmes (in €1,000), 2018–2023



	2018	2019	2020	2021	2022	2023
AIT	13,863	16,893	20,535	9,413	38,327	26,034
OeAW	19,171	20,838	17,865	14,157	16,879	13,999
ISTA	5,166	6,724	5,032	11,091	16,694	25,504
SAL		818	1,484	271	4,913	6,101
LBG		2,315	528	424	179	1,943

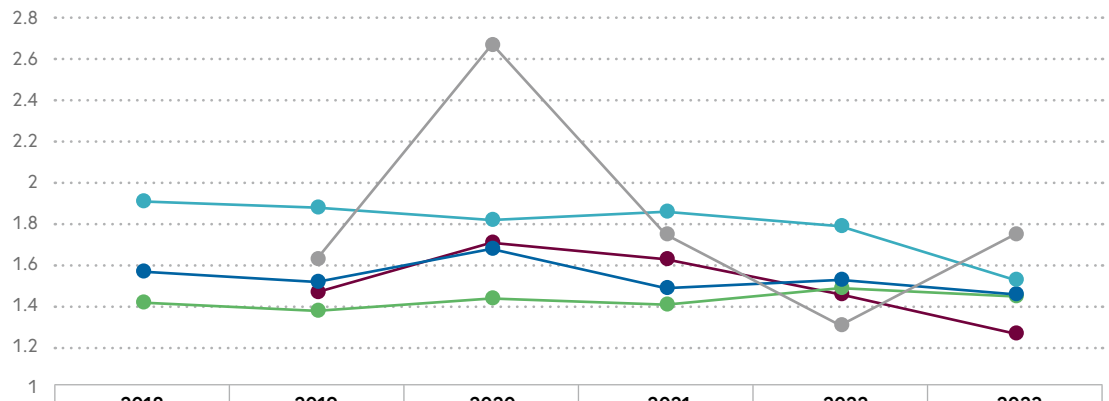
Source: Austrian Research and Technology Report 2020, 2021, 2022, 2023, 2024, FFG EU Performance Monitor.

The participations in the framework programmes are shown in approvals in Horizon 2020 (until 2021) and Horizon Europe (from 2021) in €1,000. While only the OeAW and ISTA were successful at the ERC, approvals rose sharply at all institutions in 2022 and 2023. This increase was strongest at the OeAW, ISTA, SAL and LBG in 2023 and at the AIT in 2022. Due to the switch from H2020 to Horizon Europe in 2020 and 2021, all institutions recorded declining participations in either 2020 (ISTA) or 2021 (all others). Overall, however, this development over the last six years can be seen as very positive; ISTA, for example, generated a quarter of its total income from Horizon Europe in 2023 and SAL's participations have also risen sharply in the last two years. As the projects in Horizon Europe are often very large, winning a project or not can make a visible difference. For this reason, the decline in the AIT, starting from a record level in 2022, should not be interpreted as a trend. However, reliable developments will only be visible in a few years' time.

Development of the Glass Ceiling Index

The development of the Glass Ceiling Index serves as an indicator for gender and the promotion of equality. The values for all institutions are greater than one, i. e. women are underrepresented in management positions in all institutions. The differences in level and development can be explained on the one hand by the size of the institution: At the OeAW as the largest institution, the value remains almost unchanged over the years, at SAL as the smallest institution it fluctuates strongly. On the other hand, the disciplinary orientation plays a major role: AIT, ISTA and SAL, as research institutions orientated towards the natural sciences and technology,

Figure 3-4: Gender – Glass-Ceiling Index of the research institutions, 2018–2023



	2018	2019	2020	2021	2022	2023
AIT	1.57	1.52	1.68	1.49	1.53	1.46
OeAW	1.42	1.38	1.44	1.41	1.49	1.45
ISTA	1.91	1.88	1.82	1.86	1.79	1.53
SAL		1.63	2.67	1.75	1.31	1.75
LBG		1.47	1.71	1.63	1.46	1.27

Source: Austrian Research and Technology Report 2020, 2021, 2022, 2023, 2024.

have consistently higher index values than OeAW and LBG, which also have units conducting research in the humanities. However, the development of the index over time also reflects the endeavours of the institutions to strive for gender equality. At AIT, ISTA and LBG in particular, the value is approaching 1, which indicates a noticeable increase in the representation of women in management positions.

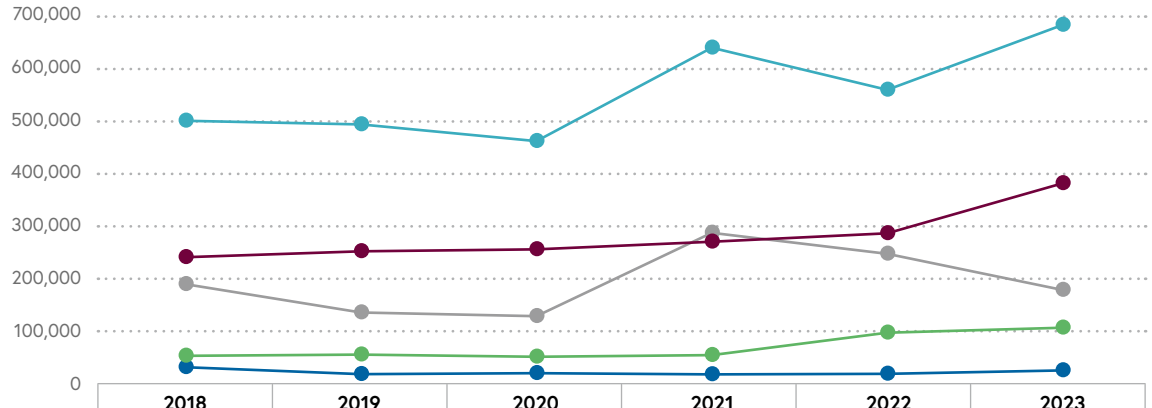
Research funding institutions

It was difficult to select informative and comparable indicators for the central research funding institutions. The presentation is therefore limited to the development of present values or funding budgets and the proportion of female project leaders.

Development of present values and funding budgets

The present values from 2018 to 2023 show three larger institutions, aws, FFG and FWF, as well as two smaller organisations, OeAD and CDG. FFG and FWF have grown in recent years, with both showing significant growth in 2023. The OeAD took on new tasks and recorded strong growth over the entire observation period. The aws, on the other hand, shows declining present values in 2022 and 2023 and the CDG recorded a declining funding budget until 2021 and has been growing again since then. At the aws, a subdued propensity to invest in the business enterprise sector led to declining performance figures in the core business, while the CDG in turn receives almost a third of its total public funding from foundation funds. All organisations benefited noticeably from the funds available from the Future Austria Fund since 2022.

Figure 3-5: Present value of funding from research funding organisations (in €1,000), 2018–2023



	2018	2019	2020	2021	2022	2023
aws	189,000	135,000	128,000	287,000	247,000	178,000
CDG	30,609	17,393	19,254	16,964	18,003	24,524
OeAD	52,380	54,688	50,548	53,725	96,444	105,970
FWF	240,500	251,743	255,479	270,017	286,092	381,504
FFG	500,737	493,799	461,948	640,131	559,810	683,618

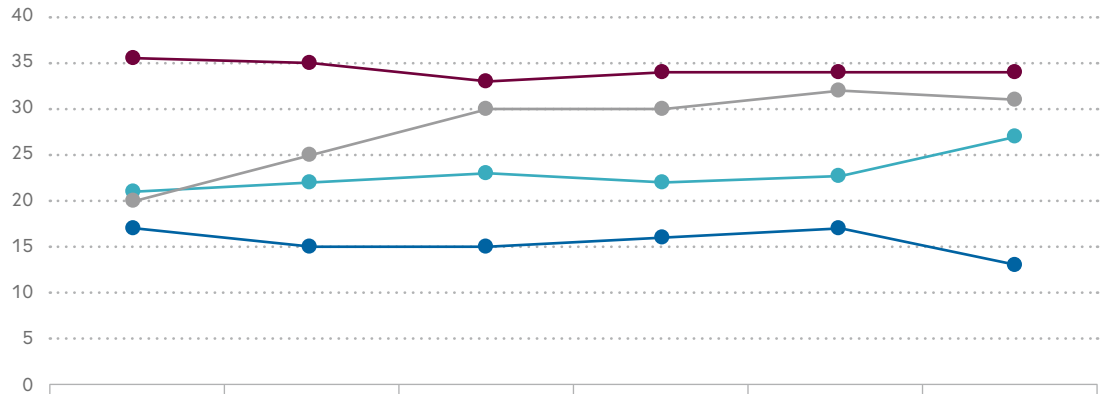
Total present value of receivables or total volume of receivables in €1,000, aws without COVID-19 aid and without special programmes Ukraine war.
Source: Austrian Research and Technology Report 2020, 2021, 2022, 2023, 2024.

Proportion of female project managers

The proportion of women among all project leaders is presented as an indicator for gender and promotion of equality. As the OeAD mainly awards scholarships and lectureships, project leaders cannot be defined and are therefore not included in this list.

As expected, the proportions are highest at the FWF due to its disciplinary breadth and lowest at the CDG due to its focus on industry-related basic research. The somewhat different survey unit at the CDG must also be taken into account – CD Laboratories and JR Centres are generally units that are significantly larger than an average research project. The percentages have remained fairly stable over time, although aws and FFG have recorded significant increases.

Figure 3-6: Proportion of women among all project managers (in %), 2018–2023



	2018	2019	2020	2021	2022	2023
aws	20%	25%	30%	30%	35%	31%
CDG	17%	15%	15%	16%	17%	13%
FWF	36%	35%	33%	34%	34%	34%
FFG	21%	22%	23%	22%	23%	27%

Proportion of women in project management positions at the CDG: heads of CD Laboratories and JR Centres.
Source: Austrian Research and Technology Report 2020, 2021, 2022, 2023, 2024.

Annex

Annex I – Directories and data sources

List of figures

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Data sources

EUROSTAT Database:[288] The Statistical Office of the European Union provides official data on a wide range of topics in a country comparison. This includes data from countries within the European Union, and for some indicators there is also data from large economies outside the EU, such as the USA.

Resilience Dashboard:[289] The Resilience Dashboard of the Joint Research Centre of the European Commission has been presenting the relative resilience capacities and weaknesses of European and non-European countries since 2021. Various indicators from the four areas of "social and economic", "green", "digital" and "geopolitical" are collected and summarised in (sub-) indices.

Global Innovation Index 2023 (GII):[290] The Global Innovation Index (GII) is published annually by the World Intellectual Property Organisation (WIPO) of the United Nations. Between 2013 and 2020, the GII was published together with the French business school INSEAD and Cornell University. Since 2021, the GII has been published by WIPO in cooperation with the Portulans Institute, various companies and academic network partners and the GII Advisory Board. In 2023, 132 economies will be compared both on the overall index and in terms of more detailed indicators on innovation system inputs and outputs.

Digital Economy and Society Index (DESI) Report 2023:[291] The Digital Economy and Society Index (DESI) is published periodically by the European Commission. Since 2023, no composite value has been reported for the DESI index. Therefore, performance indicators of the European Commission's Digital Decade[292] that are also included in the DESI are considered.

European Innovation Scoreboard 2023 (EIS):[293] The European Innovation Scoreboard report provides a comparative analysis of the innovation performance of EU Member States and other European and non-European countries.

OECD – Main Science and Technology Indicators: In its database,[294] the OECD publishes important indicators on a wide range of topics, including industry, education, energy, transport and research and development.

Education at a Glance 2023:[295] In the Education at a Glance report, the Organisation for Economic Co-operation and Development (OECD) publishes an annual compilation of international comparative indicators on education. The focus is on participation in education, graduation ratios, investment in education and teaching-learning settings.

The Atlas of Economic Complexity:[296] The Atlas of Economic Complexity compiled by Harvard University contains an index of economic complexity. The index is calculated from data on foreign trade and depicts the knowledge intensity of goods and the processes required to produce these goods.

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288 See Eurostat (2023).
289 See European Commission (2023i)
290 See WIPO (2023).
291 See European Commission (2023d).
292 See European Commission (2022a).
293 See European Commission (2023a); European Commission (2023b).
294 See OECD (2023b).
295 See OECD (2023a).
296 See The Growth Lab at Harvard University (2023).

Scimago Journal & Country Ranks:[297] The Scimago Journal & Country Rank database is a publicly accessible portal that provides indicators on scientific publications.

Scopus:[298] Scopus is a fee-based literature database that also enables advanced searches and bibliometric analyses.

IMD World Talent Ranking:[299] In its Talent Ranking, the IMD World Competitiveness Centre of the business school IMD – International Institute for Management Development presents the development of skills and the retention and international attractiveness of and for highly qualified workers.

Readiness for Frontier Technologies Index 2023:[300] The United Nations Technology and Innovation Report 2023 provides a comparative analysis of the ability to apply future technologies. The Readiness for Frontier Technologies Index measures a country's ability to use, adopt and adapt frontier technologies and is made up of five pillars: ICT deployment, skills, research and development, industry activities and access to finance.

297 See Scimago Journal & Country Rank (2023).
298 See Scopus (2023).
299 See IMD World Competitiveness Centre (2023).
300 See United Nations (2023).

Glossary KPIs of the Digital Decade

Digital goals	KPI	Statistical value
Digital skills	At least basic digital skills	% of people (age 16–74)
	ICT specialists	Percentage of total employment
Digital infrastructure	Fixed Very High Capacity Network (VHCN) coverage	% of households
	Overall 5G coverage	% of households
Digital transformation of companies	Cloud	% of enterprises (with 10 or more employees; all manufacturing and service sectors, with the exception of the financial sector).
	Big data	% of enterprises (with 10 or more employees; all manufacturing and service sectors, with the exception of the financial sector).
	Artificial intelligence	% of enterprises (with 10 or more employees; all manufacturing and service sectors, with the exception of the financial sector).
	SMEs with at least basic level of digital intensity	% SMEs.
Digitalisation of public services	Digital public services for citizens	Score (0 to 100)
	Digital public services for businesses	Score (0 to 100)
	Access to e-health records	Score (0 to 100)

Description	Data source
Individuals with “basic” or “above basic” digital skills in each of the following five dimensions: information, and data literacy, communication and collaboration, problem solving, digital content creation and safety	Eurostat – European Union survey on the use of ICT in Households and by Individuals (ISOC_SK_DSKL_I21 [I_DSK2_BAB])
Employed ICT specialists. Broad definition based on the ISCO-08 classification and including jobs like ICT service managers, ICT professionals, ICT technicians, ICT installers and servicers.	Eurostat – Labour force survey (isoc_sks_itspt)
% of households covered by any VHCN. The technologies considered are fibre to the home (FTTH) and fibre to the building (FTTB) for 2017–2018 and FTTH, FTTB and Cable DOCSIS 3.1 for 2019 onwards (source: EUROSTAT ISOC_CBT)	EUROSTAT ISOC_CBT; Broadband coverage in Europe; studies for the European Commission by Omdia and Point Topic
% of populated areas with coverage by at least one 5G mobile network	EUROSTAT ISOC_CBT; Broadband coverage in Europe; studies for the European Commission by Omdia and Point Topic
Enterprises buying sophisticated or intermediate cloud computing services	Eurostat – European Union survey on ICT usage and e-commerce in enterprises (ISOC_CICCE_USE [E_CC1_SI])
% of enterprises analysing big data from any data source	Eurostat – European Union survey on ICT usage and e-commerce in Enterprises (ISOC_EB_BD [E_BDA])
% of enterprises using any AI technology	Eurostat – European Union survey on ICT usage and e-commerce in enterprises (ISOC_EB_AI [E_AI_TANY]
The digital intensity score is based on counting how many out of 12 selected technologies are used by enterprises. A basic level requires usage of at least 4 technologies.	Eurostat – European Union survey on ICT usage and e-commerce in Enterprises (ISOC_E_DII [E_DI4_LO + E_DI4_HI + E_DI4_VHI]
The share of administrative steps that can be done online for major life events (birth of a child, new residence, etc.) for citizens.	e-Government Benchmark 2023
The indicator broadly reflects the share of public services needed for starting a business and conducting regular business operations that are available online for domestic as well as foreign users. Services provided through a portal receive a higher score, services which provide only information (but have to be completed offline) receive a more limited score.	e-Government Benchmark 2023
Measured as: (i) the nationwide availability of online access services for citizens to their electronic health records data (via a patient portal, or mobile patient app) with additional measures in place that enable certain Categories of people (e.g. guardians for children, people with disabilities, elderly) to also access their data, and (ii) the percentage of individuals who that have the ability to obtain or make use their own minimum set of health-related data currently stored in public and private electronic health record (HER) systems.	Service contract for the European Commission by: Empirica GmbH and PredictBy

Source: European Commission (2023e)

Annex II – Definitions and abbreviations

Definitions in monitoring in accordance with FoFinaG

PhD students: With the exception of ISTA, the research institutions do not have the right to award doctorates. Therefore, all doctoral students who are supervised in cooperation with a university, at the research institution for the most part, are assigned to the institutions.

Employees are employees, freelancers, temporary workers, marginally employed persons, but not employees on leave or contracts for work.

Foundation funds: At the end of 2020, the special endowment of the National Foundation for Research, Technology and Development (NFTE) and the Austrian Fund (Ö-Fonds), two important sources of funding for research funding, expired. In subsequent years, however, funds can still be drawn from the NFTE and the Ö-Fonds. From 2022 on, the institutions (aws, CDG, FFG, FWF, LBG and OeAW) have access to funds from the FZÖ. Under Indicator 1 (third-party funding and financing), the funds from these three sources are aggregated.

