



Federal Ministry
for Economic Affairs
and Energy

Lightweighting Strategy for Germany's industrial sector

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Introduction

Lightweighting is a holistic design philosophy. It aims to save weight, material and energy while also ensuring, and even improving, the performance and efficiency of components and entire systems. This is achieved through load reduction and a switch to new construction materials. By reducing mass and the amount of material needed, and by using the right lightweight design, components' carbon footprint can be significantly reduced before, during and after operation. Lightweight technologies offer unique opportunities for optimising manufacturing processes around economic, ecological, social, and technological factors, thus making these processes as sustainable as possible. In this way, lightweighting can make a decisive contribution to the Federal Government's climate, environmental, resource-protection, and sustainability objectives and targets.

The Lightweighting Strategy is to complement the existing activities and programmes of the Federal Ministry for Economic Affairs and Energy, such as the [Industrial Strategy 2030](#), and also activities conducted as part of the Ministry's [raw materials policy](#), [energy research policy](#), [digitisation policy](#), [Industry 4.0](#), [climate action](#), and [sustainability policy](#).

Combining digital tools with innovative materials and production methods and processes opens up a new horizon for industrial applications in Germany, makes traditional industries fit for the future, and ensures that they remain able to compete internationally in the field of lightweighting and its many fields of application, which include the energy sector, electric mobility, aviation and maritime technologies. Where complex geometrical lightweight structures are being developed,

additive manufacturing can be integrated into the production process to allow for new designs that would have been impossible or highly difficult and costly to achieve using traditional methods. Lightweighting and additive manufacturing are thus two key-enabling technologies that complement each other extremely well.

In times of ever greater resource scarcity and growing global demand for mobility, sustainability, prosperity and convenience, lightweighting is more important than ever and gives rise to expectations for additional employment and tremendous economic output. Germany is one of the world's strongest exporters and finds itself in an excellent starting position thanks to its outstanding lightweighting expertise in the country's academic research and development, and also in its homegrown industrial developments in products, methods, processes, manufacturing and end-of-life management.

This Lightweighting Strategy developed by the Federal Ministry for Economic Affairs and Energy wants to make Germany a successful lead provider of innovative lightweight technologies and lightweight solutions across the world, and to put German companies, especially SMEs, in a strong position on the markets of tomorrow and beyond. This will strengthen and modernise German industries in a lasting way and safeguard the competitiveness of German companies and high-wage industrial jobs in Germany.

Lightweighting has an important role to play across various sectors. In the construction industry, for instance, urbanisation demands that buildings be constructed based on thinner and more

lightweight structures, but still be stronger and firmer than ever before. This can only be achieved by using new lightweight construction materials. Another example is the mobility sector. New lightweighting concepts are important for electric mobility. A rise in expectations with regard to comfortable driving and safety within the vehicle, but also stricter carbon reduction targets, call for a holistic approach to lightweighting that spans across the vehicle's entire life cycle. This includes proper recycling of the lightweight components to keep valuable materials in the cycle. This requires a high level of innovation and forward-looking ideas that will make the industrial sector both competitive and sustainable. After all, the process of technological transformation and the trend towards sharing knowledge and information are continuing at unabated speed. The Federal Minister for Economic Affairs and Energy has responded to this development by presenting the Industrial Strategy 2030 (published in November 2019), and by announcing a Lightweighting Strategy.

Between March 2019 and March 2020, the Federal Ministry for Economic Affairs and Energy used its [lightweighting initiative](#) to conduct an open and interactive strategy process on lightweighting. As part of this process and as commissioned by the Federal Ministry for Economic Affairs and Energy, the office of the Lightweighting Strategy organised three consecutive workshops with relevant stakeholders from the lightweighting community (companies, business associations, scientists, and other stakeholders) to invite them to bring their expertise to the table and express their needs by making recommendations for a lightweighting strategy.

Altogether, 350 experts from different sectors fed in their specific insights. Around two thirds of them were industry representatives. The result of this process is the [Key-points paper 'Lightweighting prospects for Germany'](#). The proposals made by the stakeholders involved in the strategy process were consolidated mainly by industry and lay out different fields of actions, complete with core objectives and measures, thus providing for a needs-based and informed foundation for this Lightweighting Strategy.

In the following, eight packages of measures are set out and briefly introduced. These form the heart of the Ministry's Lightweighting Strategy and serve as guidance for action. The desired outcomes are also described in brief. For each measure, the document refers to the activities the Ministry wants to take so as to achieve these outcomes. In the Annex, you will find an overview of existing funding and support options provided by the Ministry that are relevant to lightweighting. This document does not compromise or alter the content of the Key-points paper that was published by the stakeholders from business and science.

