

REPORT ON RESEARCH,
INNOVATION AND TECHNOLOGICAL
PERFORMANCE IN GERMANY

COMMISSION OF EXPERTS
FOR RESEARCH
AND INNOVATION



REPORT

2022 2023 2024

2025 2026 2027

2028 2029 2030

EXECUTIVE SUMMARY

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The Commission of Experts wishes to emphasize that the positions expressed in the report do not necessarily represent the opinions of the aforementioned persons.

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Executive Summary

A Current Developments and Challenges

A0 R&I policy in the new legislative period

The governing parties have outlined their plans for the new legislative period in the coalition agreement. They have expressed the will to tackle the grand societal challenges with vigour and to set the course for a social-ecological market economy. The transformative change required for this can only be realized with considerable, often radical technological innovations, social innovations and complementary behavioural changes. The Commission of Experts advocates building on the experiences of the High-Tech Strategy to develop a new, comprehensive R&I strategy and to add a qualitative dimension to the 3.5 percent target. Furthermore, a future quota should be introduced for the federal budget.

A1 Tackling climate targets vigorously

For Germany to achieve its ambitious climate goals, the development of low-CO₂ technologies must be further advanced and their diffusion into the markets promoted. In addition to the instruments of R&I policy, CO₂ pricing is of particular importance here. According to the Commission of Experts, the incentive effects of European and national emissions trading must be increased. Furthermore, the price components in the energy sector associated with state intervention should be reformed quickly and climate-damaging subsidies dismantled. By establishing an international climate club with a common CO₂ border adjustment mechanism, competitive disadvantages of low-emission technologies in the participating countries should be compensated for compared to cheaper emission-intensive technologies from outside.

A2 Catching up and avoiding technological gaps

Germany shows considerable weaknesses in the development of digital technologies. There is a danger of losing touch in this central key enabling technology. The Commission of Experts is in favour of further promoting key digital technologies based on strategies and framework programmes and of making greater use of the innovation and value creation potential of data than has been the case to date. In addition, the Commission of Experts considers it necessary to further accelerate the expansion of the digital infrastructure and to strengthen cybersecurity in light of an intensified threat situation. Furthermore, Germany should vigorously promote e-government.

A3 Strengthening the skilled labour supply through education and qualification

For Germany to realize the innovations and productivity gains required to cope with the ongoing transformations and major tasks of the future, the strengthening of the skilled labour supply should be accelerated. To improve STEM skills, the Commission of Experts recommends that learning content and teaching methods in schools be put to the test, that impending bottlenecks in the supply of qualified teachers in STEM subjects be combated more actively and that the school subject of computer science be expanded. It advises making in-company vocational training more attractive from both the supply and the demand side and thus stabilising it. Likewise, vocational adaptability should be boosted through further training, especially through preventive bridging solutions.

A4 Increasing innovation participation

To counteract the declining trend in Germany's innovator rate, the conditions for participation in R&I activities should be improved with the help of tailored support measures. This could be done, for example, through a comprehensive start-up strategy. The Commission of Experts considers it necessary to substantially professionalize the start-up and transfer infrastructure at universities. Access to venture capital should be improved by further developing the Future Fund (Zukunftsfonds) – by creating funding modules for socially and ecologically oriented projects as well as specifically for female founders. The Commission of Experts is against mixing R&I policy and structural policy goals. Against the backdrop of differing regional conditions, it proposes that R&I funding be oriented towards potential.

A5 Developing agile governance structures

The R&I policy tasks associated with the upcoming transformative change require agile policy action. To this end, suitable governance structures must be developed and policy learning must be more strongly integrated into political processes. The digital policies of the various ministries are to be coordinated and harmonized more closely than before following the new allocation of competences. To this end, interfaces must be clearly defined and structurally anchored through interdepartmental project teams or task forces. The Commission of Experts is against relying on agency solutions as a panacea in R&I policy. It considers evaluations of R&I policy measures that are carried out systematically and with suitable methods to be important in order to learn from them for the design of future funding measures.

B Core Topics 2022

B 1 Key enabling technologies and technological sovereignty

Unique selling propositions and innovations in key enabling technologies contribute to the competitiveness of an economy's companies in these technologies.

In an international comparison, Germany shows strengths in the key enabling technology areas of production technologies as well as bio- and life sciences. However, in the area of digital technologies Germany, like the EU 27, shows clear weaknesses and is also heavily dependent on imports from China.

The Commission of Experts therefore makes the following recommendations:

- Key enabling technologies and derived key enabling technology portfolios must be defined using clear and workable criteria to ensure that their selection is not determined by assertive individual interests.
- Key enabling technologies should be systematically kept under review through continuous foresight analyses and monitoring processes. The aim of these processes must be to record current, emerging and potential key enabling technologies and to evaluate them in terms of their technological, economic and societal potential.
- The Federal Government should establish an independent strategic advisory body for key enabling technologies with the task of continuously updating a key enabling technology portfolio and developing recommendations for action for the Federal Government on how to deal with selected key enabling technologies.
- In key enabling technology areas where technological leaps are emerging, application-oriented pilot projects should be funded in addition to basic research. The development of competences for key enabling technologies must be initiated at an early stage in academic education as well as in vocational and continuing education and training.
- The Federal Government should not only focus its funding on the pre-market phase. To promote potential key enabling technologies (infant technologies), the Commission of Experts also recommends targeted market interventions, provided they have a catalytic character.
- To reinforce key enabling technologies and their own technological sovereignty, Germany and the EU should take stronger joint action to achieve a critical mass of capacities and activities.