Funding budget: The research funding organisations use various terms to describe their funding and financing performance. In the context of the Austrian Research and Technology Report (FTB), approvals are shown as present values.

Glass Ceiling Index: According to SHE figures,[301] the index compares the proportion of women among all employees with the proportion of women at management level. The index can take on any value between zero and infinity. A value below 1 indicates that women are relatively overrepresented in management positions, while a value above 1 indicates that women are underrepresented. The higher the value, the greater the underrepresentation.

Global budget: The global budget or basic funding of research institutions defines all grants from owners/shareholders/providers without earmarking (often based on a performance agreement). The basic funding is allocated by the institution itself.

Participations in framework programmes: Indicator 4 shows ERC grants acquired; Starting Grants, Consolidator Grants and Advanced Grants in the role of coordinator (i. e. no co-beneficiaries) are counted. Indicator 7 lists the number of newly approved participations of research institutions in programmes and initiatives of the current framework programmes, including ERC grants; Horizon 2020 projects are no longer included from the RTR 2024 onwards. Projects "in the context of the Framework Programme" that are mapped via the Horizon platform, such as IMI, IHI, DG Justice, CERV, are not counted. In contrast to indicator 4, all roles are counted (coordinator, partner, third party). Only EU funds are shown in the approval totals, no own contributions or national co-financing; accordingly, third party projects do not show any approval totals. The year in which the contract was signed applies to both indicators.

Practice partners: Practice partners are cooperation partners with implementation relevance that do not belong to the "industry" sector, such as service companies, hospitals, local authorities and NGOs.

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301 Cf. European Commission (2021): https://op.europa.eu/en/publication-detail/-/publication/67d5a207-4da1-11ec-91ac-01aa75ed71a1

Projects acquired: The volumes of grants acquired by the research institutions are also shown as "awarded" amounts without own contributions. In order to avoid double counting, only the newly acquired and contractually fixed projects in the respective reporting year are shown, not the ongoing projects. The year in which the contract was concluded counts.

Publications: The publications only contain scientific publications (no project reports etc.) that have undergone a quality assurance procedure (peer review). All publications have an identifiable consistent identifier such as DOI, ISSN and have been published in scientific journals, edited volumes, proceedings or monographs. Publications with multiple authors are analysed as "whole counts" (each author is credited with the publication as a whole).

Reporting dates: All data are collected as of 31 December of the respective reporting year.

Research infrastructure: All research infrastructures that were newly acquired in the reporting period and have a purchase value (cumulative) of over €100,000 (incl. VAT) as of 31 December and are located at the institution are surveyed. Research infrastructures are instruments for excellent research, research-led teaching, training of early career researchers, profile building and knowledge transfer and support technological progress and social innovation. This includes facilities, equipment, installations or other resources that are located at one site or distributed across several sites or are virtual. See the Intellectual Capital Report Ordinance (WBV) 2016[302] or the research infrastructure database,[303] as well as the Austrian Research Infrastructure Action Plan 2030.[304]

Technology Readiness Level (TRL): The TRL is a scale for assessing the development status of new technologies based on a systematic analysis. On a scale of 1 to 9, it indicates how advanced a technology is. TRL 1 refers to basic research that is still very far from application, TRL 9 to technologies that have already been successfully implemented.

Third-party funding: The third-party funding of the research institutions includes both customer revenues (private and public) and acquired funding. Funds from the National Foundation for Research, Technology and Development (NFTE), the Austrian Fund (Ö-Fonds) and the Future Austria Fund (FZÖ) are also counted as third-party funding, but not contributions from partners, other income from costs passed on by charging services, AMS subsidies and research premiums.

Time to contract: The processing time is the period between the receipt of an application by the research funding organisation and the finalisation (sending of the contract to the grant recipient). Other definitions are explained in the footnotes.

Total income: Total income corresponds to sales revenue and other operating income in accordance with the Austrian Business Code (UGB).

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302 Wissensbilanz-Verordnung 2016 – WBV 2016), StF: Federal Law Gazette II No. 97/2016 (German only)

303 BMBWF Research Infrastructure Database: https://forschungsinfrastruktur.bmbwf.gv.at/en

304 Austrian Research Infrastructure Action Plan 2030: https://forschungsinfrastruktur.bmbwf.gv.at/en/faqs-info/info/national-strategy-of-research-infrastructure

Country codes

Abbreviation	Country
AT	Austria
AU	Australia
BE	Belgium
BG	Bulgaria
BR	Brazil
CH	Switzerland
CN	China
CR	Croatia
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark

Abbreviation	Country
EE	Estonia
GB	Great Britain
EL	Greece
ES	Spain
FI	Finland
FR	France
HU	Hungary
IE	Ireland
IL	Israel
IT	Italy
LT	Lithuania
LU	Luxembourg

Abbreviation	Country
LV	Latvia
MT	Malta
NL	The Netherlands
PL	Poland
PT	Portugal
RO	Romania
RU	Russia
SE	Sweden
SI	Slovenia
SK	Slovakia
US	United States of America
ZA	South Africa

Abbreviations

AAL programme	Active and Assisted Living Programme
ACCN	Austrian Comprehensive Cancer Network
acib	Austrian Centre of Industrial Biotechnology
ACMIT	Austrian Centre for Medical Innovation and Technology
ACR	Austrian Cooperative Research
ADA	Archive of Digital Arts
AGES	Agentur für Gesundheit und Ernährungssicherheit (Agency for Health and Food Safety)
AIT	Austrian Institute of Technology GmbH
AMAS	Austrian Multi-Hazard Impact-Based Advice Service
APA	Austria Press Agency
aws	Austria Wirtschaftsservice GmbH
BBG	Bundesbeschaffung GmbH (Federal Procurement Agency)
BBMRI	Biobanking and BioMolecular resources Research Infrastructure
BKA	Bundeskanzleramt (Federal Chancellery)

BMAW	Bundesministerium für Arbeit und Wirtsschaft (Federal Ministry of Labour and Economy
BMBWF	Bundesministerum für Bildung, Wissenschaft und Forschung (Federal Ministry of Education, Science and Research)
BMEIA	Bundesministerium für europäische und internationale Angelegenheiten (Federal Ministry for European and International Affairs)
BMF	Bundesministerium für Finanzen (Federal Ministry of Finance)
BMI	Bundesministerium für Inneres (Federal Ministry of the Interior)
BMJ	Bundesministerium für Justiz (Federal Ministry of Justice)
BMK	Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology)

BML	Bundesministerium für Land- und Forstwirtschaft, Regionen und Wasserwirtschaft (Federal Ministry of Agriculture, Forestry, Regions and Water Management)
BMLV	Bundesministerium für Landesverteidigung (Federal Ministry of Defence)
BMSGPK	Bundesministerium für Soziales, Gesundheit, Pflege und Konsumenten-schutz (Federal Ministry of Social Affairs, Health, Care and Consumer Protection)
BMKÖS	Bundesministerium für Kunst, Kultur, öffentlichen Dienst und Sport (Federal Ministry for Arts, Culture, Civil Service and Sport)
BWS	Bruttowertschöpfung (Gross value added)
BRZ	Bundesrechenzentrum (Federal Computing Centre)
CCC	Comprehensive Cancer Centres
CCU	Carbon Capture and Utilisation
CDG	Christian Doppler Forschungsgesellschaft (Christian Doppler Research Association)
CeMM	Research Centre for Molecular Medicine
CFMS	Core Facility Mass Spectrometry
CLC	Co-Location Centre
CLC East	Co-Location Centre East
CLC SEA	Co-Location Centre South East Alps Region
CLIP	Cloud Infrastructure Platform
CoARA	Coalition for Advancing Research Assessment
COE	Clusters of Excellence
COMET	Competence Centres for Excellent Technologies
DeGEval	German Society for Evaluation
DESI	Digital Economy and Society Index
DIH	Digital Innovation Hub
DUH	Digital University Hub
EBIN	Emission-free buses and infrastructure
EBS	Electric-based systems
ECCC	European Cybersecurity Competence Centre and Network
ECI	Economic Complexity Index
eCORDA	External Common Research Data Warehouse
EDA	European Defence Agency
EDF	European Defence Fund
EDIH	European Digital Innovation Hubs
EF	Emerging Fields
ERDF	European Regional Development Fund
EGE	European Group on Ethics in Science and New Technologies (High Level)
EHDS	European Health Data Space
EIC	European Innovation Council
EIP	European Innovation Partnerships
EIS	European Innovation Scoreboard
EIT	European Institute of Innovation and Technology
EMBL	European Molecular Biology Laboratory
ENIN	Emission-free commercial vehicles and infrastructure
EODC	Earth Observation Data Centre
EP PerMed	European Partnership for Personalised Medicine
EPC	European Patent Convention
ERA	European Research Area
ERC	European Research Council
ERIC	European Research Infrastructure Consortium
ERSC	Excellence in Road Safety Award
ESA	European Space Agency
ESEE	East and South East Europe
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
Eurostat	Statistical Office of the European Union
R&D	Research and development
R&I	Research and innovation
FFG	Österreichische Forschungsförderungs-gesellschaft (Austrian Research Promotion Agency mbH)
FFoQSI	Austrian Competence Centre for Feed and Food Quality, Safety & Innovation

FHK	Österreichische Fachhochschul-Konferenz (Austrian University of Applied Sciences Conference)
FinV	Finanzierungsvereinbarung (Funding agreement)
FoFinaG	Forschungsfinanzierungsgesetz (Research Financing Act)
FOG	Forschungsorganisationsgesetz (Research Organisation Act)
FREG	FWIT-Rat-Errichtungsgesetz (FWIT Council Establishment Act)
RTI	Research, technology and innovation
FTB	Austrian Research and Technology Report
FWF	Austrian Science Fund
FWIT	Research, Science, Innovation and Technology Development Council
FWITRG	FWIT-Rat-Gesetz (FWIT Council Act)
FZÖ	Fonds Zukunft Österreich (Future Austria Fund)
GBA	Geologische Bundesanstalt (Federal Geological Institute)
GII	Global Innovation Index
GMI	Gregor Mendel Institute for Molecular Plant Biology
GSA	GeoSphere Austria
GWP	Gute wissenschaftliche Praxis (Good scientific practice)
HR	Human Resources
HyPA	Hydrogen Partnership Austria
ICAS	Integrated Communication and Sensing
ICH	International Conference on Harmonisation
IDSF	International Digital Security Forum Vienna
IHI	Innovative Health Initiative
IHS	Institut für Höhere Studien (Institute for Advanced Studies)
iit	Institut für Innovation und Technik (Institute for Innovation and Technology)
ICT	Information and communication technology
IMBA	Institut für Molekulare Biotechnologie (Institute for Molecular Biotechnology
IMBK	Interministerielles Beamtenkomitee (Interministerial Committee of Civil Servants)
IMP	Research Institute of Molecular Pathology
PPPI	Public Procurement Promoting Innovation
IoT	Internet of Things
IP	Intellectual Property
IPCEI	Important Projects of Common European Interest
IQOQI	Institute for Quantum Optics and Quantum Information
ISI	Ignaz Semmelweis Institute for Infection Research
ISTA	Institute of Science and Technology Austria
IWI	Industriewissenschaftliches Institut (Industrial Science Institute)
JIF	Journal Impact Factor
JKU	Johannes Kepler University
JPI	Joint Programming Initiatives
JR Centres	Josef Ressel Centres
K-Pass	Kybernet-Pass (Cybernet Pass)
KFG	Klinische Forschungsgruppen (Clinical research groups)
AI	Artificial intelligence
KIC	Knowledge and Innovation Communities
KKS	Koordinationszentrum für Klinische Studien (Coordination Centre for Clinical Studies)
KLIEN	Klima- und Energiefonds (Climate and Energy Fund)
KLIF	Klinische Forschung (Clinical research)
SME	Small and medium-sized enterprises
KPI	Key performance indicator
LBG	Ludwig Boltzmann Society – Austrian Association for the Promotion of Scientific Research
LISA	Life Science Austria
LKR	Leichtmetallkompetenzzentrum Ranshofen GmbH (Light metal centre Ranshofen)
LNAAs	Large Neutral Amino Acids

LSF	Lab Support Facility
STEM	Mathematics, Computer Science, Natural Sciences, Technology
MOOCs	Massive Open Online Courses
MUI	Medical University of Innsbruck
NCP-IP	National Contact Point for Intellectual Property in Open Knowledge Transfer
NEIA	European Innovation Agenda
NFTE	Nationalstiftung für Forschung, Technologie und Entwicklung (National Foundation for Research, Technology and Development)
NGS	Next Generation Sequencing
NIP	Österreichischer Netzinfrastrukturplan (Austrian network infrastructure plan)
NUTS	Nomenclature des unités territoriales statistiques
OeAW	Österreichische Akademie der Wissenschaften (Austrian Academy of Sciences)
ÖBH	Österreichisches Bundesheer (Austrian Armed Forces)
OeAD	OeAD-GmbH – Agency for Education and Internationalisation
OECD	Organisation for Economic Cooperation and Development
Ö-Fund	Österreich-Fonds (Austria Fund)
ÖFOS	Österreichische Systematik der Wissenschaftszweige (Austrian classification of branches of science)
ÖGUT	Österreichische Gesellschaft für Umwelt und Technik (Austrian Society for Environment and Technology
OIS	Open Innovation in Science
ÖMWS	Österreichische Militärische Weltraumstrategie (Austrian Military Space Strategy)
ÖNACE	Statistical classification of economic activities
OSA	Open Science Austria
PARC	Partnership for the Assessment of Risks from Chemicals
PGS	Private non-profit sector
QM	Quality management
RCPE	Research Centre Pharmaceutical Engineering
RIC	Regional Innovation Centres
RIS	Regional Innovation Scheme
RIV	Regional Innovation Valley
RRF	Recovery and Resilience Facility
SAL	Silicon Austria Labs GmbH
SCB	Space Capability Board
SCI	Science Citation Index
SCIE	Science Citation Index Expanded
SDGs	Sustainable Development Goals
SFEB	Strategischer Forschungs- und Entwicklungsbereich (Strategic area for research and development)
SOFF	Systematic Observation Financing Facility
SSCI	Social Sciences Citation Index
TFZ	Technologie- und Forschungszentrum (Technology and research centre)
THCS	Transforming Health and Care Systems
THE-Ranking	Times Higher Education World Ranking
TRL	Technology Readiness Level
UFG	Umweltförderungsgesetz (Environmental Promotion Act)
UN	Unitary Patent
uniko	Österreichische Universitätenkonferenz (Austrian University Conference)
VBCF	Vienna BioCenter Core Facilities GmbH
VEN	Vienna Evaluation Network
VKF	Verein Klinische Forschung (Clinical Research Association)
VLSI	Vienna Life Science Instruments
VSC	Vienna Scientific Computing
FTE	Full time equivalents
WMO	World Meteorological Organisation
WoS	Web of Science
WTR	IMD World Talent Rankings
WWTF	Wiener Wissenschafts-, Forschungs- und Technologiefonds (Vienna Science, Research and Technology Fund)
ZAMG	Zentralanstalt für Meteorologie und Geodynamik (Central Institute for Meteorology and Geodynamics)
ZSI	Centre for Social Innovation

Annex III – Federal research funding and contracts according to the Federal Research Database

The database for research funding and contracts (B_f.dat) for the Federal Government has been in place since 1975 and was set up by the former Federal Ministry of Science and Research as a "documentation of facts by the Federal Government".

Today, the database is maintained by the Federal Ministry of Education, Science and Research (BMBWF). The mandatory reporting of the ministerial departments to the relevant Minister of Science is recorded in the Research Organisation Act FOG, Federal Law Gazette No. 341/1981 as amended. In 2008, the system was changed to a database to which all ministerial departments have access and independently enter research-related funding and contracts.

Each department is responsible for the validity and completeness of its data in its respective area of activity. The Federal Research Database has been publicly accessible since 1 June 2016 and provides an up-to-date overview of the projects funded by the Federal Ministries.[305] As a documentation database, the B_f.dat also serves to record brief content-related information on the registered research funding and grants. With regard to the respective reporting year, the database includes both ongoing and newly approved as well as completed R&D contracts and grants, as well as their overall funding volume and the funds actually disbursed per reporting year. Overall, this provides an up-to-date picture of directly commissioned R&D studies, expert opinions, evaluations, funding, etc. and their financing by the Federal Government.

The Federal Research Database thus contributes significantly to transparency in the allocation of public funds and to the overall picture of research funding in Austria. In total, however, the volume of research contracts and funding directly commissioned by the ministries is comparatively small – particularly when compared to the university budgets and the funding allocated to the research funding institutions (for details, see the overview "Effective use of federal funds for research" in Annex IV). The amounts should therefore be seen as supplementary information in the interests of maximum transparency and completeness.