Lightweighting strategy – 8 packages of measures

Package of measures 1

Optimising the public-sector funding web-site for start-ups and SMEs

Package of measures 2

Expanding the light-weighting network and strengthening PR work

Package of measures 3

Shaping and promoting vocational training and continuing education in the field of sustainable light-weighting technologies

Package of measures 4

Swiftly strengthening technology transfer through standardisation and harmonisation

Package of measures 5

Establishing focal areas for sustainable lightweighting

Measures 6

Promoting the development of methods for digitising light-weighting

Measure 7

Coordinating the establishment of digital infrastructure for resource-efficient developments in lightweighting

Measure 8

Using lightweighting as a technical means of putting the Federal Government's energy transition into practice

Package of measures 1

Optimising the public-sector funding website for start-ups and SMEs

Any effective funding policy action requires transparency with regard to funding options and fields relevant to lightweighting, as well as streamlined application and reporting processes. This can only be achieved if there is legal certainty around new types of research cooperation and if funding programmes are flexible and adjustable enough to allow for innovation to be sped up. The establishment of project cascades over different technology readiness levels (TRL) should be as simple as possible.

Goal/Impact

In the short term, an improvement of the funding-policy framework is to be made, with a focus on the needs of small and medium-sized enterprises (SMEs). This is to help foster technology transfer, remove obstacles that prevent SMEs from getting involved in R&D programmes, and allow these companies to become involved in the national, strategic innovation process at an earlier stage and therefore adopt a steering position. In the medium term, this is to build lightweighting expertise within the Mittelstand and lay a solid basis for a continuous transfer of technology and knowledge from science to business. This is to be achieved across different materials and sectors. The objective is to considerably shorten time to market. More inventions need to be turned into innovative products and services.

Action to be taken by the Federal Ministry for Economic Affairs and Energy

In order to implement the package of measures, the Federal Ministry for Economic Affairs and Energy is planning

- to swiftly adjust the [Lightweighting Technology Transfer Programme \(TTP LB\)](#) to improve the situation of SMEs/start-ups that apply under the programme
- to optimise coordination between the Ministry's various funding programmes related to lightweighting, particularly with a view to providing targeted funding for project cascades across several different TRLs. The focus is on the following selected funding programmes (detailed information can be found in the annex):
 - [Collective Industrial Research programme](#)
 - [EXIST Business Start-up Grant/EXIST Transfer of Research](#) (<https://www.exist.de/DE/Home/inhalt.html>)
 - [7th Energy Research Programme](#)
 - [Maritime Research Programme](#)
 - [‘LuFo’ aviation research programme](#)
 - [New vehicle and systems technologies \(NFST\)](#)
 - [Supporting electric mobility in the context of lightweighting](#)
- to establish a digital guide listing all funding programmes relevant for the horizontal task of lightweighting
- to provide more funding for additive manufacturing
- to engage in greater dovetailing with the [Cleantech Initiative for Eastern Germany](#) via the lightweighting initiative including TTP LB; synergies with the Ministry's strategies for better efficiency, such as the National Energy Efficiency Action Plan (NAPE) 2.0.

Package of measures 2

Expanding the lightweighting network and strengthening PR work

Professional, focused marketing and more frequent and stronger political flagship events such as the existing Lightweighting Summit, which is hosted during the HANNOVER MESSE, complete with other measures to raise awareness for the economic and ecological need for lightweighting is to establish lightweighting as a trademark for sustainable innovation. This includes the continuation of transparent, user-specific communication around lightweighting policy at national, European, and international level – something that could be supported by long-term jobs becoming available within the ‘technology transfer points’ or ‘centres of excellence for lightweighting’. The sharing of best practices leading to a transfer of technology and knowledge, and mutual changes of perspective between the administrative/political side and start-ups/SMEs/science should be intensified. Beyond this, European and international networking is to be strengthened as part of the work to find and harness synergies, integrate lightweighting into industrial applications, and build strategies around it.

Goal/Impact

In the medium term, this short-term measure is to lay the basis for early and intensive networking between business (especially SMEs) and research on matters related to lightweighting.

Furthermore, stakeholders should become aware of the social relevance of lightweighting, thus allowing for lightweighting options and production measures to be routinely explored and included into new development processes, ideally from the very start. Finally, this measure will also lay or improve the basis for the highest-ranking decision-makers in business, science, and government to be able to portray and clearly highlight the importance of lightweighting for a low-emission, sustainable economy that is also strong.

Action to be taken by the Federal Ministry for Economic Affairs and Energy

In order to implement the measure, the Federal Ministry for Economic Affairs and Energy will examine

- whether and to what extent lightweighting can be better established within the Mittelstand 4.0 Centres of Excellence – a step that would further improve the transfer of knowledge and technology across different industries and materials
- whether it is possible to establish a platform allowing for national lightweighting capacity (especially in the field of additive manufacturing) to be used in the event of supply-chain disruption

- whether ‘best-in-class’ centres of innovation could be established to support the development of innovation and to support systematic forms of knowledge gathering
- whether the Ministry’s lightweighting initiative can be developed in a way that establishes greater networking between those practicing lightweighting at European and at international level
- to what extent the TTP LB format can be expanded to allow for European cross-border lightweighting projects to receive more targeted funding
- how existing instruments in the Ministry’s toolbox can be better used to encourage networking with lightweighting partners at European and international level. This particularly includes an assessment as to
 - how lightweighting can be better built into the Ministry’s [Market Entry Programme \(MEP\)](#) and how funding could be provided for this
 - how lightweighting activities conducted by German companies on international markets, especially in Asia and North America, could be supported by the Ministry
- how lightweighting can be better fed into multilateral forums, such as the [United Nations Global Compact 2021 Leaders Summit](#)
- how lightweighting ‘made in Germany’ can be better showcased at international trade fairs and how this can be supported by the Ministry via its Foreign Trade Fair Programme (AMP). Industry-specific fairs and other special formats should also be considered for this.
- whether the inclusion of domestic trade fairs related to lightweighting in the [‘programme to promote the participation of young, innovative companies in leading international trade fairs in Germany’ \(MjiU\)](#) could help support start-ups enter new international markets. This should include new formats (such as LightCon).
- whether and to what extent the [Africa Business Network](#) can make a contribution towards a potential market entry in African countries