B2 Motorized private transport on the road to sustainability

German policy is faced with the major challenge of having to bring emissions from the transport sector to zero as early as 2045. Private motorized transport is a major source of greenhouse gas emissions. At the vehicle level, a reduction of these emissions can be achieved using new drive systems and alternative fuels. The battery-powered passenger car is proving to be the most ecologically and economically advantageous alternative. Furthermore, developments in digitalization and autonomous driving create opportunities for innovative mobility services such as car sharing and on-demand transport, which can contribute to reducing emissions through shared vehicle use or the bundling of transport.

The Commission of Experts therefore recommends:

- Appropriate measures should be taken to quickly realize a sufficiently high CO₂ price to reduce the attractiveness of conventional combustion engines and at the same time give companies planning security regarding the marketability of e-mobility and the future development of alternative drive systems.
- The system of taxes and charges should be fundamentally reformed by reducing flat-rate taxes, such as vehicle tax, and instead levying more usage-based charges, such as tolls and parking fees.
- The supply of CO₂-neutral electricity should be increased through the expansion of renewable electricity sources.
- Electricity should be exempted from additional financial burdens without a steering effect, such as the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz, EEG) levy and the electricity tax, to keep electricity prices low.
- The development of new types of batteries with a lower ecological footprint should be vigorously promoted.
- The current purchase premium system for the purchase of electric cars should be phased out by 2025 as planned.
- Plug-in hybrids should be immediately excluded from purchase premiums, as they perform significantly worse in the environmental balances than battery-electric vehicles.
- Pricing of CO₂ and other externalities should be achieved through a combination of a CO₂ price and a correspondingly adjusted petrol/diesel tax.
- Section 50 of the Passenger Transport Act (Personenbeförderungsgesetz, PBefG) should be reformed so that municipalities can exert less influence on the providers of bundled on-demand transport.

B3 Innovations in the platform economy

Digital platforms orchestrate the interaction of different stakeholder groups and enable the development of innovative business models as well as new products and services. Companies that use digital B2B platforms see many advantages for their own innovation activities, for example, through simplified access to data or the integration of external partners in the innovation process. The potential for value creation by means of B2B platforms and especially using data-based platforms in the industrial sector is estimated to be high for the German economy.

It is important to leverage this potential and avoid a drain of value creation to the large B2C platforms from the USA and China that are increasingly penetrating the B2B sector. The Commission of Experts therefore recommends:

- The requirements of the Public Sector Information Directive and measures of the Open Data Strategy should be implemented quickly and consistently.
- The Federal Government is requested to review the progress of GAIA-X in a timely manner and at regular intervals. If it becomes apparent that GAIA-X is falling significantly and permanently short of the targets set, funding should be adjusted accordingly.
- The framework conditions for data intermediaries in the planned Data Governance Act should be designed in such a way that stakeholders have an incentive to offer such intermediary services and high-quality services are ensured.
- To increase trust in B2B platform ecosystems, the creation of B2B platforms that companies operate and design collaboratively should be encouraged.
- Data literacy training should be further reinforced. Against this background, the Commission of Experts welcomes the extension of the go-digital support programme until the end of 2024 and in particular the newly included go-data module.
- Based on the welcome regulations in the German Act Against Restraints of Competition Digitalization Act (GWB-Digitalisierungsgesetz) and in the planned Digital Markets Act (DMA) for the improvement of data portability and interoperability of digital platforms, suitable criteria must be developed in order to be able to check the implementation of these regulations.
- The Federal Government and the European Commission should advocate for uniform platform regulation throughout the EU.
- It is necessary to evaluate the regulatory measures such as the tenth GWB amendment or the DMA for their innovation effects after their introduction. The emergence of similarly high market concentrations as in the B2C sector should be prevented.

B 4 Digital transformation in the healthcare system

The digitalization of the healthcare system is associated with great potential for innovation and value creation regarding better quality and more efficient healthcare. In particular, the increasing availability of health data in combination with new digital analysis methods creates opportunities for more personalized diagnostics and treatment. In international comparison, Germany lags far behind in the digitalization of the healthcare system.

The Commission of Experts recommends the following measures to reduce existing barriers and to be able to leverage the innovation potential associated with digitalization:

- The digitalization strategy for the healthcare system announced in the coalition agreement should be developed and implemented quickly. All relevant stakeholders should be involved in the development. A coordinating body with the broadest possible enforcement powers should be created or commissioned for implementation.
- To enable an efficient and frictionless exchange of data and information and to ensure interoperability between IT systems, sufficient space must be given to the establishment of interoperable and international standards as part of the digitalization strategy for the healthcare system.
- The GDPR-compliant scientific use of health data, to which the Commission of Experts feels the Health Data Use Act (Gesundheitsdatennutzungsgesetz) announced in the coalition agreement can contribute, should be designed for researchers in such a way that the administrative burden is as low as possible.
- It is welcome that a GDPR-compliant electronic patient record (ePR) is to be made available to all insured persons via opt-out. To be able to leverage the potential associated with ePR data, the possibility of releasing the data, especially for research purposes, should be designed to be as low-threshold as possible.
- For the possibilities of telemedicine to be used more, sufficient financial incentives are required for the service providers. Where this is not the case at present, equal services should therefore be remunerated equally in the introductory phase.
- Digital health applications (DiGA) must present various proofs of medical evidence, among other things, as part of the approval process. Although this is a mandatory requirement for ensuring quality healthcare, the introduction of flexible, adaptive study designs and requirements should be explored. After approval, the functionality and effectiveness of the digital health applications should be continuously monitored.
- To provide incentives for quality improvement on the part of the digital health applications providers and to guarantee the quality of the digital health applications, suitable performance-based remuneration models should be introduced.

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