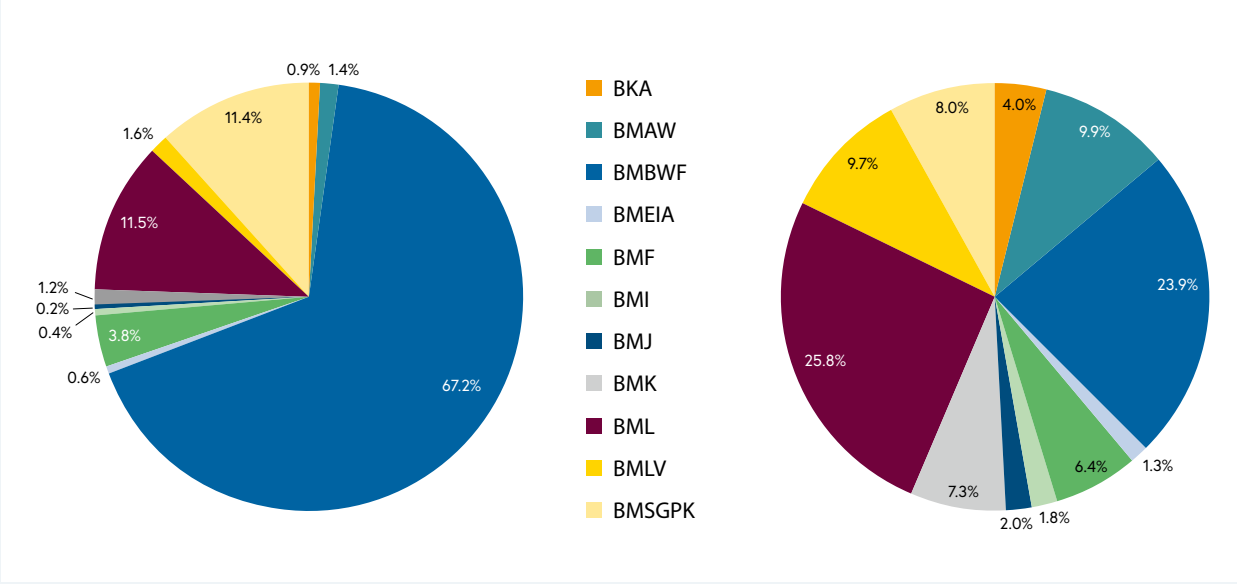
Figure A III-1 provides an overview of the R&D projects entered in B_f.dat by the ministries. It also shows the percentage of R&D projects per department and the percentage of total funding. The data in B_f.dat reveal that a total of €700.72 million was paid out for 453 R&D projects in 2023. This sum also includes global institutional funding. In total, around 80.2% of the funding in 2023 was paid out as global funding to various research institutions. Subcontracting this from the total disbursement volume in 2023, the remaining funding amount is just under €139.01 million. This amount is €58.77 million or 73% higher than in 2022. It should be noted that this funding amount often includes partial amounts from ongoing or completed projects for each reporting year and that the funding amount is therefore subject to annual fluctuations depending on the progress of the respective project.

In 2023, as in previous years, the BMBWF is the department with the largest share of entries and funding amounts. As Figure A III-1 illustrates, 23.8% of the R&D projects[306] and 67.2% of the amounts (excluding global funding) are attributable to the BMBWF. Funding cases and funding contributions have changed for the BMBWF compared to 2022: While the share of funding cases has fallen by 4.2 percentage points, the share of amounts has risen by 2.1 percentage points. In terms of funding amounts, the Federal Ministry of Agriculture,

305 https://www.bmbwf.gv.at/bfdat-public

306 Due to combined projects between the ministries, double counting may occur in this form of presentation.

Figure A III-1: Share of ongoing and completed R&D projects and grants by funding amounts in 2023 (left) and by projects (right), in %



Source: BMBWF, Federal Research Database B-f.dat; illustration: WPZ Research.

Regions and Tourism (BMLRT) follows with a share of 11.5% and – only just behind – the Federal Ministry of Social Affairs, Health, Care and Consumer Protection (BMSGPK) with a share of 11.4%. The comparatively low percentage of the BMK (1.2%) is due to the fact that R&D funding is largely handled by the funding institutions FFG and aws.

Annex IV – Statistics

Funding of gross domestic expenditure for R&D[307] (Tables A IV-1 and A IV-2)

According to an estimate by Statistics Austria, around €16.6 billion is expected to be spent on research and development (R&D) in Austria in 2024. The R&D intensity, i. e. the share of R&D expenditure in nominal gross domestic product (GDP), is therefore 3.34%. The nominal increase in total Austrian R&D expenditure from 2023 to 2024 is estimated at 6.8% and is therefore higher than the forecast increase in nominal GDP of 4.6%. Domestic expenditure on research and development has risen sharply over the past two decades: in 2014, the research intensity was 3.08%, compared to 2.17% in 2004.

In 2024, companies in Austria are expected to contribute around €8.4 billion to research and thus finance around half of R&D expenditure (51%). R&D funding from companies also includes the distributions from the research premium, which the Federal Ministry of Finance forecasts to amount to €1 billion in 2024. At around €5.6 billion, the public sector will account for 34% of total R&D funding, with the Federal Government being the most important source of funding at around €4.6 billion (28%). Around €700 million will be financed by the regional governments. Other public organisations (e. g. local governments, chambers, social insurance institutions, higher education institutions) will contribute around €260 million. Foreign sources, mainly foreign companies, are expected to finance research in Austria in the amount of over €2.6 billion.

The estimate of Austrian gross domestic expenditure for R&D 2024 includes budget and financial statement data from the Federal Government and the regional governments, current economic forecasts and information from the latest R&D surveys.

Federal R&D expenditure 2024

The tables "Federal expenditure on research and research promotion" show the total research-related expenditure of the Federal Government, including the research-related share of contributions to international organisations. The source is the "Detailed overview of the research-related appropriation of federal funds" in the R&D supplement to the BFG 2024 (part a and part b). The methodological approach is the internationally applied "GBARD" concept,[308] which, in contrast to the domestic concept, includes research-relevant contributions to international organisations and forms the basis for the classification of R&D budget data according to socio-economic objectives for reporting to the EU and OECD.

In 2024, the following socio-economic objectives (each as a share of total funding) will account for the largest share of federal expenditure on research and research promotion:

- Promotion of trade, commerce and industry: 27.6%
- Promotion of the general knowledge advancement: 27.3%
- Promotion of the healthcare system: 19.5%

307 On the basis of the results of the R&D statistical surveys and other currently available documents and information (in particular the R&D-relevant budget and financial statement data of the federal government and the federal governments), Statistics Austria usually prepares the "Global estimate of Austrian gross domestic expenditure on R&D" every year. The global estimate also includes retrospective revisions and updates based on the latest data. In accordance with the definitions of the Frascati Manual, which is valid worldwide (OECD, EU) and thus ensures international comparability, the financing of expenditure on research and experimental development carried out in Austria is presented.

308 GBARD: Government Budget Allocations for Research and Development.

- Promotion of social and socio-economic development: 5.1%
- Promotion of exploration of the earth, the seas, the atmosphere and outer space: 4.3%
- Promotion of transport, traffic and communications: 3.9%
- Promotion of energy production, storage and distribution: 3.8%

R&D expenditure of the regional governments

The research funding by the regional governments shown as a subtotal in Table A IV-1 is based on the R&D expenditure estimates reported by the offices of the regional governments on the basis of the respective regional budgets or financial statements. The R&D expenditure of the regional hospitals is estimated annually by Statistics Austria in accordance with a methodology agreed with the offices of the regional governments.

R&D expenditure 2021 in international comparison

The overview table shows Austria's position in comparison to the other Member States of the European Union and other countries based on the most important R&D-relevant key figures. Detailed information on R&D financing and R&D implementation by economic sector and on R&D employees is only available for international comparisons for the year 2021.

List of tables in the statistical annex

Table A IV-1: Global estimate 2024: Gross domestic expenditure on R&D funding for research and experimental development conducted in Austria 2010–2024

Funding	2010	2011 [1]	2012	2013 [1]	2014	2015 [1]	2016	2017 [1]	2018	2019 [1]	2020	2021 [1]	2022	2023	2024
1. Gross domestic expenditure on R&D (in € million)	**8,066.4**	**8,276.3**	**9,287.8**	**9,571.3**	**10,275.2**	**10,499.2**	**11,145.0**	**11,289.8**	**11,912.0**	**12,441.2**	**12,199.0**	**13,225.5**	**14,236.6**	**15,580.4**	**16,643.7**
Funded by:															
Federal Government [2]	2,257.6	2,232.6	2,410.2	2,383.7	2,592.8	2,528.2	2,825.3	2,681.9	2,954.6	2,848.4	3,321.1	3,217.2	3,642.1	4,191.2	4,619.9
Research premium [3]	328.9	381.7	574.1	469.0	493.2	508.0	527.7	637.5	713.1	841.5	1,044.1	889.6	760.0	1,277.7	1,000.0
Regional governments [4]	405.2	298.7	416.3	307.5	461.6	345.0	445.8	392.7	500.6	464.4	568.7	490.5	586.2	646.1	702.5
Business enterprise sector [5]	3,639.4	3,820.9	4,243.3	4,665.8	4,901.3	5,222.2	5,377.5	5,532.8	5,610.6	5,982.3	5,030.7	6,114.6	6,596.4	6,692.4	7,420.8
Abroad [5]	1,297.6	1,401.7	1,495.9	1,590.2	1,664.0	1,737.7	1,802.2	1,874.3	1,944.4	2,110.8	2,022.8	2,278.3	2,392.9	2,487.8	2,586.5
Other [6]	137.9	140.8	148.0	155.2	162.3	158.1	166.6	170.7	188.8	193.9	211.7	235.2	259.0	285.2	314.1
2. Nominal GDP [7] (in € billion)	295.90	310.13	318.65	323.91	333.15	344.27	357.61	369.36	385.27	397.15	380.89	405.24	447.22	477.25	498.97
3. Gross domestic expenditure on R&D as % of GDP	***2.73***	***2.67***	***2.91***	***2.95***	***3.08***	***3.05***	***3.12***	***3.06***	***3.09***	***3.13***	***3.20***	***3.26***	***3.18***	***3.26***	***3.34***

Date: 24 April 2024

Source: Statistics Austria. Based on funding data for R&D carried out in Austria. Data as of April 2024.

1) Survey results.
2) 2011, 2013, 2015, 2017, 2019, 2021: Survey results (Federal Government incl. FWF, FFG and National Foundation for Research, Technology and Development). 2010, 2012: Supplements T to the Federal Finance Acts (part b, performance in each case); 2014, 2016, 2018, 2020, 2022: Detailed overviews of the use of federal funds for research in the Federal Finance Acts (part b, performance in each case); 2023, 2024: Detailed overview of the use of federal funds for research in the Federal Finance Act 2024 (part b, financing estimate).
   2010: Including €74.6 million National Foundation for Research, Technology and Development.
   2012: Including €51.3 million National Foundation for Research, Technology and Development.
   2014: Including €38.7 million National Foundation for Research, Technology and Development.
   2016: Including €51.7 million National Foundation for Research, Technology and Development.
   2018: Including €141.0 million National Foundation for Research, Technology and Development.
   2020: Including €140.4 million National Foundation for Research, Technology and Development.
   2022: Including €146.0 million National Foundation for Research, Technology and Development.
   2023: Including €140.0 million National Foundation for Research, Technology and Development.
   2024: Including €140.0 million National Foundation for Research, Technology and Development.
3) 2011, 2013, 2015, 2017, 2019, 2021: survey results. 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2023, 2024: BMF.
4) 2011, 2013, 2015, 2017, 2019, 2021: Survey results. 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2023, 2024: Based on the R&D expenditure reported by the offices of the provincial governments (provincial financial statements, financing estimates 2023 and 2024).
5) 2011, 2013, 2015, 2017, 2019, 2021: survey results. 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2023, 2024: Statistics Austria estimate.
6) Funding by local governments (excluding Vienna), chambers, social insurance institutions, the higher education sector, other public funding and funding by the private non-profit sector. 2011, 2013, 2015, 2017, 2019, 2021: survey results. 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2023, 2024: Statistics Austria estimate.
7) 2010–2023: Statistics Austria. 2024: Wifo economic forecast. As of March 2024.

Table A IV-2: Global estimate 2024: Gross domestic expenditure on R&D Financing of research and experimental development carried out in Austria 2010–2024 as a percentage of GDP

Funding	2010	2011 [1]	2012	2013 [1]	2014	2015 [1]	2016	2017 [1]	2018	2019 [1]	2020	2021 [1]	2022	2023	2024
1. Gross domestic expenditure on R&D (in € million)	**2.73**	**2.67**	**2.91**	**2.95**	**3.08**	**3.05**	**3.12**	**3.06**	**3.09**	**3.13**	**3.20**	**3.26**	**3.18**	**3.26**	**3.34**
Funded by:															
Federal Government [2]	0.76	0.72	0.76	0.74	0.78	0.73	0.79	0.73	0.77	0.72	0.87	0.79	0.81	0.88	0.93
Research premium [3]	0.11	0.12	0.18	0.14	0.15	0.15	0.15	0.17	0.19	0.21	0.27	0.22	0.17	0.27	0.20
Regional governments [4]	0.14	0.10	0.13	0.09	0.14	0.10	0.12	0.11	0.13	0.12	0.15	0.12	0.13	0.14	0.14
Business enterprisesector [5]	1.23	1.23	1.33	1.44	1.47	1.52	1.50	1.50	1.46	1.51	1.32	1.51	1.47	1.40	1.49
Abroad [5]	0.44	0.45	0.47	0.49	0.50	0.50	0.50	0.51	0.50	0.53	0.53	0.56	0.54	0.52	0.52
Other [6]	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06
2. Nominal GDP [7] (in € billion)	**295.90**	**310.13**	**318.65**	**323.91**	**333.15**	**344.27**	**357.61**	**369.36**	**385.27**	**397.15**	**380.89**	**405.24**	**447.22**	**477.25**	**498.97**

Status: 24 April 2024

Source: Statistics Austria.

On the basis of funding data for R&D carried out in Austria. Data as of April 2024.
Footnotes see Table A IV-1

Table A IV-3: Federal expenditure on research and research funding 2021–2024

Ministries [1]	Cash Flow Statement				Cash Flow Budget			
	2021 [2]		2022 [3]		2023 [3]		2024 [3]	
	in € million	%	in € million	%	in € million	%	in € million	%
Federal Chancellery (BKA) [4]	2.283	*0.1*	2.523	*0.1*	2.216	*0.1*	1.916	*0.0*
Federal Ministry of Arts, Culture, Civil Service and Sport (BMKÖS)	46.803	*1.4*	40.176	*1.1*	51.221	*1.2*	50.382	*1.1*
Federal Ministry for European and International Affairs (BMEIA)	3.498	*0.1*	3.330	*0.1*	3.683	*0.1*	4.003	*0.1*
Federal Ministry of Labour (BMA)	4.010	*0.1*	.	.	.	.	.	.
Federal Ministry of Labour and Economy (BMAW)	.	.	124.525	*3.5*	288.209	*6.9*	270.417	*5.9*
Federal Ministry for Digital and Economic Affairs (BMDW)	93.167	*2.8*	.	.	.	.	.	.
Federal Ministry of Education. Science and Research (BMBWF)	2,490.690	*76.2*	2,700.269	*74.7*	2,984.798	*71.5*	3,337.625	*72.4*
Federal Ministry of Finance (BMF)	27.776	*0.8*	30.953	*0.9*	36.236	*0.9*	52.250	*1.1*
Federal Ministry of the Interior (BMI)	2.011	*0.1*	2.322	*0.1*	1.574	*0.0*	1.519	*0.0*
Federal Ministry of Defence (BMLV)	2.516	*0.1*	3.495	*0.1*	4.830	*0.1*	7.987	*0.2*
Federal Ministry of Agriculture, Regions and Tourism (BMLRT)	64.376	*2.0*	.	.	.	.	.	.
Federal Ministry of Agriculture. Forestry, Regions and Water Management (BML)	.	.	59.197	*1.6*	52.975	*1.3*	87.854	*1.9*
Federal Ministry of Justice (BMJ)	0.070	*0.0*	0.045	0.0	0.173	*0.0*	0.076	*0.0*
Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK)	523.163	*16.0*	629.393	*17.5*	738.972	*17.7*	787.226	*17.1*
Federal Ministry of Social Affairs, Health, Care and Consumer Protection (BMSGPK)	9.212	*0.3*	9.572	*0.3*	9.504	*0.2*	9.941	*0.2*
Total	**3,269.575**	***100.0***	**3,605.800**	***100.0***	**4,174.391**	***100.0***	**4,611.196**	***100.0***

Status: March 2024 Source: Statistics Austria

1) In accordance with the version of the Federal Ministries Act 1986 valid in the respective year (2021: Federal Law Gazette I No. 30/2021; 2022, 2023, 2024: Federal Law Gazette I No. 98/2022).
2) Federal Finance Act 2023. Detailed overview of research-related appropriation of federal funds.
3) Federal Finance Act 2024. Detailed overview of research-related appropriation of federal funds.
4) Including the highest executive bodies.

Detailed overview of research-related appropriation of federal funds

Research-related federal expenditure by ministerial departments, 2022 to 2024

The following overviews are structured according to:

1. Contributions from federal funds to international organisations that have research and research promotion as (one of) their objectives (part a)
2. Budgeted federal expenditure on research and research funding in Austria (Part b, Federal budget for research)

For the compilation of these expenditures, the decisive aspect is the extent to which an expenditure is research-related, based on the definition of research in the OECD's Frascati Manual. The same definition is also applied by Statistics Austria for its research and experimental development (R&D) surveys.