Package of measures 3

Shaping and promoting vocational training and continuing education in the field of sustainable lightweighting technologies

Political backing is to be given to the efforts made by business and science to develop lightweighting-related qualification concepts and measures and to include these in practical training across all levels of the education system. To this end, it is necessary to support the uptake of modern instruments (e.g. eLearning) and the transfer of new fields of research (cross-scale simulation, digital twins, 3D printing etc.) into lightweighting training. Lightweighting platforms and networks are to be expanded and encouraged to disseminate knowledge within their target groups. Systemic thinking and problem-solving skills should be consistently trained and encouraged in schools, vocational training, higher education, and continuing education. 'Lightweighting scholarships' for national and international courses can be a potential building block in this.

Goal/Impact

Within the medium term, top-level training and continuing education on lightweighting should be available in schools, universities, in non-university training settings and in the commercial field, so as to form a broad and sustainable basis for innovative lightweighting made in Germany.

Action to be taken by the Federal Ministry for Economic Affairs

In order to implement the measure, the Federal Ministry for Economic Affairs and Energy, which is responsible for regulating the relevant dual vocational training courses, will examine

- together with the experts involved in the process to change the rules and regulations that apply for specific courses of dual vocational training, how skills related to lightweighting could be included in the modernised training regulations
- whether it could be possible to establish a pool of best-practice examples that could be used in training and continuing education in schools, universities, non-university training settings and in the commercial field in Germany

Course units for metalworkers, for instance, are already being offered as part of the cross-company courses to supplement vocational training. These make it possible to also impart and foster trainees' practical skills outside the company and teach them at a uniform level across Germany and in line with the most recent technical developments.

Package of measures 4

Swiftly strengthening technology transfer through standardisation and harmonisation

Successful research and development outcomes are to be turned into successful and swift applications – a process that should be encouraged and supported via new standardisation processes. Furthermore, the creation of neutral bodies tasked with harmonising and publishing standards in business and science is to be supported, especially ones that focus on the assessment of products' environmental footprints and on life-cycle assessment (LCA).

Goal/Impact

A swift provision of standards (e.g. for LCA, environmental footprints etc.) is to pave the way for certified standards to be created in the medium term. This is to speed up the process of establishing lightweight construction in SMEs and stabilise domestic SMEs' competitiveness in the field of lightweighting across different sectors. This industry activity in the pre-certified stage is to speed up processes and improve domestic companies' competitiveness.

Action to be taken by the Federal Ministry for Economic Affairs

In order to implement the measure, the Federal Ministry for Economic Affairs and Energy will examine

- whether and how it might be possible to support the establishment of a neutral body for the pre-normative stage, which would be tasked with drawing up standards for new materials and applications and to speed up time to market
- whether support can be given to foster cooperation with the German Institute for Standardization (DIN) in the field of lightweighting. In this context, it is important to highlight:
 - the Ministry's [WIPANO – Knowledge and Technology Transfer using Patents and Standards funding programme](#) with its two focal areas of promoting cooperation on standardisation and of fostering SMEs' participation in standardisation bodies

Package of measures 5

Establishing focal areas for sustainable lightweighting

In the medium term, the goal is for industry and science to design product development strategies that not only focus on mere product performance, but also incorporate key aspects such as reusability and recyclability, quality assurance methods (especially in disruptive environments), material evaluation and selection at an early stage (e.g. in design for recycling or circular design) and the development of standardised accounting practices for lightweighting. In the long term, industry and science are to develop suitable production technologies and flexible manufacturing concepts for recyclable mono- and multi-material lightweighting (incl. joining technologies that allow for recycling). This paradigm shift will be supported in the best way possible in terms of communication and funding policies. In particular, the establishment and sustainable expansion of cross-sectoral demonstration centres for sustainable lightweighting, especially for the circular economy, are to be advanced and supported.

Goal/Impact

By promoting these development goals, the aim is to develop significant value creation through mono- and multi-material lightweighting in Germany in the medium term, as well as to optimise the ecological impact of the sector through technological progress.

Action to be taken by the Federal Ministry for Economic Affairs and Energy

In order to implement the package of measures, the Federal Ministry for Economic Affairs and Energy will examine

- which adjustments need to be made to the Lightweighting Technology Transfer Programme (German abbreviation: TTP LB) in order to promote sustainable lightweighting even more strongly, especially demonstration centres for the circular economy, and to bring lightweighting into broad industrial use
- in which sectors or which phases of the life cycle there are still specific obstacles to lightweighting that hinder efforts to achieve sustainability and climate goals, and how these obstacles can be minimised
- how companies can be supported in a way that enables them to establish or further expand and consolidate their international edge in terms of sustainability in lightweighting technology ‘made in Germany’, in order to contribute to achieving the goals of the UN’s [2030 Agenda](#) for Sustainable Development
- how the European [Ecodesign Working Plan](#) can be supported to link circular design with increased competitiveness in lightweighting

Measure 6

Promoting the development of methods for digitising lightweighting

Industry and especially science are called upon to develop and provide data-based development methods for mono- and multi-material lightweighting that can be used across all sectors in the medium term, as well as AI-based tools (AI = artificial intelligence) for lightweight system construction. In the long term, the aim is to develop virtual process chains for lightweight system construction and models for computer-based LCA. These developments are to be awarded political support and taken into account in the relevant funding policies.

Goal/Impact

Based on the use of digital twins that can be applied throughout the entire life cycle to optimise processes, procedures and products (in terms of functionality and performance, service life, costs, sustainability, etc.), innovative lightweight solutions can be brought to market faster while using resources more efficiently. The aim is to make the planning of lightweight manufacturing processes (in additive manufacturing in particular) more efficient and to enable processes to be handled more intuitively. It is also to achieve better integration of production preparation and post-processing. In this respect, end-to-end solutions, i.e. continuous digital and consistent process chains, are to be established.

Action to be taken by the Federal Ministry for Economic Affairs and Energy

In order to implement the measure, the Federal Ministry for Economic Affairs and Energy will examine

- whether and to what extent the content of the TTP LB can be expanded in order to further boost digital method development for lightweighting, including in additive manufacturing
- whether [ERP Digitisation and Innovation Loans](#) and the [ERP Mezzanine for Innovation programme](#) are suitable instruments to promote the creation of virtual process chains and computer-based LCA

Measure 7

Coordinating the establishment of digital infrastructure for resource-efficient developments in lightweighting

In the long term, it will be necessary for industry and science to jointly develop and expand databases containing content relevant to lightweighting and to ensure easier access for companies to existing technical equipment for the purpose of recording corresponding data sets. The Federal Government will provide support to ensure that this measure is well coordinated through suitable bodies (e.g. lightweighting centres).

Goal/Impact

The goal of this measure is to create quality-assured databases and platforms for lightweighting concepts, materials, methods and processes that contain both material data and models and offer secure mechanisms for controlled access. These are to be used for the resource-efficient and sustainable development of innovative lightweighting solutions.

Action to be taken by the Federal Ministry for Economic Affairs and Energy

In order to implement the measure, the Federal Ministry for Economic Affairs and Energy will examine

- whether there are already suitable approaches for databases that can be used and expanded to include content relevant to lightweighting
- whether and which bodies already exist that can take on the coordinating role mentioned above, or which steps must otherwise be taken to create such bodies

Measure 8

Using lightweighting as a technical means of putting the Federal Government's energy transition into practice

In the context of building a circular economy, in particular, lightweighting can significantly contribute towards conserving natural resources and reducing greenhouse gases, thus helping to implement the Federal Government's climate goals. Relevant research work can also be supported within the framework of the Energy Research Programme.