BUNDESVORANSCHLAG 2024

Detailübersicht Forschungswirksame Mittelverwendungen des Bundes

(Beträge in Millionen Euro)

a) Beitragszahlungen an internationale Organisationen - Finanzierungsvoranschlag

VA-Stelle	Konto	Ugl	Bezeichnung	Anm	Finanzierungsvoranschlag 2024			Finanzierungsvoranschlag 2023			Erfolg 2022		
					Insgesamt	hievon		Insgesamt	hievon		Insgesamt	hievon	
						%	Forschung		%	Forschung		%	Forschung
			Bundeskanzleramt										
			UG10										
10010100	7800	100	Mitgliedsbeiträge an Institutionen im Ausland		0,185	100	0,185	0,171	100	0,171	0,141	100	0,141
10010100	7800	110	Mitgliedsbeitrag AV-Infostelle		0,045	5	0,002	0,039	5	0,002	0,034	5	0,002
10010200	7800	100	Mitgliedsbeiträge an Institutionen im Ausland										
10010402	7800	100	Mitgliedsbeiträge an Institutionen im Ausland	*	0,012	100	0,012	0,012	100	0,012	0,001	100	0,001
			Summe UG10		**0,242**		**0,199**	**0,222**		**0,185**	**0,176**		**0,144**
			Summe Bundeskanzleramt		**0,242**		**0,199**	**0,222**		**0,185**	**0,176**		**0,144**
			BM für europäische und internationale Angelegenheiten										
			UG12										
12020200	7800	101	Mitgliedsbeitrag für OECD		4,650	35	1,628	4,200	35	1,470	4,109	35	1,438
12020200	7800	102	OECD-Energieagentur (Mitgliedsbeitrag)										
12020200	7840	000	Laufende Transfers an Drittländer	*	0,001	35		3,220	35	1,127	2,555	35	0,894
12020200	7840	002	Organisation der VN für industr.Entwicklung(UNIDO)		0,950	46	0,437	0,735	46	0,338	0,675	46	0,311
12020200	7840	003	Org. VN Erziehung,Wissensch.u.Kultur(UNESCO)		2,250	30	0,675	2,250	30	0,675	2,045	30	0,614
12020200	7840	056	UNODC Büro d. VN f. Drogen- u.Verbrechensbekämpfung		0,726	10	0,073	0,726	10	0,073	0,726	10	0,073
12020200	7840	100	IAEA – Intern. Atom Energie Agentur	*	3,400	35	1,190						
			Summe UG12		**11,977**		**4,003**	**11,131**		**3,683**	**10,110**		**3,330**
			Summe BM für europäische und internationale Angelegenheiten		**11,977**		**4,003**	**11,131**		**3,683**	**10,110**		**3,330**
			BM für Finanzen										
			UG15										
15010100	7800	000	Laufende Transferzahlungen an das Ausland		0,151	100	0,151	0,151	100	0,151	0,105	100	0,105
			Summe UG15		**0,151**		**0,151**	**0,151**		**0,151**	**0,105**		**0,105**
			Summe BM für Finanzen		**0,151**		**0,151**	**0,151**		**0,151**	**0,105**		**0,105**
			BM für Arbeit und Wirtschaft										
			UG40										
40020100	7800	100	Mitgliedsbeiträge an Institutionen im Ausland		0,550	15	0,083	0,550	15	0,083	0,435	15	0,065
			Summe UG40		**0,550**		**0,083**	**0,550**		**0,083**	**0,435**		**0,065**
			Summe BM für Arbeit und Wirtschaft		**0,550**		**0,083**	**0,550**		**0,083**	**0,435**		**0,065**
			BM für Bildung, Wissenschaft und Forschung										
			UG30										
30010300	7800	104	OECD-Schulbauprogramm		0,031	100	0,031	0,031	100	0,031		100	
30010400	7800	000	Laufende Transferzahlungen an das Ausland	*	0,444	100	0,444	0,692	100	0,692	0,442	100	0,442
			Summe UG30		**0,475**		**0,475**	**0,723**		**0,723**	**0,442**		0,442
			UG31										
31030100	7800	000	Laufende Transferzahlungen an das Ausland		0,800	100	0,800	0,800	100	0,800	0,947	100	0,947
31030100	7800	066	Forschungsvorhaben in		0,251	100	0,251	0,201	100	0,201	0,269	100	0,269

a) Beitragszahlungen an internationale Organisationen - Finanzierungsvoranschlag

VA-Stelle	Konto	Ugl	Bezeichnung	Anm	Finanzierungsvoranschlag 2024			Finanzierungsvoranschlag 2023			Erfolg 2022		
					Insgesamt	hievon		Insgesamt	hievon		Insgesamt	hievon	
						%	Forschung		%	Forschung		%	Forschung
			internationaler Kooperation										
31030100	7800	200	Beiträge an internationale Organisationen		2,104	50	1,052	2,103	50	1,052	1,519	50	0,760
31030204	7800	062	ESO								5,756	100	5,756
31030204	7800	063	Europ. Zentrum für mittelfristige Wettervorhersage								1,380	100	1,380
31030204	7800	064	Molekularbiologie - Europäische Zusammenarbeit								3,345	100	3,345
31030204	7800	065	World Meteorological Organisation								0,441	50	0,221
31030204	7800	200	Beiträge an internationale Organisationen								0,914	50	0,457
31030204	7800	242	Beitrag für die CERN								24,751	100	24,751
31030300	7800	062	ESO		6,800	100	6,800	6,300	100	6,300			
31030300	7800	063	Europ. Zentrum für mittelfristige Wettervorhersage		1,550	100	1,550	1,300	100	1,300			
31030300	7800	064	Molekularbiologie - Europäische Zusammenarbeit		3,983	100	3,983	3,861	100	3,861			
31030300	7800	065	World Meteorological Organisation		0,550	50	0,275	0,550	50	0,275			
31030300	7800	200	Beiträge an internationale Organisationen		0,965	50	0,483	0,940	50	0,470			
31030300	7800	242	Beitrag für die CERN		29,200	100	29,200	25,700	100	25,700			
			Summe UG31		**46,203**		**44,394**	**41,755**		**39,959**	**39,322**		**37,886**
			Summe BM für Bildung, Wissenschaft und Forschung		**46,678**		**44,869**	**42,478**		**40,682**	**39,764**		**38,328**
			BM für Klimaschutz, Umwelt, Energie, Mobil., Innov. u.Technologie										
			UG34										
34010100	7800	200	Beiträge an internationale Organisationen		0,070	100	0,070	0,070	100	0,070	0,060	100	0,060
34010100	7800	600	ESA-Pflichtprogramme		19,462	100	19,462	19,462	100	19,462	20,938	100	20,938
34010100	7800	601	EUMETSAT		8,801	100	8,801	8,801	100	8,801	8,627	100	8,627
34010100	7800	602	OECD-Energieagentur		0,050	100	0,050	0,050	100	0,050	0,054	100	0,054
34010100	7800	603	ESA-Wahlprogramme		50,616	100	50,616	47,616	100	47,616	35,937	100	35,937
34010100	7830	000	Laufende Transfers an Drittländer		0,195	100	0,195	0,195	100	0,195	0,191	100	0,191
			Summe UG34		**79,194**		**79,194**	**76,194**		**76,194**	**65,807**		**65,807**
			UG41										
41010100	7800	200	Beiträge an internationale Organisationen		0,110	6	0,007	0,110	6	0,007	0,010	6	0,001
41010300	7800	000	Laufende Transferzahlungen an das Ausland		0,563	100	0,563						
41010300	7830	000	Laufende Transfers an Drittländer		0,340	100	0,340	0,325	100	0,325	0,199	100	0,199
41020100	7800	200	Beiträge an internationale Organisationen			100			100		0,001	100	0,001
41020402	7800	200	Beiträge an internationale Organisationen		0,066	15	0,010	0,070	15	0,011	0,071	15	0,011
41020500	7800	200	Beiträge an internationale Organisationen		0,030	15	0,005	0,030	15	0,005	0,070	15	0,011
41020500	7830	000	Laufende Transfers an Drittländer		0,482	15	0,072	0,482	15	0,072	0,439	15	0,066
41020601	7800	200	Beiträge an internationale Organisationen		0,050	50	0,025	0,050	50	0,025	0,037	50	0,019
			Summe UG41		**1,641**		**1,022**	**1,067**		**0,445**	**0,827**		**0,308**
			Summe BM für Klimaschutz, Umwelt, Energie, Mobil., Innov. u.Technologie		**80,835**		**80,216**	**77,261**		**76,639**	**66,634**		**66,115**
			BM für Land- und Forstwirtschaft, Regionen und Wasserwirtschaft										
			UG42										
42010100	7800	100	Mitgliedsbeiträge an Institutionen im	*	0,004	50	0,002						

a) Beitragszahlungen an internationale Organisationen - Finanzierungsvoranschlag														
VA-Stelle	Konto	Ugl	Bezeichnung	Anm	Finanzierungsvoranschlag 2024			Finanzierungsvoranschlag 2023			Erfolg 2022		
					Insgesamt	hievon		Insgesamt	hievon		Insgesamt	hievon	
						%	Forschung		%	Forschung		%	Forschung
			Ausland										
42020202	7800	080	FAO-Beiträge										
42020202	7800	083	Int. Vertrag für pflanzengenetische Ressourcen										
42040100	7800	100	Mitgliedsbeiträge an Institutionen im Ausland		0,004	50	0,002	0,008	50	0,004			
42050300	7800	080	FAO-Beiträge		3,400	51	1,734	3,400	51	1,734	2,994	51	1,527
42050300	7800	083	Int. Vertrag für pflanzengenetische Ressourcen		0,025	100	0,025	0,025	100	0,025	0,025	100	0,025
			Summe UG42		**3,433**		**1,763**	**3,433**		**1,763**	**3,019**		**1,552**
			Summe BM für Land- und Forstwirtschaft, Regionen und Wasserwirtschaft		**3,433**		**1,763**	**3,433**		**1,763**	**3,019**		**1,552**
			Teil a -Summe		**143,866**		**131,284**	**135,226**		**123,186**	**120,243**		**109,639**

b) Bundesbudget Forschung - Finanzierungsvoranschlag

(ausgen. die bereits im Abschnitt a) ausgewiesen sind)

VA-Stelle	Konto	Ugl	Bezeichnung	Anm	Finanzierungsvoranschlag 2024			Finanzierungsvoranschlag 2023			Erfolg 2022		
					Insgesamt	hievon		Insgesamt	hievon		Insgesamt	hievon	
						%	Forschung		%	Forschung		%	Forschung
			Parlamentsdirektion										
			UG02										
02010500	7330	086	Nationalfonds für Opfer des Nationalsozialismus	*	1,740		0,007	2,487	3	0,075	5,260	4	0,190
02010500	7330	091	Individualzahlungen an NS-Überlebende	*	19,000		0,071						
02010500	7330	092	Individualzahlungen an NS-Überlebende (Härtefälle)	*	1,500		0,006						
02010500	7330	093	Projektförderungen und soziale Programme	*	0,500		0,002						
			Summe UG02		**22,740**		**0,086**	**2,487**		**0,075**	**5,260**		**0,190**
			Summe Parlamentsdirektion		**22,740**		**0,086**	**2,487**		**0,075**	**5,260**		**0,190**
			Bundeskanzleramt										
			UG10										
10010100	7260	000	Mitgliedsbeiträge an Institutionen im Inland		0,003	13		0,011	13	0,001	0,001	28	
10010100	7270	000	Werkleistungen durch Dritte	*	0,678	8	0,054	1,246	8	0,100	0,664	22	0,144
10010200	7260	000	Mitgliedsbeiträge an Institutionen im Inland		0,005	50	0,003		50		0,005	50	0,003
10010200	7270	000	Werkleistungen durch Dritte		5,192	4	0,208	4,935	4	0,197	1,430	4	0,057
10010401	7340	001	Pauschalabgeltung gem. § 32 Abs.5 BStatG		57,141	1	0,571	57,324	1	0,573	49,901	1	0,499
10010402			Österr. Staatsarchiv										
			Summe UG10		**63,019**		**0,836**	**63,516**		**0,871**	**52,001**		**0,703**
			UG25										
25010500	7270	006	Werkleistungen durch Dritte (zw)	*	0,257	37	0,095	0,343	12	0,040	0,393	86	0,339
25010500	7420	313	Familie und Beruf Management GesmbH Förd. (zw)	*	1,040	67	0,700	1,040	67	0,700	1,040	67	0,700
25010500	7664	007	Forschungsförderung gem. § 39i FLAG 1967 (zw)								0,210	100	0,210
25020100	7270	000	Werkleistungen durch Dritte	*				1,988	17	0,345	0,624	27	0,170
25020200	7270	000	Werkleistungen durch Dritte	*							1,159	6	0,067
			Summe UG25		**1,297**		**0,795**	**3,371**		**1,085**	**3,426**		**1,486**
			Summe Bundeskanzleramt		**64,316**		**1,631**	**66,887**		**1,956**	**55,427**		**2,189**
			BM für Inneres										
			UG11										
11010100	7270	900	Werkleistungen durch Dritte	*				5,729			0,049	100	0,049
11010200	7270	900	Werkleistungen durch Dritte	*	0,045	100	0,045				0,031	100	0,031
11020600			Bundeskriminalamt	*	18,425	8	1,474	16,650	8	1,332	15,834	8	1,267
11020600	7270	900	Werkleistungen durch Dritte								0,119	100	0,119
11020800	7270	900	Werkleistungen durch Dritte	*							0,039	100	0,039
			Summe UG11		**18,470**		**1,519**	**22,379**		**1,332**	**16,072**		**1,505**
			UG18										
18010400	7660	900	Zuschüsse f. lfd. Aufwand an private Institutionen	*				0,177	100	0,177	0,456	100	0,456
18010400	7670	309	Projekte des AMIF (EU) (zw)	*							0,301	100	0,301
18010400	7672	009	Projekte des AMIF (Kofinanzierung)	*				0,065	100	0,065	0,060	100	0,060
			Summe UG18					**0,242**		**0,242**	**0,817**		**0,817**
			Summe BM für Inneres		**18,470**		**1,519**	**22,621**		**1,574**	**16,889**		**2,322**
			BM für Justiz										
			UG13										
13010100	6430	000	Sonstige Beratungskosten	*	0,152	50	0,076	0,256	50	0,128	0,090	50	0,045
13030101	6430	000	Sonstige Beratungskosten	*				0,075	60	0,045			
			Summe UG13		**0,152**		**0,076**	**0,331**		**0,173**	**0,090**		**0,045**
			Summe BM für Justiz		**0,152**		**0,076**	**0,331**		**0,173**	**0,090**		**0,045**
			BM für Landesverteidigung										
			UG14										

b) Bundesbudget Forschung - Finanzierungsvoranschlag

(ausgen. die bereits im Abschnitt a) ausgewiesen sind)

VA-Stelle	Konto	Ugl	Bezeichnung	Anm	Finanzierungsvoranschlag 2024			Finanzierungsvoranschlag 2023			Erfolg 2022		
					Insgesamt	hievon		Insgesamt	hievon		Insgesamt	hievon	
						%	Forschung		%	Forschung		%	Forschung
14040100			Heeresgeschichtliches Museum	*							2,386	37	0,883
14050100	7270	000	Werkleistungen durch Dritte	*							0,151	58	0,088
14050100	7270	900	Werkleistungen durch Dritte	*							2,513	100	2,513
14050202	4691	000	Versuche und Erprobungen auf kriegstechn. Gebiet	*							0,112	10	0,011
14070100	7270	900	Werkleistungen durch Dritte	*	6,500	100	6,500	3,126	100	3,126			
14070100	7411	002	FFG - FTI-Programme, Förderungen			100		0,174	100	0,174			
14070200			Heeresgeschichtliches Museum	*	4,001	37	1,480	4,115	37	1,523			
14080105	4691	000	Versuche und Erprobungen auf kriegstechn. Gebiet	*	0,070	10	0,007	0,070	10	0,007			
			Summe UG14		**10,571**		**7,987**	**7,485**		**4,830**	**5,162**		**3,495**
			Summe BM für Landesverteidigung		**10,571**		**7,987**	**7,485**		**4,830**	**5,162**		**3,495**
			BM für Finanzen										
			UG15										
15010100	6430	001	Arbeiten des WIIW		0,973	50	0,487	0,946	50	0,473	0,808	50	0,404
15010100	6430	002	Arbeiten des WSR		1,599	50	0,800	1,454	50	0,727	1,412	50	0,706
15010100	6430	003	Arbeiten des Wifo	*	5,247	50	2,624	4,986	50	2,493	4,911	50	2,456
15010100	7270	000	Werkleistungen durch Dritte	*	1,852	18	0,333	1,764	18	0,318	1,713	18	0,308
15010100	7662	002	Institut für höhere Studien und wiss. Forschung	*	5,128	100	5,128	4,256	50	2,128	4,235	100	4,235
15010100	7669	020	Sonstige Förderungsbeiträge	*	0,300	100	0,300	0,400	100	0,400	0,726	100	0,726
15010600	7411	002	FFG - FTI-Programme, Förderungen		14,900	100	14,900	4,920	100	4,920	0,717	100	0,717
15010600	7411	003	FFG - FTI-Programme (F&E-Dienstleist.,Sonst.WV)		4,100	100	4,100	1,230	100	1,230	0,066	100	0,066
15010600	7411	004	FFG - Administrative Kosten		1,425	100	1,425	1,000	100	1,000	0,492	100	0,492
			Forschungswirksamer Lohnnebenkostenanteil		22,002	100	22,002	22,396	100	22,396	20,738	100	20,738
			Summe UG15		**57,526**		**52,099**	**43,352**		**36,085**	**35,818**		**30,848**
			Summe BM für Finanzen		**57,526**		**52,099**	**43,352**		**36,085**	**35,818**		**30,848**
			BM für Kunst, Kultur, öffentlichen Dienst und Sport										
			UG17										
17020100	7672	132	Sporttechnologie Projekte		4,500	100	4,500	6,400	100	6,400	1,182	73	0,858
17020100	7678	008	Seibersd.Laboratories/Dopingkontr.analytik/Forsch.	*	0,380	92	0,350				0,369	95	0,350
			Summe UG17		**4,880**		**4,850**	**6,400**		**6,400**	**1,551**		**1,208**
			UG32										
32010300			Denkmalschutz		56,352	18	10,143	45,103	18	8,119	40,105	18	7,219
32030100			Bundesmuseen		153,865	23	35,389	146,806	25	36,702	138,039	23	31,749
			Summe UG32		**210,217**		**45,532**	**191,909**		**44,821**	**178,144**		**38,968**
			Summe BM für Kunst, Kultur, öffentlichen Dienst und Sport		**215,097**		**50,382**	**198,309**		**51,221**	**179,695**		**40,176**
			BM für Arbeit und Wirtschaft										
			UG20										
20010101	7340	302	Überweisung an das AMS gem. § 41 (2) (zw)	*	699,600	1	5,250	662,100	1	5,250	622,311	1	4,048
20010201	7270	006	Werkleistungen durch Dritte (zw)	*	120,687	1	0,700	88,590	1	0,700	391,727		0,675
20010201	7668	900	Gemeinnützige Einrichtungen (zw)	*	80,000	1	0,400	124,620		0,400	174,845		0,350
20010202	7270	000	Werkleistungen durch Dritte	*	8,100	1	0,080	6,500	1	0,080	5,485	1	0,035
			Summe UG20		**908,387**		**6,430**	**881,810**		**6,430**	**1.194,368**		**5,108**
			UG33										
33010100			Kooperation Wissenschaft-Wirtschaft		50,350	100	50,350	43,100	100	43,100	46,752	100	46,752
33010200			Innovation, Technologietransfer		186,501	100	186,501	214,546	100	214,546	57,178	100	57,178
33010300			Gründung innovativer Unternehmen		27,053	100	27,053	24,050	100	24,050	15,422	100	15,422
			Summe UG33		**263,904**		**263,904**	**281,696**		**281,696**	**119,352**		**119,352**
			Summe BM für Arbeit und		**1.172,291**		**270,334**	**1.163,506**		**288,126**	**1.313,720**		**124,460**

b) Bundesbudget Forschung - Finanzierungsvoranschlag

(ausgen. die bereits im Abschnitt a) ausgewiesen sind)