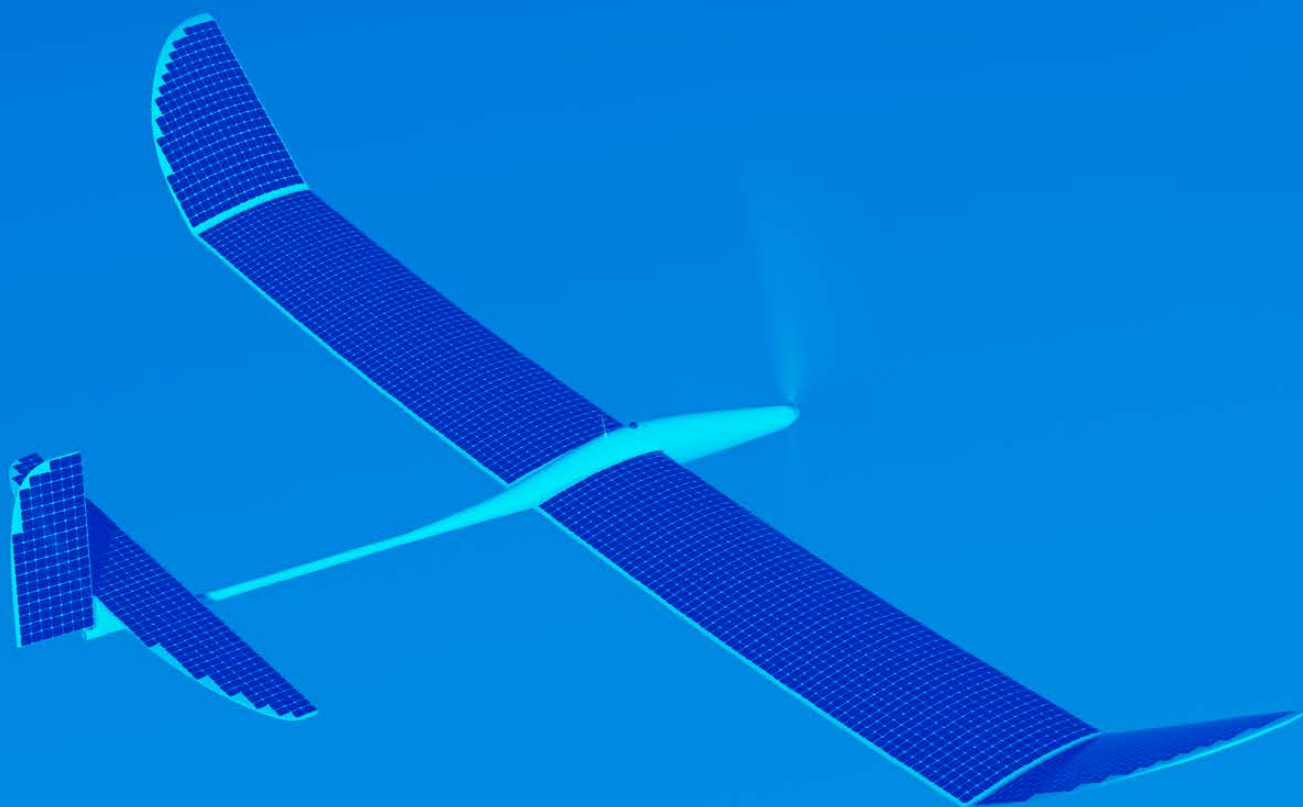
Goal/Impact

Companies that use recyclable lightweight products should be given incentives to invest in such products and to communicate the sustainability of their processes and business models. This can be achieved, for example, through the use of appropriate standardised accounting and reporting systems. The increase in energy efficiency and reduction in carbon emissions that can be realised through lightweighting methods should also be used to implement the goals and measures laid out in the 2050 Energy Efficiency Strategy and the 2030 National Energy Efficiency Action Plan (NAPE 2030).

Action to be taken by the Federal Ministry for Economic Affairs and Energy

In accordance with the Federal Government's 2050 Energy Efficiency Strategy, the funding for investments in energy-efficient plants and processes (Federal funding for energy efficiency in commerce) provided by the Federal Ministry for Economic Affairs and Energy will in future be directed towards resource efficiency. In this context, it will be important to appropriately supplement the corresponding funding programmes. For example, projects related to the energy transition that are funded by the TTP LB can pave the way for further investment funding and speed up the transfer of innovative lightweight technology into practice. This will be decisive when it comes to designing and further developing the corresponding funding instruments.

Outlook



From the perspective of business and science, Germany – as a leading supplier of innovative lightweight technologies – should respond to the challenges of global markets even more rigorously than in the past. In addition to cutting-edge technologies, this requires strategies that address research and general industrial policy aspects, as laid down in the Industrial Strategy 2030 of the Federal Ministry for Economic Affairs and Energy. Furthermore, trade and raw materials policy aspects also need to be explicitly taken into account, as set out in the raw materials strategy of the Federal Ministry for Economic Affairs and Energy. Such aspects include, for example, considerations on securing and keeping valuable raw materials and material resources within the country. The basis for this could be provided by intelligent cradle-to-cradle or circular economy concepts using digital technologies where necessary.

Lightweighting should take on an important role in the context of implementing the 2030 Climate Action Programme and the Federal Government's economic stimulus programme to overcome the economic crisis caused by the coronavirus pandemic.

Furthermore, lightweighting should be used to help implement the European Green Deal initiative with the aim of strengthening the resilience of the economy and of SMEs in particular, while seeking to build a more sustainable economy. Therefore, future funding and policies for lightweighting should take into account the Circular Economy Action Plan which is central to the European Green Deal.

Continuous material and process innovations for lightweighting are key to ensuring integrated value

creation in Germany and Europe. This makes it necessary to step up training and further education in lightweight technologies and to better adjust the training programmes to the real needs of industry and the current progress in research. Beyond this, it needs to be possible to comprehensively map the lightweighting expertise required in fully digitised and integrated value chains.

To become an international leader in lightweight technologies, Germany's lightweighting community needs to exert stronger influence on international standardisation processes.

At the same time, efforts are being undertaken to further strengthen the identity of lightweighting as a driving force for safeguarding Germany's competitiveness and to communicate this internally and externally.

The current Lightweighting Strategy of the Federal Ministry for Economic Affairs and Energy will be reviewed and amended every three years under the Ministry's lightweighting initiative in cooperation with its advisory bodies to continue the interactive and very successful dialogue established between industry, science and government. In the future, such advisory bodies will continue to act as a link between the expert community and policy-makers and provide both advice and support for implementation, e.g. through expert groups that are convened on specific occasions or to discuss particular topics.

In the next legislative term of the German Bundestag, the strategy is to be further developed and implemented in a comprehensive manner in cooperation with all federal ministries concerned while continuing to involve the expert community.

Annex

Selected funding programmes and other support measures related to lightweighting at a glance

Lightweight Technology Transfer Programme (TTP LB)

New Vehicle and System Technologies (NFST)

Funding for applied non-nuclear research under the 7th Energy Research Programme (ERP) 'Innovations for the Energy Transition'

Collective Industrial Research (IGF)

WIPANO – Knowledge and Technology Transfer using Patents and Standards

ERP Digitisation and Innovation Loan

ERP Mezzanine for Innovation

EXIST Business Start-up Grant

EXIST Transfer of Research

'LuFo' aviation research programme

Maritime Research Programme

Innovative Shipbuilding Safeguards Competitive Jobs

Market Entry Programme (MEP)

Foreign Trade Fair Programme (AMP)

Programme to promote the participation of young innovative companies in leading international trade fairs in Germany (MjiU)

Lightweight Technology Transfer Programme (TTP LB)



Financial framework

Approx. €70 million per year



Five funding lines

- Technology development
- Resource efficiency and substitution
- New materials
- Demonstration projects
- Standardisation



Application

Two deadlines per year – 1 April and 1 October Two-stage application procedure – 1) project outline, 2) if approved, application



Contact and further information

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Further information at <https://www.bmwi.de/Redaktion/DE/Artikel/Technologie/technologietransfer-programm-leichtbau.html>

New Vehicle and System Technologies (NFST)



Financial framework

Approx. €90 million per year



Two programme categories

- Automated driving
- Innovative vehicles

The specialist programme entitled 'New Vehicle and System Technologies' (NFST) provides funding for R&D projects on applied lightweight vehicle construction (rail and road transport) within the 'Innovative vehicles' category, under the priority area 'Increasing Efficiency through Lightweighting'. Eligible for funding are collaborative projects focusing on material-appropriate design (ensuring safety, dynamics, economic efficiency and functionality), production methods in lightweight vehicle construction as well as simulation and modelling methods up to TRL 7.



Application

Two deadlines per year – 1 April and 1 October Two-stage application procedure – 1) project outline, 2) if approved, application



Contact and further information

TÜV Rheinland Consulting GmbH
Project Management Bodengebundene Verkehrstechnologien
(ground-based transport technologies)

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Phone: +49 221 806-4158

Further information at www.fahrzeugtechnologien.de

Funding for applied non-nuclear research under the 7th Energy Research Programme (ERP) ‘Innovations for the Energy Transition’



Financial framework

Approx. €577 (disbursements in 2019)



Funding lines/funding priorities

Four funding lines, containing a total of 18 points and regulatory sandboxes:

- Energy use, for example in the area of industry and commerce
- Energy supply, for example in the area of wind energy
- System integration
- Cross-system research topics

Funding formats:

Regulatory sandboxes of the Energy Transition

Applied research usually undertaken by a network of SMEs, large companies and research institutions



Application

Applications can be submitted throughout the year

Two-stage application procedure – 1) project outline, 2) if approved, application



Contact and further information

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Phone: +49 2461 61-1999

Further information at <http://www.energieforschung.de/>

Collective Industrial Research (IGF)



Financial framework

Approx. €180 million per year



Funding priorities

Open to all sectors and technologies

The Collective Industrial Research (IGF) programme provides funding for pre-competitive research projects undertaken by research associations that are relevant for SMEs. The programme is open to all topics and sectors. Projects that are relevant to lightweighting are also eligible for funding. A series of measures have been put in place to ensure the participation of SMEs. These include action to ensure that the research results are published and made available to all interested companies. The research associations identify the research needs of SMEs within their respective sector/ area of expertise and select the projects for which they will submit a funding request. A 'project support committee' representing a predetermined number of SMEs is set up for each project. The research institutions carrying out the project involve the committee throughout the execution of the project to ensure that the research activities are geared towards the needs of the SMEs.



Application

The 100 members of the German Federation of Industrial Research Associations (AiF) are eligible to apply and can submit an application for expert assessment to the AiF at any time. Each application is assessed by several experts and ranked with a maximum score of 40. According to the ranking, the applications are submitted to the Federal Ministry for Economic Affairs and Energy for approval. The Ministry examines them on the basis of the expert opinions and looks at whether they conform to the guidelines. It approves the applications according to the funds available.



Contact and further information

For administrative support: AiF Arbeitsgemeinschaft industrieller Forschungsvereinigungen 'Otto von Guericke' e.V.
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 Fax: +49 221 37680-27
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WIPANO – Knowledge and Technology Transfer using Patents and Standards



Financial framework

€20 to 21 million per year (2021 – 2023)



Five funding priorities

- Public research – promotion of the utilisation of research findings
- Public research – further development of inventions
- Companies – patenting
- Knowledge transfer through standardisation
- Companies – standardisation



Application

Applications can be submitted throughout the year

Two-stage application procedure – 1) project outline, 2) if approved, application



Contact and further information

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Further information at www.wipano.de

ERP Digitisation and Innovation Loan



Financial framework

Planned funding for 2021: €1,600 million

Share of which available for 70% liability release: €200 million



Funding priorities

The ERP Digitisation and Innovation Loan provides funding of a maximum of €25 million to meet the financing needs (investments and working capital) associated with a digitisation and innovation project. In addition to specific digitisation projects, innovative projects seeking to develop new or enhanced products, processes or services are eligible if they meet further requirements, such as above-average company growth and high R&D spending.