VA-Stelle	Konto	Ugl	Bezeichnung	Anm	Finanzierungsvoranschlag 2024			Finanzierungsvoranschlag 2023			Erfolg 2022		
					Insgesamt	hievon		Insgesamt	hievon		Insgesamt	hievon	
						%	Forschung		%	Forschung		%	Forschung
			Wirtschaft										
			BM für Soziales, Gesundheit, Pflege und Konsumentenschutz										
			UG21										
21010100	7270	000	Werkleistungen durch Dritte		5,464	3	0,164	4,878	3	0,146	3,480	3	0,104
21010300	7270	000	Werkleistungen durch Dritte		2,268	16	0,363	1,660	16	0,266	0,888	16	0,142
21010300	7660	900	Zuschüsse f. lfd. Aufwand an private Institutionen		5,700	2	0,114	5,000	2	0,100	5,509	2	0,110
21010400	7262	001	Beitrag Europ. Zentrum Wohlfahrtspol.u.Sozialfor.		0,666	50	0,333	0,587	50	0,294	0,587	50	0,294
21010400	7270	000	Werkleistungen durch Dritte		4,204	2	0,084	33,452	2	0,669	20,484	4	0,819
21010400	7270	304	Werkleistungen EU-SILC		1,582	100	1,582	1,344	100	1,344	1,262	100	1,262
			Summe UG21		**19,884**		**2,640**	**46,921**		**2,819**	**32,210**		**2,731**
			UG24										
24010200	7420	012	Transferzahlungen AGES		62,151	11	6,837	49,878	11	5,487	55,878	11	6,147
24030100	7270	000	Werkleistungen durch Dritte		8,810	4	0,352	27,200	4	1,088	14,496	4	0,580
24030200	7270	000	Werkleistungen durch Dritte		5,583	2	0,112	5,515	2	0,110	5,691	2	0,114
			Summe UG24		**76,544**		**7,301**	**82,593**		**6,685**	**76,065**		**6,841**
			Summe BM für Soziales, Gesundheit, Pflege und Konsumentenschutz		**96,428**		**9,941**	**129,514**		**9,504**	**108,275**		**9,572**
			BM für Bildung, Wissenschaft und Forschung										
			UG30										
30010400			Qualitätsentwicklung und -steuerung	*	69,652	8	5,572	58,364	8	4,669	60,854	8	4,868
30010500			Lehrer/innenbildung		292,447	8	23,396	277,909	7	19,454	244,702	8	19,576
30010800	7270	900	Werkleistungen durch Dritte		6,195	90	5,576	4,583	90	4,125	0,883	90	0,795
30020700			Zweckgebundene Gebarung Bundesschulen	*	7,709	3	0,231	7,709	3	0,231	8,818	3	0,265
			Summe UG30		**376,003**		**34,775**	**348,565**		**28,479**	**315,257**		**25,504**
			UG31										
31010100			Zentralstelle und Serviceeinrichtungen		66,141	20	13,228	60,546	20	12,109	54,983	20	10,997
31020100			Universitäten		4.615,972	51	2.354,146	4.361,536	50	2.180,768	3.974,521	51	2.027,006
31020100	7270	000	Werkleistungen durch Dritte		0,360	51	0,184	0,360	50	0,180	0,072	51	0,037
31020100	7348	788	Institute of Precision Medicine RRF		10,000	100	10,000	10,000	100	10,000		100	
31020100	7353	440	Klinischer Mehraufwand (Klinikbauten)		29,995	50	14,998	78,995	50	39,498	47,273	50	23,637
31020200			Fachhochschulen		479,134	18	86,244	383,333	14	53,667	403,614	18	72,651
31020300	7270	900	Werkleistungen durch Dritte		2,475	22	0,545	1,618	22	0,356	1,063	22	0,234
31030100			Projekte und Programme	*	2,593	100	2,593	2,515	100	2,515	2,132	100	2,132
31030100	7260	000	Mitgliedsbeiträge an Institutionen im Inland		0,091	100	0,091	0,073	100	0,073	0,069	100	0,069
31030100	7270	034	Ersatzmethoden zum Tierversuch		0,090	100	0,090	0,120	100	0,120	0,111	100	0,111
31030100	7270	900	Werkleistungen durch Dritte		6,080	100	6,080	9,546	100	9,546	4,953	100	4,953
31030100	7280	018	OeAD-Abwicklung		1,758	100	1,758	1,697	100	1,697	1,687	100	1,687
31030100	7280	788	Werkleistungen (Sonstige Leist. v. Dritten) RRF		1,055	100	1,055	0,835	100	0,835	0,200	100	0,200
31030100	7411	069	OeAD Förderungen		20,522	100	20,522	17,136	100	17,136	14,300	100	14,300
31030100	7411	070	OeAD Begleitmaßnahmen		4,568	100	4,568	3,116	100	3,116	3,060	100	3,060
31030100	7413	788	Quantum Austria-RRF		14,014	100	14,014	11,110	100	11,110		100	
31030100	7662	311	Institut für höhere Studien und wiss. Forschung		0,001	100	0,001	0,001	100	0,001	0,133	100	0,133
31030100	7665	007	Stiftung Dokumentationsarchiv		0,850	100	0,850	0,680	100	0,680	0,650	100	0,650
31030100	7679	120	Lfd. Transfers an sonstige juristische Personen		35,100	100	35,100	22,177	100	22,177	7,071	100	7,071
31030201			Zentralanstalt für Meteorologie und								25,549	34	8,687

b) Bundesbudget Forschung - Finanzierungsvoranschlag

(ausgen. die bereits im Abschnitt a) ausgewiesen sind)

VA-Stelle	Konto	Ugl	Bezeichnung	Anm	Finanzierungsvoranschlag 2024			Finanzierungsvoranschlag 2023			Erfolg 2022		
					Insgesamt	hievon		Insgesamt	hievon		Insgesamt	hievon	
						%	Forschung		%	Forschung		%	Forschung
			Geodynamik										
31030202			Geologische Bundesanstalt								11,642	46	5,355
31030204			Forschungsinstitutionen	*							8,274	100	8,274
31030204	7270	031	Med Austron								1,740	100	1,740
31030204	7332	352	FWF Programme								218,330	100	218,330
31030204	7332	452	FWF Geschäftsstelle								12,994	100	12,994
31030204	7332	552	FWF Begleitmaßnahmen								1,375	100	1,375
31030204	7340	004	ISTA								65,577	100	65,577
31030204	7340	006	ÖAW - LV								137,177	100	137,177
31030204	7340	010	ÖAW Beauftragungen und Programme										
31030204	7661	022	Ludwig-Boltzmann-Gesellschaft								7,000	100	7,000
31030204	7679	007	Verein der Freunde der Salzburger Stiftung								1,000	100	1,000
31030300			Basisfinanzierung von Institutionen	*	54,788	100	54,788	14,846	100	14,846			
31030300	7270	031	Med Austron		1,740	100	1,740	1,740	100	1,740			
31030300	7332	352	FWF Programme		324,784	100	324,784	255,600	100	255,600			
31030300	7332	452	FWF Geschäftsstelle		16,000	100	16,000	13,700	100	13,700			
31030300	7332	552	FWF Begleitmaßnahmen		1,500	100	1,500	1,500	100	1,500			
31030300	7332	788	Quantum Austria FWF Programme RRF		5,600	100	5,600	8,555	100	8,555			
31030300	7333	788	Quantum Austria FWF Geschäftsstelle RRF		0,331	100	0,331	0,500	100	0,500			
31030300	7340	004	ISTA		90,800	100	90,800	90,800	100	90,800			
31030300	7340	006	ÖAW - LV		169,242	100	169,242	138,190	100	138,190			
31030300	7340	020	GeoSphere Austria		40,590	37	15,018	33,328	34	11,332			
31030300	7661	022	Ludwig-Boltzmann-Gesellschaft		11,111	100	11,111	12,290	100	12,290			
31030300	7679	007	Verein der Freunde der Salzburger Stiftung		1,000	100	1,000	1,000	100	1,000			
			Summe UG31		**6.008,285**		**3.257,981**	**5.537,443**		**2.915,637**	**5.006,550**		**2.636,437**
			Summe BM für Bildung, Wissenschaft und Forschung		**6.384,288**		**3.292,756**	**5.886,008**		**2.944,116**	**5.321,807**		**2.661,941**
			BM für Klimaschutz, Umwelt, Energie, Mobil., Innov. u.Technologie										
			UG34										
34010200	7273	788	AWS Aufbau- und Resilienzfazilität RRF Abwicklung		0,428	100	0,428	0,161	100	0,161	0,294	100	0,294
34010200	7274	022	IPCEI Abwicklungskosten		0,346	100	0,346				0,572	100	0,572
34010200	7274	788	FFG Aufbau- und Resilienzfazilität RRF Abwicklung		0,127	100	0,127				0,028	100	0,028
34010200	7340	100	Rat f. Forschung und Technologieentwicklung		0,727	100	0,727	0,900	100	0,900	1,500	100	1,500
34010200	7411	021	Important Projects of Common European Interest		28,109	100	28,109	35,521	100	35,521	13,444	100	13,444
34010200	7411	022	Important Projects of Common European Interest-Abw			100		0,229	100	0,229		100	
34010200	7411	788	Lfd Transfers an verbundene Unternehmungen RRF		17,123	100	17,123	13,733	100	13,733		100	
34010200	7413	001	Austrian Institute of Technology AIT-Förderungen		0,010	100	0,010	0,010	100	0,010	0,015	100	0,015
34010200	7413	002	Austrian Institute of Technology AIT		65,873	90	59,286	65,000	90	58,500	64,588	90	58,129
34010200	7413	003	Nuclear Engineering Seibersdorf NES		10,600	30	3,180	7,790	30	2,337	6,623	30	1,987
34010200	7413	004	Silicon Austria Labs GmbH		26,850	100	26,850	26,431	100	26,431	27,354	100	27,354
34010200	7414	002	Austria Tech		1,300	100	1,300	1,150	100	1,150	1,150	100	1,150
34010200	7414	788	FFG Aufbau- und Resilienzfazilität RRF Abwicklung			100		0,078	100	0,078		100	
34010200	7417	788	AWS Aufbau- und Resilienzfazilität		16,822	100	16,822	20,528	100	20,528		100	

b) Bundesbudget Forschung - Finanzierungsvoranschlag

(ausgen. die bereits im Abschnitt a) ausgewiesen sind)

VA-Stelle	Konto	Ugl	Bezeichnung	Anm	Finanzierungsvoranschlag 2024			Finanzierungsvoranschlag 2023			Erfolg 2022		
					Insgesamt	hievon		Insgesamt	hievon		Insgesamt	hievon	
						%	Forschung		%	Forschung		%	Forschung
			RRF										
34010200	7660	075	F&T-Förderung		0,340	100	0,340	0,340	100	0,340	0,430	100	0,430
34010200	7662	341	Joanneum Research Forsch.ges.m.b.H(Techn.schwerp)		2,559	100	2,559	2,559	100	2,559	2,739	100	2,739
34010200	7667	006	Sonstige gemeinnützige Einrichtungen		1,245	100	1,245	1,245	100	1,245	1,018	100	1,018
34010200	7668	040	Salzburg Research		0,410	100	0,410	0,410	100	0,410	0,486	100	0,486
34010200	7690	002	Preisverleihungen		0,005	100	0,005	0,005	100	0,005	0,011	100	0,011
34010300	7260	000	Mitgliedsbeiträge an Institutionen im Inland		0,180	100	0,180	0,180	100	0,180	0,185	100	0,185
34010300	7270	000	Werkleistungen durch Dritte		4,092	100	4,092	5,330	100	5,330	6,820	100	6,820
34010300	7273	011	AWS Abwicklungskosten		2,546	100	2,546						
34010300	7274	011	FFG Abwicklungskosten		22,682	100	22,682				21,035	100	21,035
34010300	7277	488	aws Covid-19 Startup Hilfsfonds Abwicklungskosten		0,035	100	0,035				0,022	100	0,022
34010300	7280	030	FTI-Projekte, Beauftragungen an Dritte		0,500	100	0,500	0,500	100	0,500	0,465	100	0,465
34010300	7411	001	FFG - Basisprogramme		138,000	100	138,000	134,759	100	134,759	159,687	100	159,687
34010300	7411	002	FFG - FTI-Programme, Förderungen		202,439	100	202,439	175,155	100	175,155	158,831	100	158,831
34010300	7411	003	FFG - FTI-Programme (F&E-Dienstleist.,Sonst.WV)		10,000	100	10,000	10,000	100	10,000	4,634	100	4,634
34010300	7411	004	FFG - Administrative Kosten					23,156	100	23,156			
34010300	7412	001	Austria Wirtschaftsservice GmbH AWS - Förderungen		16,954	100	16,954	19,232	100	19,232	18,865	100	18,865
34010300	7412	002	Austria Wirtschaftsservice GmbH AWS		2,000	100	2,000				1,112	100	1,112
34010300	7412	003	Austria Wirtschaftsservice GmbH AWS - Admin.Kost.					2,268	100	2,268	1,897	100	1,897
34010300	7417	488	aws COVID-19 Startup Hilfsfonds (Abwicklung)					0,039	100	0,039			
34010300	7432	030	FTI-Projekte, Förderungen		0,250	100	0,250	0,250	100	0,250	0,291	100	0,291
			Summe UG34		**572,552**		**558,545**	**546,959**		**535,006**	**494,096**		**483,001**
			UG41										
41010200	7330	080	Transferzahlungen an Klima- und Energiefonds	*	173,000	30	51,900	196,000	30	58,800	73,710	95	70,025
41020100	7270	000	Werkleistungen durch Dritte		3,555	50	1,778	3,444	50	1,722	1,382	50	0,691
41020100	7270	800	Dekarbonisierung/E-Mobilität		175,722	45	79,075	110,722	45	49,825	0,730	45	0,329
41020100	7270	801	E-Mobilität für alle: Urbane Elektromobilität		0,001	20		0,001	20			20	
41020100	7411	002	FFG - FTI-Programme, Förderungen		1,000	100	1,000	1,000	100	1,000			
41020100	7411	003	FFG - FTI-Programme (F&E-Dienstleist.,Sonst.WV)		0,010	100	0,010	0,010	100	0,010			
41020100	7411	004	FFG - Administrative Kosten		0,010	100	0,010	0,010	100	0,010			
41020100	7480	501	Progr.Kombinierter Güterverk.Straße-Schiene-Schiff		5,800	50	2,900	5,800	50	2,900	3,373	50	1,687
41020100	7660	000	Zuschüsse f. lfd. Aufwand an private Institutionen		1,030	95	0,979	1,030	95	0,979	0,580	95	0,551
41020100	7668	055	Technisches Museum Wien		0,620	80	0,496	0,601	80	0,481	0,410	80	0,328
41020402	7270	000	Werkleistungen durch Dritte		0,964	5	0,048	1,464	5	0,073	0,723	5	0,036
41020402	7270	006	Werkleistungen durch Dritte (zw)		1,500	5	0,075	1,500	5	0,075	2,096	5	0,105
			Summe UG41		**363,212**		**138,271**	**321,582**		**115,875**	**83,004**		**73,752**
			UG43										
43010200	7700	500	Investitionszuschüsse		170,624	1	1,706	345,117	1	3,451	41,100	1	0,411
43010300			Klima- und Energiefonds		364,150	2	7,283	355,360	2	7,107	129,810	4	5,192
43010500	7270	080	Forschungsaufwendungen		0,300	100	0,300	0,290	100	0,290	0,312	100	0,312
43020100	7270	080	Forschungsaufwendungen		0,155	100	0,155	0,155	100	0,155	0,161	100	0,161
43020100	7420	021	Transferzahlungen an die UBA Ges.m.b.H		25,000	3	0,750	14,956	3	0,449	14,956	3	0,449

b) Bundesbudget Forschung - Finanzierungsvoranschlag (ausgen. die bereits im Abschnitt a) ausgewiesen sind)														
VA-Stelle	Konto	Ugl	Bezeichnung	Anm	Finanzierungsvoranschlag 2024			Finanzierungsvoranschlag 2023			Erfolg 2022		
					Insgesamt	hievon		Insgesamt	hievon		Insgesamt	hievon	
						%	Forschung		%	Forschung		%	Forschung
			Summe UG43		**560,229**		**10,194**	**715,878**		**11,452**	**186,339**		**6,525**
			Summe BM für Klimaschutz, Umwelt, Energie, Mobil., Innov. u.Technologie		**1.495,993**		**707,010**	**1.584,419**		**662,333**	**763,439**		**563,278**
			BM für Land- und Forstwirtschaft, Regionen und Wasserwirtschaft										
			UG42										
42040100			Zentralstelle	*	5,713	100	5,713	5,197	100	5,197	4,549	100	4,549
42040200	7411	027	Lfd Transfers an Ernährungsagentur-AGES	*	28,235	33	9,318	21,803	33	7,195	21,802	33	7,195
42040200	7411	029	Lfd Transf.an Bundesamt u. Forschungszentr.f.Wald		29,160	33	9,623	17,500	33	5,775	15,500	33	5,115
42040200	7411	081	Lfd Transf.an Span.Hofreitschule-Lipizz.Gest.Piber		2,500	3	0,075						
42040400	7411	002	FFG - FTI-Programme, Förderungen								1,408	100	1,408
42040400	7411	003	FFG - FTI-Programme (F&E-Dienstleist.,Sonst.WV)								1,295	100	1,295
42040400	7411	004	FFG - Administrative Kosten										
42040500			Land- und forstwirtschaftliches Schulwesen	*	95,543	22	21,019	95,583	22	21,028	88,083	22	19,378
42050300	7660	022	Nationale Agrarmaßnahmen	*	0,059	100	0,059	0,054	100	0,054	0,054	100	0,054
420504			Dienststellen Landwirtschaft		10,751	25	2,688	9,949	28	2,786	9,433	28	2,641
42050400			Bundesamt für Weinbau	*				5,730	3	0,172			
42060100	7270	000	Werkleistungen durch Dritte		0,692	20	0,138	0,563			0,383	20	0,077
42060200			Nationale und internat. Forstmaßnahmen	*	34,401	100	34,401	6,150	100	6,150	12,987	100	12,987
42060400	7270	000	Werkleistungen durch Dritte	*	0,300	100	0,300	0,010	100	0,010	0,325	100	0,325
42060500			Bundesamt für Wasserwirtschaft		7,627	25	1,907	7,980	25	1,995	7,609	25	1,902
42060600			Siedlungswasserwirtschaft	*	0,850	100	0,850	0,850	100	0,850	0,719	100	0,719
			Summe UG42		**215,831**		**86,091**	**171,369**		**51,212**	**164,147**		**57,645**
			Summe BM für Land- und Forstwirtschaft, Regionen und Wasserwirtschaft		**215,831**		**86,091**	**171,369**		**51,212**	**164,147**		**57,645**
			Teil b -Summe		**9.753,703**		**4.479,912**	**9.276,288**		**4.051,205**	**7.969,729**		**3.496,161**
			Gesamtsumme Teil a + b		**9.897,569**		**4.611,196**	**9.411,514**		**4.174,391**	**8.089,972**		**3.605,800**

BUNDESVORANSCHLAG 2024

Detailübersicht Forschungswirksame Mittelverwendungen des Bundes

Anmerkungen

Allgemeine Anmerkungen

Hinweis: BVA 2022 ist auf Grund der zwei BFG-Novellen (BGBl. I Nr. 100/2022 und BGBl. I Nr. 66/2022) aktualisiert.

*) F& E Koeffizienten geschätzt

Die Detailübersicht Forschungswirksame Mittelverwendung des Bundes:

a) Beitragszahlungen aus Bundesmitteln an internationale Organisationen, die Forschung und Forschungsförderung (mit) als Ziel haben,

b) Bundesbudget-Forschung - Finanzierungsvorschlag (ausgen. die bereits im Abschnitt a) ausgewiesen sind)

Für die Aufstellung dieser Ausgaben ist in erster Linie der Gesichtspunkt der Forschungswirksamkeit maßgebend, der inhaltlich über den Aufgabenbereich 99 "Grundlagen-, angewandte Forschung und experimentelle Entwicklung" hinausgeht und auf dem Forschungsbegriff des Frascati-Handbuches der OECD beruht, wie er im Rahmen der forschungsstatistischen Erhebungen der STATISTIK AUSTRIA zur Anwendung gelangt.

Forschungswirksame Anteile bei den Bundesausgaben finden sich daher nicht nur bei den Ausgaben des Aufgabenbereiches 99 "Grundlagen-, angewandte Forschung und experimentelle Entwicklung" sondern auch in zahlreichen anderen Aufgabenbereichen.

Finanzierungsvoranschlag

VA-Stelle	Konto	Ugl	Anmerkung
			Parlamentsdirektion
02010500	7330	086	*) Forschungsanteil für den FV 2022 liegt bei 4,55%, für den FV 2021 bei 3,79% und für den Erfolg 2020 bei 4,50% (System rundet). *) Erfolg 2022 wurden 13 Forschungsprojekte und 1 Rest-Teilbetrag in der Höhe von 190.163 Euro ausbezahlt, das wären rd. 3,615 vom NF-Gesamtbudget (5,260 Mio. Euro) *) BVA 2024: Forschungsanteil liegt bei 0,375 % (System rundet auf 0).
02010500	7330	091	BVA 2024: Forschungsanteil liegt bei 0,375 % (System rundet auf 0)
02010500	7330	092	BVA 2024: Forschungsanteil liegt bei 0,375 % (System rundet auf 0 %)
02010500	7330	093	BVA 2024: Forschungsanteil liegt bei 0,375 % (System rundet auf 0 %)
			Bundeskanzleramt
10010100	7270	000	Forschungsanteil ist 21,750 % System rundet.
10010402	7800	100	*) jährlicher Betrag des österreichischen Staatsarchivs an den Internationalen Archivbeirat sowie an das DLM-Forum MTÜ.
25010500	7664	007	
25010500	7270	006	*) Forschungsanteil liegt beim Erfolg 2022 bei 86,26 % und beim BVA 2023 bei 11,66 % (System rundet)
25010500	7420	313	*) Forschungsanteil liegt bei 67,31 % (System rundet)
25020100	7270	000	*) Forschungsanteil liegt beim Erfolg 2022 bei 27,24 % und BVA 2023 bei 17,35 % (System rundet)
25020200	7270	000	*) Forschungsanteil liegt beim Erfolg 2022 bei 5,78 % (System rundet)
			BM für Inneres
11010100	7270	900	*) Teilbetrag der Voranschlagsstelle.
11010200	7270	900	*) Teilbetrag der Voranschlagsstelle.
11020600			* Teilbetrag der Voranschlagsstelle
11020800	7270	900	*) Teilbetrag der Voranschlagsstelle.
18010400	7660	900	*) Teilbetrag der Voranschlagsstelle.
18010400	7672	009	*) Teilbetrag der Voranschlagsstelle
18010400	7670	309	*) Teilbetrag der Voranschlagsstelle
			BM für europäische und internationale Angelegenheiten
12020200	7800	102	
12020200	7840	000	IAEO - ALT
12020200	7800	101	
12020200	7840	100	IAEA 35 % Forschung => 1.190
			BM für Justiz
13010100	6430	000	*) Evaluierung und Weiterentwicklung des LKZ-Systems (Leisuntgskennzahlen für die Erwachsenenschutzvereine); Auftragnehmer: IRKS; Auftragsvolumen: 85.260 EUR, in 3 Teilen in den Jahren 2020 bis 2022 zu je 28.420 EUR bezahlt). *) Jährliche Erstellung "Rechtsextremismus-Bericht"; Auftragnehmer: DÖW,, Auftragsvolumen: 81.000 EUR, Bezahlung 65.160,00 EUR im Jahr 2024 und 46.020 EUR in den Jahren 2025 bis 2028. *) Studie Evaluierung der Arbeit der Familiengerichtshilfe; Auftraggeber: Universität Wien (Ö: Institut für Familienforschung (ÖIF), Auftragsvolumen: 93.207 EUR, davon 46.603,50 EUR im Jahr 2023 bezahlt und 46.603,50 EUR voraussichtlich im Jahr 2024 fällig.

			*) Studie zum Modellprojekt Einigungsverfahren, Auftragnehmer: IRKS, Auftragsvolumen: 79.703,00 EUR, lt. Zahlungsplan in 2 Teilen zu je 39.851,50 EUR in den Jahren 2023 und 2024 zu bezahlen. *) Studie zum Thema "Vor dem Gesetz sind alle gleich ? Ein Projekt zur Sichtbarmachung von Diskriminierung und Ungleichheit von lesbischen, schwulen, bisexuellen, trans*, nichtbinären, intersexuellen und queeren Personen im Justizbereich" (Auftragnehmer: QWIEN - Zentrum für queere Geschichte, Auftragsvolumen: 30.000 EUR, Bezahlung in vier Raten, wobei 2 Raten im Jahr 2022 fällig und bezahlt wurden (15.000 EUR) und 2 Raten im Jahr 2023 fällig sind, wovon eine bereits bezahlt wurde. *) Konsolidierung der Endberichte zum Projekt "Ö. Urteile wegen NS-Tötungsverbrechen" der AG zur Ausforschung mutmaßlicher NS-Täter (Auftragnehmer: FStN), Auftragsvolumen: 5.000 EUR im Jahr 2022 bezahlt. *) Studie zum Thema "Evaluierung des 2. Erwachsenenschutz-Gesetzes", Auftragsvolumen: 84.000 EUR, davon wurden 42.000 EUR im Jahr 2022 bezahlt und werden vorrauss. 42.000 EUR im Jahr 2023 fällig.
13030101	6430	000	*) * Studie iZm StVG-Novelle, Auftragsvolumen: 75.000 EUR
			BM für Landesverteidigung
14040100			*) Teilbetrag (eigene Fistl);
14050100	7270	900	*) Teilbetrag der Voranschlagsstelle.
14050100	7270	000	*) Teilbetrag der Voranschlagsstelle.
14050202	4691	000	*) Teilbetrag der Voranschlagsstelle
14070100	7270	900	*) Teilbetrag der Voranschlagsstelle
14070200			Teilbetrag (eigene Fistl)
14080105	4691	000	*) Teilbetrag der Voranschlagsstelle
			BM für Finanzen
15010100	7662	002	*) Forschungsanteil liegt bei 100 %.
15010100	7669	020	Forschungsanteil liegt bei 100 %.
15010100	7270	000	*) Teilbetrag der Voranschlagsstelle; Forschungsanteil 18 %. 15010100 7270 000 (Statistik Austria) wird hinzugefügt, dass vor Jahren beschlossen wurde, dass für "Statistik" in der Beilage T 18 % der Gesamtsumme angenommen werden.
15010100	6430	003	Forschungsanteil liegt bei 50 %.
			BM für Kunst, Kultur, öffentlichen Dienst und Sport
17020100	7678	008	Erfolg 2022: Forschungsanteil ist 94,851 % (System rundet). BVA 2024: Forschungsanteil ist 92,105 % (System rundet).
			BM für Arbeit und Wirtschaft
20010101	7340	302	*) Forschungsanteil liegt beim Erfolg 2022 bei rd. 0,65 %, beim BVA 2023 bei rd. 0,79 % und beim BVA 2024 bei rd. 0,75 % (System rundet)
20010201	7270	006	*) Forschungsanteil liegt beim Erfolg 2022 bei rd. 0,17 % beim BVA 2023 bei 0,79 % und beim BVA 2024 bei 0,58 % (System rundet)
20010201	7668	900	*)Forschungsanteil liegt beim Erfolg 2022 bei 0,20 %, beim BVA 2023 bei rd. 0,32 % und beim BVA 2024 bei 0,50 % (System rundet)
20010202	7270	000	*) Forschungsanteil liegt beim Erfolg 2022 bei 0,64 %, beim BVA 2023 bei 1,23 % und beim BVA 2024 bei 0,99 % (System rundet)
			BM für Bildung, Wissenschaft und Forschung
30010400			*)Teilbetrag der Voranschlagsstelle.
30010400	7800	000	*) Teilbetrag der Voranschlagsstelle.
30020700			*) Teilbetrag der Voranschlagsstelle.
31030100			*) Der Restbetrag ergibt sich rechnerisch bei dieser VA-Stelle.
31030204			*) Der Restbetrag ergibt sich rechnerisch bei dieser VA-Stelle.
31030300			*) Der Restbetrag ergibt sich rechnerisch bei dieser VA-Anstelle.
			BM für Klimaschutz, Umwelt, Energie, Mobil., Innov. u.Technologie
41010200	7330	080	* KLIEN: ab 2016 werden bei dieser Post nur mehr F&E-Projekte finanziert; daher die Erhöhung von 39 auf 95 %.

			BM für Land- und Forstwirtschaft, Regionen und Wasserwirtschaft
42010100	7800	100	*) 42040100 Finanzstelle 90300
42020202	7800	080	
42040100			*) PSP-Element 42P101010001
42040100	7800	100	
42040200	7411	027	*42040200 Finanzstellen 90306 (AGES) und 90309 (BFW)
42040500			*) BVA 2024: Finanzstellen 22010 (Franciso-Joseph.), 22013 (Raumberg-Gump), 22016 (Gartenbau), 22112 (alpenl. Milchw.), 22014 (Hochschule) und 30812 (Klosterneuburg)
42050300	7660	022	BVA 2024: HHP/PSP-Element 42P101010001
42050400			*) Finanzstelle 25010 (BAB) und 30811 (BA Weinbau)
42060200			*) HHP/PSP-Element 42P101010001
42060400	7270	000	*) HHP/PSP-Element 42P101010001
42060600			*442060600 Teilbetrag des DB; lt. Mitteilung der Förderungsabwicklungsstelle

Ergebnisvoranschlag			
VA-Stelle	Konto	Ugl	Anmerkung
			Keine Anmerkungen erfasst.