Funding will be provided for small and larger medium-sized enterprises with a group turnover of up to €500 million. The loan offers optional liability release of up to 70% and includes a grant element.



Application

Applications can be submitted to KfW Bankengruppe via the customer's bank/financing partner (free selection) prior to the start of the project.



Contact and further information

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Email: info@kfw.de

Further information at <https://www.foerderdatenbank.de/FDB/Content/DE/Foerderprogramm/Bund/BMWi/erp-digitalisierung-innovation-bund.html>

ERP Mezzanine for Innovation



Financial framework

Share of which available for debt capital:
€240 million and for subordinated capital:
€160 million



Funding priorities

The ERP Mezzanine for Innovation programme also provides SMEs with an integrated financing package of debt capital and subordinated capital for projects that are undertaken to develop new products, processes and services. The projects must be different from the state of the art in the EU and be new to the company. The core aspects of the innovation must be in-house.



Application

Applications can be submitted to KfW Bankengruppe via the customer's bank/financing partner (free selection) prior to the start of the project.



Contact and further information

KfW Bankengruppe
Palmengartenstraße 5-9
60325 Frankfurt am Main
Phone: +49 800 5399001
Email: info@kfw.de
Further information at <https://www.foerderdatenbank.de/FDB/Content/DE/Foerderprogramm/Bund/BMWi/erp-mezzanine-innovation-bund.html>

EXIST Business Start-up Grant



Financial framework

€30 million per year



Funding priorities

Open to all technologies

The EXIST Business Start-up Grant is provided to students, graduates and scientists to support the preparation of innovative technology-oriented and knowledge-based start-up projects (prototype, business model, market preparation and business financing).



Application

Applications can be submitted throughout the year

One-step application procedure via universities or research institutions

Project start: from 3 months after receipt of application



Contact and further information

Projektträger Jülich (PtJ)

Geschäftsstelle Berlin

Postfach 610247

10923 Berlin

Information hotline: +49 30 20199-411

Email: ptj-exist-gruenderstipendium@fz-juelich.de

Further information at www.exist.de

EXIST Transfer of Research



Financial framework

€50 million per year



Funding priorities

Open to all technologies

EXIST Transfer of Research supports outstanding research-based start-up ideas from the scientific community based on two phases of funding.

Funding phase 1: Undertaking development work to demonstrate technical feasibility, manufacturing and testing prototypes, preparing business plan and setting up the company

Funding phase 2: Undertaking development work up to the stage of market maturity, taking actions to prepare the commencement of business of the new technology company, and creating the basis for securing external funding for the business



Application

For **funding phase 1:** Two-stage application procedure via universities and research institutions, submission of project outlines by 31 January and 31 July each year

Project start: from six months after date for submission of applications

For **funding phase 2:** Single-stage application procedure, six months before the end of funding phase 1, application must be submitted by the newly established company

Contact and further information

Projektträger Jülich (PtJ)

Geschäftsstelle Berlin

Postfach 610247

10923 Berlin

Information hotline: +49 30 20199-411

Email: ptj-exist-forschungstransfer@fz-juelich.de

Further information at www.exist.de

‘LuFo’ aviation research programme



Financial framework

Approx. €180 million per year



Funding lines/funding priorities

Eligible for funding are R&D projects on the aircraft as an overall system (fixed and rotary wing aircraft).

Funding priorities (see announcement):

- Passenger-friendly and eco-efficient cabin
- Powerful, safe and energy-efficient systems
- Quiet and efficient drives
- Structures and construction methods
- Flight physics
- Safe, efficient and environmentally sound aviation processes, flight guidance and air traffic control
- Environmentally friendly aviation
- Development of alternative drive concepts
- Mobility of the future
- Strengthening the competitiveness of SMEs, international diversification of supplier industry
- Industry 4.0, AI/Trusted AI



Application

Applications can be submitted within the scope of announcements or calls under the Aviation Research programme VI (published in the Federal Gazette);
New announcement LuFo VI-2 Autumn 2020

Two-stage application procedure – 1) submission of project outline, 2) external review, selection and ranking of project outlines, call for applications



Contact and further information

The following project management agency (PT) was commissioned as administrative assistant for the implementation of the funding measure:

Projekträger Luftfahrtforschung (PT-LF)
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
Königswinterer Straße 522 – 524
53227 Bonn

Further information at www.luftfahrtforschungsprogramm.de

Maritime Research Programme



Financial framework

In 2020, the Maritime Research Programme provided funding worth €48 million for the maritime industry. For the following years, the 2020 2nd supplementary budget provides for an increase of €20 million per year.



Funding lines/funding priorities

The programme aims to strengthen the innovative potential of the maritime sector in the face of international competition by promoting innovative maritime technology solutions and applications. It further seeks to safeguard and increase forward-looking jobs in Germany while fostering climate change mitigation and environmental protection. Eligible for funding under this programme are projects focusing on research work and technological developments in conventional industry segments including shipping technology, production of maritime systems, and shipping.