Table A IV-5: Federal expenditure 2006 to 2024 on research and research promotion by socio-economic objectives

Breakdown of Annex T of the Auxiliary Documents and the "Detailed overviews of the research-related appropriation of federal funds" (Part a and Part b) for the Federal Finances Acts (BGF)

Reporting years		Total federal expenditure for R&D	of which for												
			Promotion of research covering the earth, the seas, the atmosphere and space	Promotion of agriculture and forestry	Promotion of trade, commerce and industry	Promotiion of energy production, storage and distribution	Promotion of the transport, traffic and communication sector	Promotion of schools and education	Promotion of the healthcare system	Promotion of social and socio-economic development	Promotion of environmental protection	Promotion of urban and spatial planning	Promotion of national defence	Promotion of other objectives	Promotion of the general knowledge advancement
2006 [1]	in 1000 €	1,697,550	76,887	57,698	411,462	20,951	42,795	18,997	379,776	81,812	53,279	9,602	126	–	544,165
	in %	*100.0*	*4.5*	*3.4*	*24.2*	*1.2*	*2.5*	*1.1*	*22.4*	*4.8*	*3.1*	*0.6*	*0.0*	–	*32.2*
2007 [2]	in 1000 €	1,770,144	80,962	64,637	435,799	28,001	40,013	19,990	373,431	90,639	56,075	9,673	27	894	570,003
	in %	*100.0*	*4.6*	*3.7*	*24.6*	*1.6*	*2.3*	*1.1*	*21.1*	*5.1*	*3.2*	*0.5*	*0.0*	*0.1*	*32.1*
2008 [3]	in 1000 €	1,986,775	87,751	66,273	525,573	24,655	39,990	37,636	422,617	90,879	57,535	12,279	142	–	621,445
	in %	*100.0*	*4.4*	*3.3*	*26.5*	*1.2*	*2.0*	*1.9*	*21.3*	*4.6*	*2.9*	*0.6*	*0.0*	–	*31.3*
2009 [4]	in 1000 €	2,149,787	104,775	66,647	538,539	32,964	47,300	42,581	456,544	97,076	67,985	14,522	133	–	680,721
	in %	*100.0*	*4.9*	*3.1*	*25.1*	*1.5*	*2.2*	*2.0*	*21.2*	*4.5*	*3.2*	*0.7*	*0.0*	–	*31.6*
2010 [5]	in 1000 €	2,269,986	103,791	67,621	587,124	39,977	56,969	50,648	472,455	99,798	67,114	12,792	123	–	711,574
	in %	*100.0*	*4.6*	*3.0*	*25.9*	*1.8*	*2.5*	*2.2*	*20.8*	*4.4*	*3.0*	*0.6*	*0.0*	–	*31.2*
2011 [6]	in 1000 €	2,428,143	107,277	63,063	613,692	41,294	54,043	59,479	510,359	115,792	77,578	20,170	99	–	765,297
	in %	*100.0*	*4.4*	*2.6*	*25.3*	*1.7*	*2.2*	*2.4*	*21.0*	*4.8*	*3.2*	*0.8*	*0.0*	–	*31.6*
2012 [7]	in 1000 €	2,452,955	103,432	60,609	607,920	55,396	47,934	65,537	499,833	121,570	86,776	20,338	120	–	783,490
	in %	*100.0*	*4.2*	*2.5*	*24.8*	*2.3*	*2.0*	*2.7*	*20.4*	*5.0*	*3.5*	*0.8*	*0.0*	–	*31.8*
2013 [8]	in 1000 €	2,587,586	108,966	70,897	641,851	76,014	53,713	83,087	542,560	117,714	83,556	21,985	280	–	786,963
	in %	*100.0*	*4.2*	*2.7*	*24.9*	*2.9*	*2.1*	*3.2*	*21.0*	*4.5*	*3.2*	*0.8*	*0.0*	–	*30.5*
2014 [9]	in 1000 €	2,647,489	113,173	60,714	689,214	64,582	64,675	81,354	566,058	119,780	48,381	22,639	961	–	815,958
	in %	*100.0*	*4.3*	*2.3*	*26.0*	*2.4*	*2.4*	*3.1*	*21.4*	*4.5*	*1.8*	*0.9*	*0.0*	–	*30.9*
2015 [10]	in 1000 €	2,744,844	124,648	58,414	678,572	122,624	51,785	78,241	584,254	128,733	49,176	26,817	1,949	–	839,631
	in %	*100.0*	*4.5*	*2.1*	*24.7*	*4.5*	*1.9*	*2.9*	*21.3*	*4.7*	*1.8*	*1.0*	*0.1*	–	*30.5*
2016 [11]	in 1000 €	2,875,706	131,240	60,828	747,264	122,903	46,654	82,610	592,407	135,709	49,586	28,435	2,610	–	875,460
	in %	*100.0*	*4.6*	*2.1*	*26.0*	*4.3*	*1.6*	*2.9*	*20.6*	*4.7*	*1.7*	*1.0*	*0.1*	–	*30.4*
2017 [12]	in 1000 €	2,889,779	144,552	70,329	728,136	106,887	68,214	74,493	609,919	159,300	45,228	35,171	4,899	9,730	832,921
	in %	*100.0*	*5.0*	*2.4*	*25.2*	*3.7*	*2.4*	*2.6*	*21.1*	*5.5*	*1.6*	*1.2*	*0.2*	*0.3*	*28.8*
2018 [13]	in 1000 €	2,913,369	147,535	69,753	752,214	107,966	69,823	75,212	615,795	158,546	45,196	35,534	5,245	8,955	821,595
	in %	*100.0*	*5.1*	*2.4*	*25.8*	*3.7*	*2.4*	*2.6*	*21.1*	*5.4*	*1.6*	*1.2*	*0.2*	*0.3*	*28.2*
2019 [14]	in 1000 €	3,009,644	160,949	70,930	780,351	92,750	82,573	75,403	609,233	172,216	48,224	30,273	5,466	–	881,276
	in %	*100.0*	*5.3*	*2.4*	*25.9*	*3.1*	*2.7*	*2.5*	*20.2*	*5.7*	*1.6*	*1.0*	*0.2*	–	*29.4*
2020 [15]	in 1000 €	3,287,074	157,168	76,088	838,117	147,692	86,093	66,989	644,298	187,622	124,921	31,374	4,817	–	921,895
	in %	*100.0*	*4.8*	*2.3*	*25.5*	*4.5*	*2.6*	*2.0*	*19.6*	*5.7*	*3.8*	*1.0*	*0.1*	–	*28.1*
2021 [16]	in 1000 €	3,269,575	163,626	89,873	837,528	132,915	103,738	67,038	674,093	186,386	68,642	33,272	5,149	–	907,315
	in %	*100.0*	*5.0*	*2.7*	*25.6*	*4.1*	*3.2*	*2.1*	*20.6*	*5.7*	*2.1*	*1.0*	*0.2*	–	*27.7*
2022 [17]	in 1000 €	3,605,800	168,401	98,776	982,777	159,175	84,316	73,935	756,930	201,330	71,819	48,242	6,771	–	953,328
	in %	*100.0*	*4.7*	*2.7*	*27.3*	*4.4*	*2.3*	*2.1*	*21.0*	*5.6*	*2.0*	*1.3*	*0.2*	–	*26.4*
2023 [18]	in 1000 €	4,174,391	181,756	95,492	1,176,968	180,652	145,471	80,653	836,359	218,497	98,944	51,807	6,673	–	1,101,119
	in %	*100.0*	*4.4*	*2.3*	*28.2*	*4.3*	*3.5*	*1.9*	*20.0*	*5.2*	*2.4*	*1.2*	*0.2*	–	*26.4*
2024 [18]	in 1000 €	4,611,196	199,815	134,271	1,269,182	176,846	181,050	91,386	897,409	236,755	102,092	55,693	11,374	–	1,255,323
	in %	*100.0*	*4.3*	*2.9*	*27.6*	*3.8*	*3.9*	*2.0*	*19.5*	*5.1*	*2.2*	*1.2*	*0.2*	–	*27.3*

Date: March 2024

Source: Statistics Austria.

1) Annex T of the Auxiliary Document for the Federal Finances Act 2008 (BFG 2008), Cash Flow Statement. Revised data. 2) Annex T of Auxiliary Document for the Federal Finance Act 2009, Cash Flow Statement. 3) Annex T of Auxiliary Document for the Federal Finance Act 2010, Cash Flow Statement. 4) Annex T of Auxiliary Document for the Federal Finance Act 2011, Cash Flow Statement. 5) Annex T of Auxiliary Document for the Federal Finance Act 2012, Cash Flow Statement. 6) Annex T of Auxiliary Document for the Federal Finance Act 2013 (Cash Flow Budget), Cash Flow Statement. Revised data. 7) Supplement T of the Working Document to the Federal Finance Act 2014 (Cash Flow Budget), Cash Flow Statement. 8) Annex T of Auxiliary Document for the Federal Finance Act 2015 (Cash Flow Budget), Cash Flow Statement. Revised data. 9) Federal Finance Act 2016, Detailed overview of research-related appropriation of federal funds, Cash Flow Statement. 10) Federal Finance Act 2017, Detailed overview of research-related appropriation of federal funds, Cash Flow Statement. Revised data. 11) Federal Finance Act 2018, Detailed overview of research-related appropriation of federal funds, Cash Flow Statement. 12) Federal Finance Act 2019, Detailed overview of research-related appropriation of federal funds, Cash Flow Statement. Revised data. 13) Federal Finance Act 2020, Detailed overview of research-related appropriation of federal funds, Cash Flow Statement. 14) Federal Finance Act 2021, Detailed overview of research-related appropriation of federal funds, Cash Flow Statement. Revised data. 15) Federal Finance Act 2022, Detailed overview of research-related appropriation of federal funds, Cash Flow Statement. 16) Federal Finance Act 2023, Detailed overview of research-related appropriation of federal funds, Cash Flow Statement. 17) Federal Finance Act 2024, Detailed overview of research-related appropriation of federal funds, Cash Flow Budget, Cash Flow Statement. 18) Federal Finance Act 2024, detailed overview of federal funds used for research, financing estimate.

Table A IV-6: Federal expenditure 2024 on research and research promotion by socio-economic objective and ministry

Breakdown of the annual values for 20241) of the "Detailed overview of the use of federal funds for research" for the Federal Finance Act 2024 (part a and part b)

Departments		Total federal expenditure on R&D	of which for													
			Promoting the explo-ration of the earth, oceans, atmosphere and space	Promotion of agricul-ture and forestry	Promotion of trade, commerce and industry	Promot-ing the generation, storage and distri-bution of energy	Promotion of the transport, traffic and commu-nications sector	Promotion of teaching and education	Promotion of the healthcare system	Promotion of social and socio-economic develop-ment	Promotion of envi-ronmental protection	Promotion of urban and spatial planning	Promotion of national defence	Promotion of other objectives	Promotion of the general ex-pansion of knowledge
BKA [2]	in 1000 €	1,916	–	–	–	–	2	–	–	1,649	–	265	–	–	–
	in %	*100.0*	–	–	–	–	*0.1*	–	–	*86.1*	–	*13.8*	–	–	–
BMKÖS	in 1000 €	50,382	6,122	–	–	–	–	–	350	14,643	–	–	–	–	29,267
	in %	*100.0*	*12.2*	–	–	–	–	–	0.7	*29.1*	–	–	–	–	*58.0*
BMEIA	in 1000 €	4,003	–	–	–	1,190	–	–	–	2,813	–	–	–	–	–
	in %	*100.0*	–	–	–	*29.7*	–	–	–	*70.3*	–	–	–	–	–
BMAW	in 1000 €	270,417	998	111	229,992	14,946	887	–	1,885	6,707	11,231	–	111	–	3,549
	in %	*100.0*	0.4	0.0	85.1	5.5	0.3	–	0.7	*2.5*	4.2	–	0.0	–	1.3
BMBWF	in 1000 €	3,337,625	153,966	46,482	662,071	37,521	56,843	90,302	852,944	188,915	45,414	52,134	3,967	–	1,147,066
	in %	*100.0*	*4.6*	*1.4*	*19.8*	*1.1*	*1.7*	*2.7*	*25.6*	*5.7*	*1.4*	*1.6*	*0.1*	–	*34.3*
BMF	in 1000 €	52,250	1,452	1,319	19,010	2,613	816	706	6,296	11,500	1,361	448	41	–	6,688
	in %	*100.0*	*2.8*	*2.5*	*36.3*	*5.0*	*1.6*	*1.4*	*12.0*	*22.0*	*2.6*	*0.9*	0.1	–	*12.8*
BMI	in 1000 €	1,519	–	–	–	–	–	–	–	1,519	–	–	–	–	–
	in %	*100.0*	–	–	–	–	–	–	–	*100.0*	–	–	–	–	–
BMJ	in 1000 €	76	–	–	–	–	–	–	–	76	–	–	–	–	–
	in %	*100.0*	–	–	–	–	–	–	–	100.0	–	–	–	–	–
BMK	in 1000 €	787,226	35,781	3,119	357,605	120,576	122,502	–	28,633	4,484	44,086	2,846	748	–	66,846
	in %	*100.0*	*4.5*	*0.4*	*45.4*	*15.3*	*15.6*	–	*3.6*	*0.6*	*5.6*	*0.4*	0.1	–	*8.5*
BMLV	in 1000 €	7,987	–	–	–	–	–	–	–	–	–	–	6,507	–	1,480
	in %	*100.0*	–	–	–	–	–	–	–	–	–	–	*81.5*	–	*18.5*
BML	in 1000 €	87,854	1,496	83,240	504	–	–	378	–	1,809	–	–	–	–	427
	in %	*100.0*	*1.7*	*94.7*	*0.6*	–	–	*0.4*	–	*2.1*	–	–	–	–	*0.5*
BMSGPK	in 1000 €	9,941	–	–	–	–	–	–	7,301	2,640	–	–	–	–	–
	in %	*100.0*	–	–	–	–	–	–	*73.4*	*26.6*	–	–	–	–	–
Total	**in 1000 €**	**4,611,196**	**199,815**	**134,271**	**1,269,182**	**176,846**	**181,050**	**91,386**	**897,409**	**236,755**	**102,092**	**55,693**	**11,374**	**–**	**1,255,323**
	in %	***100.0***	***4.3***	***2.9***	***27.6***	***3.8***	***3.9***	***2.0***	***19.5***	***5.1***	***2.2***	***1.2***	***0.2***	**–**	***27.3***

Date: March 2024

Source: Statistics Austria.

1) Cash Flow Budget.

2) Including the highest executive bodies

Table A IV-7: General research-related higher education institutions expenditures by the Federal Government 2000–2024 "General University Funds" [1)]

Years	General University Funds	
	Total	R&D
	In € million	
2000	1,956,167	842,494
2001	2,008,803	866,361
2002	2,104,550	918,817
2003	2,063,685	899,326
2004	2,091,159	980,984
2005	2,136,412	1,014,543
2006	2,157,147	1,027,270
2007	2,314,955	1,083,555
2008	2,396,291	1,133,472
2009	2,626,038	1,236,757
2010	2,777,698	1,310,745
2011	2,791,094	1,388,546
2012	2,871,833	1,395,130
2013	3,000,004	1,453,596
2014	3,059,949	1,481,744
2015	3,117,320	1,509,576
2016	3,262,376	1,610,742
2017	3,319,288	1,638,460
2018	3,294,879	1,658,500
2019	3,488,597	1,755,220
2020	3,698,739	1,859,785
2021	3,894,654	1,957,235
2022	4,040,988	2,069,802
2023	4,471,429	2,250,984
2024	4,676,683	2,399,684

Date: March 2024 Source: Statistics Austria.

1) 2000–2024: Based on Annex T of the Auxiliary Document and the "Detailed overviews of research-related appropriation of federal funds" for the Federal Finances Acts.

Table A IV-8: Research promotion schemes and contracts awarded by the Federal Government in 2023 by sector/areas of performance and awarding ministries

Analysis of the federal research database [1] without "major" global funding [2]

Ministries	Partial amounts 2023	of which awarded to																			
		Higher education sector					Federal sector							Private non-profit sector			Business enterprise sector					
		Universities (incl. Teaching hospitals)	Universities of the Arts	Universities of Applied Sciences	Other higher education sector [3]	Combined	Federal institutions (outside the higher education sector)	AIT Austrian Institute of Technology	Austrian Academy of Sciences	Private non-profit facilities mostly run on public financing	Ludwig Boltzmann Society	Other public sector [4]	Combined	Private non-profit facilities	Individual researchers	Combined	Institutes'sub-sector „Kooperativer Bereich", incl. Competence centres	Company R&D sub-sector „Firmeneigener Bereich"	Combined	Austrian Science Fund	Austrian Research Promotion Agency	Abroad
	in €	in per cent																			
BKA	1,190,117	27.4	–	–	–	27.4	46.5	–	–	4.6	–	3.6	54.7	12.2	–	12.2	–	3.2	3.2	–	–	2.5
BMAW	1,908,340	9.5	–	–	–	9.5	10.8	–	–	47.6	–	2.5	60.9	4.5	–	4.5	4.1	21.0	25.1	–	–	–
BMBWF	93,133,972	3.1	–	–	–	3.1	8.1	0.0	–	6.0	–	1.9	16.0	1.1	0.0	1.1	–	0.2	0.2	–	35.0	44.6
BMEIA	814,896	–	–	–	–	–	100.0	–	–	–	–	–	100.0	–	–	–	–	–	–	–	–	–
BMF	5,241,994	1.6	–	–	–	1.6	34.5	–	–	12.5	–	–	47.0	0.1	0.4	0.5	–	3.3	3.3	–	44.4	3.2
BMI	584,316	2.4	–	–	–	2.4	–	–	–	44.5	4.9	–	49.4	–	–	–	–	48.2	48.2	–	–	–
BMJ	284,452	64.9	–	–	–	64.9	–	–	–	16.1	–	–	16.1	14.8	–	14.8	–	–	–	–	–	4.2
BMK	1,679,212	20.1	–	–	–	20.1	4.3	–	–	36.2	–	3.0	43.5	9.5	–	9.5	16.3	3.7	20.0	–	6.9	–
BML	15,941,919	71.5	–	–	–	71.5	21.4	0.3	–	3.2	–	0.6	25.5	0.2	–	0.2	0.6	2.2	2.8	–	–	–
BMLV	2,168,261	7.0	–	–	–	7.0	2.5	4.9	0.3	–	–	11.2	18.9	1.3	2.6	3.9	11.8	35.4	47.2	–	7.4	15.6
BMSGPK	15,834,807	2.5	–	–	–	2.5	95.1	–	–	1.6	–	–	96.7	0.2	–	0.2	0.2	0.3	0.5	–	–	0.1
Total	**138,782,286**	**11.5**	**–**	**–**	**–**	**11.5**	**21.3**	**0.1**	**0.0**	**6.4**	**0.0**	**1.6**	**29.4**	**1.1**	**0.1**	**1.2**	**0.5**	**1.7**	**2.2**	**–**	**25.4**	**30.3**

Date: April 2024

Source: Statistics Austria.

1) Data as of 15 March 2024. 2) i.e. excluding institutional funding with funding amounts over €500 000. 3) Private universities, university colleges of teacher education, research institutes at federal institutes of technology and other institutions attributable to the higher education sector. 4) State, local and municipal and chamber institutions as well as social insurance institutions.

Table A IV-9: Research promotion schemes and contracts awarded by the Federal Government in 2023 by socio-economic objectives and awarding ministries

Analysis of the federal research database [1] without "major" global funding [2]

Ministries		Partial amounts 2023	of which for											
			Promotion of research covering the earth, seas, the atmosphere and space	Promotion of agriculture and forestry	Promotion of trade, commerce and industry	Promoting the generation, storage and distribution of energy	Promotion of the transport, traffic and communications sector	Promotion of teaching and education	Promotion of the healthcare system	Promotion of social and socio-economic development	Promotion of environmental protection	Promotion of urban and spatial planning	Promotion of national defence	Promotion of the general expansion of knowledge
BKA	in €	1,190,117	–	–	–	–	–	–	–	1,169,009	–	–	–	21,108
	in %	*100.0*	–	–	–	–	–	–	–	*98.2*	–	–	–	*1.8*
BMAW	in €	1,908,340	–	–	–	–	–	39,090	50,992	1,523,358	10,000	–	–	284,900
	in %	*100.0*	–	–	–	–	–	*2.0*	*2.7*	*79.9*	*0.5*	–	–	*14.9*
BMBWF	in €	93,133,972	8,907,560	–	–	–	–	–	7,867,790	3,129,111	291,494	–	–	72,938,017
	in %	*100.0*	*9.6*	–	–	–	–	–	*8.4*	*3.4*	*0.3*	–	–	*78.3*
BMEIA	in €	814,896	–	–	–	–	–	–	–	814,896	–	–	–	–
	in %	*100.0*	–	–	–	–	–	–	–	*100.0*	–	–	–	–
BMF	in €	5,241,994	–	–	–	–	–	–	–	2,745,877	118,880	44,400	–	2,332,837
	in %	*100.0*	–	–	–	–	–	–	–	*52.4*	*2.3*	*0.8*	–	*44.5*
BMI	in €	584,316	–	–	–	–	–	–	–	507,323	–	–	–	76,993
	in %	*100.0*	–	–	–	–	–	–	–	*86.8*	–	–	–	*13.2*
BMJ	in €	284,452	–	–	–	–	–	–	11,932	272,520	–	–	–	–
	in %	*100.0*	–	–	–	–	–	–	*4.2*	*95.8*	–	–	–	–
BMK	in €	1,679,212	–	–	499,123	–	–	–	119,086	36,721	334,161	50,000	–	640,121
	in %	*100.0*	–	–	*29.7*	–	–	–	*7.1*	*2.2*	*19.9*	*3.0*	–	*38.1*
BML	in €	15,941,919	6,658,739	7,794,203	50,680	45,000	–	–	24,000	470,135	238,187	638,636	–	22,339
	in %	*100.0*	*41.8*	*48.9*	*0.3*	*0.3*	–	–	*0.2*	*2.9*	*1.5*	*4.0*	–	*0.1*
BMLV	in €	2,168,261	49,800	–	413,485	–	–	–	95,300	30,500	–	–	1,243,532	335,644
	in %	*100.0*	*2.3*	–	*19.1*	–	–	–	*4.4*	*1.4*	–	–	*57.3*	*15.5*
BMSGPK	in €	15,834,807	8,225	116,610	–	–	–	–	14,743,926	920,122	39,984	–	–	5,940
	in %	*100.0*	*0.1*	*0.7*	–	–	–	–	*93.1*	*5.8*	*0.3*	–	–	*0.0*
Total	**in €**	**138,782,286**	**15,624,324**	**7,910,813**	**963,288**	**45,000**	**–**	**39,090**	**22,913,026**	**11,619,572**	**1,032,706**	**733,036**	**1,243,532**	**76,657,899**
	in %	***100.0***	***11.3***	***5.7***	***0.7***	***0.0***	**–**	***0.0***	***16.5***	***8.4***	***0.7***	***0.5***	***0.9***	***55.3***

Date: April 2024

Source: Statistics Austria.

1) Date as pf 15 March 2024. 2) i.e. excluding institutional funding with funding amounts exceeding €500,000.

Table A IV-10: An internal comparison of research and experimental development (R&D) in 2021

Country	Gross domestic expenditure on R&D as % of GDP	Financing of gross domestic expenditure on R&D through		Employees in R&D in full-time equivalents	Gross domestic expenditure on R&D in the			
		government	business		Business enterprise sector	Higher education sector	Government sector	Private non-profit sector
		in %			in % of gross domestic expenditure on R&D			
Austria [4)]	**3.26**	**28.5**	**53.0**	**87,459**	**68.9**	**23.1**	**7.5**	**0.5**
Belgium	3.43	17.3	64.4	119,165 [b)]	74.7	16.2	8.6	0.5
Bulgaria	0.77	26.1	32.9	25,122	65.8	6.5	27.1	0.6
Croatia	1.24	35.9	38.4	16,528	46.5	32.3	20.9	0.3
Cyprus	0.80	36.7	35.7	2,249	42.2	38.4	6.0	13.4
Czech Republic	2.00	32.3	36.1	84,671	62.8	20.3	16.7	0.3
Denmark [p)]	2.76	28.7 [2)]	59.6 [2)]	62,169	62.1	34.1	3.4	0.4
Estonia	1.77	37.0	51.0	6,783	55.8	33.6	9.3	1.2
Finland	2.99	25.6	58.1	56,488 [d)]	68.8	23.1	7.3	0.8
France	2.22	32.5	55.4	496,250	65.7	20.5	11.7	2.1
Germany	3.13	30.0	62.8	753,940	66.9	18.3	14.8 [d)]	.
Greece	1.46	44.5	38.3	61,702	47.1	30.1	22.3	0.6
Hungary	1.64	35.1	50.6	61,149	75.5 [d)]	13.8 [d)]	10.2 [d)]	.
Ireland	1.11	16.8	55.5	38,444	80.5	16.0 [e)]	3.5	.
Italy	1.43	35.2	53.9	333,103	60.2	24.0 [e)]	14.0	1.9
Latvia	0.75	33.9	33.5	7,066	37.3	44.3	18.4	.
Lithuania	1.10	29.8	36.1	14,918	49.2	35.1	15.7	.
Luxembourg	1.04	47.0	44.2	5,689	50.6	25.0	24.4	0.0 [u)]
Malta	0.65	31.1	61.3	1,945	64.3	34.2	1.5	.
Netherlands	2.27	30.7	56.5	173,667	66.1	28.5	5.5 [d)]	0.0 [d)]
Poland	1.43	37.4	51.0	185,313	63.1	34.7	2.0	0.2
Portugal	1.67	35.6	53.7	69,769	59.7	33.3	4.7	2.3
Romania	0.47	31.7	55.2	34,270	60.4	9.2	30.0	0.3
Slovakia	0.92	37.9	45.7	22,358	56.0	25.4	18.5	0.0
Slovenia	2.13	24.3	48.7	17,396	73.3	12.3	13.5	0.8
Spain	1.41	37.5	50.2	249,474	56.2	26.6	16.9	0.3
Sweden	3.40	23.3	60.7	115,940 [b)]	72.4	23.0	4.4	0.1 [e)]
EU-27 countries [e)]	**2.27**	**30.3**	**57.7**	**3,103,026**	**.**	**.**	**.**	**.**
Bosnia and Herzegovina	0.19	43.1	38.7	1,928	37.4	57.7	4.9	0.0
Iceland	2.80	25.0	48.9	4,414	71.7	25.5	2.8	.
Montenegro	0.50 [1)]	49.0 [1)]	37.8 [1)]	685 [2)]	13.8 [2)]	36.5 [2)]	49.7 [2)]	0.1 [2)]
North Macedonia [3)]	0.37	47.4	22.3	2,030	25.7	63.6	9.6	1.1
Norway	1.94	46.6	43.5	51,927	53.9	33.0	13.2	.
Serbia	0.99	37.5	0.6	21,442	45.2	28.2	26.6	0.0
Switzerland	3.31	26.8	65.9	90,832	68.3	28.2	0.9	2.6
Turkey	1.40	27.5	54.6	243,905	61.3	34.2	4.5	.
United Kingdom	1.76 [p) 2)]	25.9 [1)]	54.8 [1)]	486,088 [p) 2)]	68.0 [p) 2)]	23.1 [p) 2)]	6.6 [p) 2)]	2.3 [p) 2)]
Japan	3.34	15.5 [e)]	78.1	942,024 [d)]	78.6	11.9	8.4	1.2
People's Republic of China (excluding Hong Kong) [3)]	2.41	19.8	77.5	5,234,508	76.6	7.7	15.7	.
Russia [2)]	1.04	66.3	30.2	753,796	60.7	10.6	28.3	0.4
South Korea	4.93	22.8	76.1	577,099	79.1	9.1	9.8	2.0
United States	3.46 [d) p)]	19.9 [d) p)]	67.9 [p)]	.	77.6 [p)]	10.4 [d) p)]	8.3 [d) p)]	3.7 [d) e)]

b) Break in the time series. d) Different definition. e) Estimated values. p) Preliminary values. u) Low reliability.
1) 2018. 2) 2019. 3) 2020. 4) Statistics Austria; results of the survey on research and experimental development.
Full time equivalent = person-year.

Source: Eurostat (date: 17 March 2024), Statistics Austria

Table A IV-11: FWF: Shares of new approvals by disciplines (Austrian Systematics of the Sciences 2012, 3-digit level), 2021–2023

Subject	2021		2022		2023	
	in %	in € million	in %	in € million	in %	in € million
101 Mathematics	9.03	23.11	6.76	18.45	9.20	32.11
102 Computer science	6.82	17.48	6.73	18.37	4.23	14.75
103 Physics, astronomy	9.67	24.77	14.81	40.43	14.35	50.09
104 Chemistry	5.03	12.88	4.94	13.50	5.83	20.33
105 Geosciences	3.32	8.50	3.06	8.35	1.87	6.53
106 Biology	17.51	44.84	22.25	60.73	22.57	78.75
107 Other natural sciences	0.45	1.14	0.26	0.70	0.42	1.47
201 Construction	0.46	1.17	0.81	2.21	1.16	4.06
202 Electrical engineering, electronics, information technology	1.03	2.63	1.18	3.22	0.78	2.71
203 Mechanical engineering	0.41	1.04	0.43	1.18	0.60	2.09
204 Chemical process engineering	0.33	0.83	0.00	0.00	0.17	0.59
205 Materials technology	0.37	0.95	0.61	1.67	0.78	2.73
206 Medical technology	0.40	1.03	0.29	0.80	0.43	1.50
207 Environmental Engineering, Applied Geosciences	0.67	1.73	0.52	1.42	0.33	1.15
208 Environmental biotechnology	0.02	0.06	0.04	0.10	0.03	0.12
209 Industrial biotechnology	0.79	2.02	0.30	0.81	0.21	0.74
210 Nanotechnology	0.38	0.97	0.47	1.29	1.73	6.03
211 Other technical sciences	0.37	0.95	0.28	0.76	0.10	0.36
301 Medical-theoretical sciences, pharmacy	10.43	26.72	8.84	24.14	7.64	26.67
302 Clinical medicine	6.35	16.26	3.70	10.10	3.40	11.85
303 Health sciences	1.42	3.63	0.67	1.82	0.69	2.41
304 Medical biotechnology	0.77	1.97	0.54	1.47	0.34	1.18
305 Other human medicine, health sciences	0.19	0.50	0.15	0.41	0.25	0.86
401 Agriculture, forestry and fishing	0.41	1.06	0.42	1.14	0.08	0.27
402 Animal breeding. animal production	0.70	0.45	0.20	0.55	0.14	0.47
403 Veterinary medicine	0.15	0.38	0.52	1.43	0.25	0.87
404 Agricultural biotechnology, food biotechnology	0.15	0.39	0.00	0.00	0.00	0.00
405 Other agricultural sciences	0.50	1.29	0.09	0.24	0.04	0.15
501 Psychology	1.86	4.76	1.46	3.99	1.91	6.68
502 Economics	1.22	3.12	0.81	2.21	1.48	5.18
503 Educational sciences	0.55	1.41	0.28	0.75	0.26	0.92
504 Sociology	2.74	7.02	1.88	5.13	1.69	5.90
505 Law	0.24	0.60	0.44	1.20	0.14	0.48
506 Political science	1.30	3.32	0.74	2.01	0.32	1.13
507 Human geography, regional geography, spatial planning	0.48	1.23	0.54	1.48	0.39	1.37
508 Media and communication sciences	0.68	1.75	0.72	1.98	0.22	0.77
509 Other social sciences	0.40	1.03	0.27	0.73	0.45	1.56
601 History, archaeology	3.26	8.34	2.15	5.87	3.78	13.19
602 Linguistics and literature	3.20	8.20	2.95	8.04	3.65	12.75
603 Philosophy, ethics, religion	2.53	6.47	3.66	10.00	4.40	15.34
604 Arts	2.78	7.11	3.62	9.87	1.81	6.32
605 Other humanities	1.17	3.00	1.63	4.44	1.87	6.52
Total	**100.00**	**256.08**	**100.00**	**272.97**	**100.00**	**348.94**

Source: FWF.

Table A IV-12: FFG: Total funding by topic area of funding 2021–2023*

	2021		2022		2023	
	in %	Total funding in € million	in %	Total funding in € million	in %	Total funding in € million
Energy/Environment	16.1	119.1	22.0%	152.6	25.4	196.6
ICT	18.8	138.3	25.2%	174.4	17.5	135.2
LifeSciences	9.9	72.7	7.6%	52.9	12.2	93.9
Mobility	18.6	137.1	9.7%	67.2	11.4	88.0
Production	23.1	170.2	21.3%	147.8	19.4	149.6
Security	2.0	15.1	2.4%	16.5	3.0	23.3
Other	10.5	77.2	10.2%	70.6	10.1	78.1
Space	1.1	7.8	1.6%	11.1	1.1	8.3
Total	**100.0**	**737.7**	**100.0%**	**693.2**	**100.0**	**773.1**

* Approved funding, excluding commissions. In contrast to the table in the RTI 2023, this table only shows funding for research and development (R&D). Infrastructure funding (broadband, zero-emission buses, zero-emission commercial vehicles, charging infrastructure) is excluded.

Source: FFG.

Table A IV-13: aws: Shares of new approvals by funding topic (industry), 2021–2023*

Subject area, subject fields or industry	Funding					
	2021		2022		2023	
	in %	in € million	in %	in € million	in %	in € million
Services	24.16	1,896.9	30.07	415.3	14.74	476.1
Energy and water supply, waste water	6.32	495.9	1.27	17.5	1.59	51.3
Trade, maintenance, repair	11.95	938.1	14.00	193.4	12.92	417.0
Food products, beverages, tobacco	10.24	804.2	7.39	102.0	6.99	225.6
Manufacturing	17.50	1,374.2	27.75	383.2	36.88	1,190.7
Other industries	10.36	813.2	4.07	56.2	5.04	162.7
Tourism	6.71	526.9	5.31	73.3	9.41	303.8
Transport and communication	4.82	378.7	2.11	29.1	10.93	352.8
Not classified	7.93	622.9	8.04	111.0	1.52	49.0
Total	**100.00**	**7,851.0**	**100.00**	**1,381.0**	**100.00**	**3,229.0**

* aws total incl. special programmes

Source: aws.

Table A IV-14: aws: Shares of new approvals by company size, 2021–2023*

Subject area, subject fields or industry	Funding					
	2021		2022		2023	
	in %	in € million	in %	in € million	in %	in € million
Sole proprietorships	24.97	1,960.2	8.37	115.6	3.38	109.0
Microenterprises	18.73	1,470.3	15.38	212.4	8.81	284.4
Small enterprises	18.97	1,489.4	23.47	324.1	22.47	725.5
Medium-sized enterprises	17.07	1,340.4	27.30	377.0	27.48	887.3
Large enterprises	16.40	1,287.6	17.84	246.4	34.61	1,117.4
Not classified	3.86	303.1	7.64	105.5	3.26	105.4
Total	**100.00**	**7,851.0**	**100.00**	**1,381.0**	**100.00**	**3,229.0**

* aws total incl. special programmes

Source: aws.

Table A IV-15: CDG: CD Laboratories by thematic cluster, 2021–2023

Thematic cluster	Number of CD Laboratories 2021	Budget 2021 in €	Number of CD Laboratories 2022	Budget 2022 in €	Number of CD Laboratories 2023	Budget 2023 in €
Chemistry	6	2,212,353.95	7	2,302,327.28	9	3,021,913.38
Life Sciences and Environment	16	6,047,240.37	13	6,179,510.23	15	6,477,760.21
Mechanical and instrument engineering	6	1,684,571.80	5	1,288,186.41	6	945,872.42
Materials and substances	17	5,858,582.12	18	6,006,053.04	20	8,424,900.13
Mathematics, informatics, electronics	26	9,450,809.87	30	10,611,669.51	30	10,846,842.52
Medicine	14	3,632,533.39	16	3,295,336.27	16	5,399,212.44
Economics, Social Sciences and Law	2	432,315.61	1	309,693.47	1	315,151.00
Total	**87**	**29,318,407.10**	**90**	**29,992,776.21**	**97**	**35,431,652.10**

Note: Budget data 2023 are plan data as of 31 December 2023. Source: CDG.

Table A IV-16: CDG: JR Centres by thematic clusters, 2021–2023

Thematic cluster	Number of JR Centres 2021	Budget 2021 in €	Number of JR Centres 2022	Budget 2022 in €	Number of JR Centres 2023	Budget 2023 in €
Chemistry	–	–	–	–	1	75,000.02
Life Sciences and Environment	3	893,961.37	4	819,488.47	3	1,030,955.50
Mechanical and instrument engineering	1	253,228.98	1	241,534.30	1	169,500.00
Materials and substances	1	177,875.08	–	–	–	–
Mathematics, informatics, electronics	7	1,655,455.39	8	2,102,530.51	10	2,308,313.02
Medicine	1	265,209.53	1	14,078.49	–	–
Economics, Social Sciences and Law	2	538,183.29	2	494,304.64	3	697,219.22
Total	**15**	**3,783,913.64**	**16**	**3,671,936.41**	**18**	**4,280,987.76**

Note: Budget data 2023 are plan data as of 31 December 2023. Source: CDG.