Funding priorities:

- Environmentally friendly maritime technologies (MARITIME.green)
- Maritime digitisation and smart technologies (MARITIME.smart)
- Maritime safety (MARITIME.safe) and
- Maritime resources (MARITIME.value)



Application

Applications can be submitted within the scope of the funding announcements following a two-stage-procedure. The first stage involves the submission of a project outline (see information on project outlines). In the second stage – after positive evaluation of the outline – formal funding requests can be submitted electronically via ‘easy-Online’.



Contact and further information

Ms Elke Proß

Phone: +49 30 20199-507

Email: pross@fz-juelich.de

Further information at www.bmwi.de/Redaktion/DE/Textsammlungen/Technologie/Schluesseletechnologien/forschung-entwicklung-innovation-in-der-maritimen-wirtschaft.html

Innovative Shipbuilding Safeguards Competitive Jobs



Financial framework

One third of the funding programme is co-financed by the respective federal state in which the applicant shipyard is based. As part of the economic stimulus package, the federal share of innovation funding will be significantly increased (from €25 to €45 million per year).

German shipyards can apply to the Federal Office of Economic Affairs and Export Control (BAFA) for a grant covering up to 50% of their costs for investment, design, engineering and testing.



Programme lines/funding priorities

The funding programme is a key element for boosting the competitiveness of the maritime industry in Germany. German shipyards specialise in special shipbuilding – a sector where the risks of technical or economic failure are particularly high, which is equally true for every innovation measure being undertaken in this field.

Shipbuilding innovations must be successful right when they are applied for the first time. The pro-rata grant awarded to cover innovation costs provides the necessary incentives for shipyards to assume the risks associated with the industrial use of shipbuilding innovations.

Eligible for funding are:

- new ship types
- new ship components and systems, and
- the development or application of new shipbuilding processes



Application

Applications for funding can be submitted to BAFA at any time



Contact and further information

BAFA

Referat 423

Ms Jana Knackstedt

Phone: +49 6196 908 2032

Further information at [www.bafa.de/DE/Wirtschafts Mittelstandsfoerderung/Handwerk Industrie/Innovativer Schiffbau/innovativer schiffbau node.html](http://www.bafa.de/DE/Wirtschafts_Mittelstandsfoerderung/Handwerk_Industrie/Innovativer_Schiffbau/innovativer_schiffbau_node.html)

Market Entry Programme (MEP)



Financial framework

A total of €10 million per year (open to all topics and sectors)



Programme lines/funding priorities

The Market Entry Programme operated by the Federal Ministry for Economic Affairs and Energy supports small and medium-sized enterprises in opening up and securing foreign markets. The MEP was launched in 2012 and covers many relevant topics and target markets. The standardised services offered by the programme can be used in a flexible and needs-based manner.

The programme is open to all topics and sectors. Priority areas and topics include:

- Export initiatives: environmental technologies; civil security technologies and services; healthcare
- Construction (incl. **lightweighting**)
- Various industry and technology topics (incl. lightweighting)



Application

The programming is based on a competition of ideas from all stakeholders involved with German government measures to promote foreign trade and investment, and on a market and opportunity assessment carried out in cooperation with GTAI.



Contact and further information

Geschäftsstelle Markterschließung für KMU

Germany Trade & Invest

Villemombler Straße 76, 53123 Bonn

Phone: +49 228 24 993-308

Email: mep@gtai.de

Further information at www.ixpos.de/markterschliessung

Foreign Trade Fair Programme (AMP)



Financial framework

€45.5 million (2020)



Programme focus/objectives

The participation of German businesses in trade fairs abroad is one of the most important and effective instruments of German industry's export marketing. Foreign trade fairs offer a platform for buying and selling, making investments and boosting cooperation abroad, and are highly valued as forums for exchanging information and establishing contacts. Even companies operating only within Germany use foreign trade fairs to gather information about market trends, product innovations and technological changes.

Through its official participation in selected trade fairs and exhibitions abroad, the Federal Republic of Germany paves the way for the successful use of this marketing tool. Companies and SMEs in particular, can use Germany's joint stands at favourable conditions to present their businesses under the 'made in Germany' brand. In addition to a joint stand, exhibitors benefit from further trade-fair-specific support measures and services.

The AMP is open to all business sectors. The foreign trade fairs which Germany participates in are selected in close cooperation with the Association of the German Trade Fair Industry (AUMA) which coordinates the interests of industry and takes into account the special needs of small and medium-sized enterprises. Of the approximately 3,000 foreign trade fairs that take place outside the EU (according to the AUMA trade fair database) that are of supraregional or international significance, around 300 are included each year within in the Federal Ministry for Economic Affairs and Energy's AMP.



Application

No application is required. Interested companies wishing to exhibit products 'made in Germany' can simply register with a company responsible for the implementation of the trade fair, which also acts as the central contact for all organisational matters.



Contact and further information

Bundesamt für Wirtschaft und Ausfuhrkontrolle
(Federal Office for Economic Affairs and Export Control)

Referat 414 – Außenwirtschaft, Messen

Frankfurter Straße 29 – 35

65760 Eschborn

Phone: +49 6196 908-2669

Email: amp@bafa.bund.de

Ausstellungs- und Messe-Ausschuss der Deutschen Wirtschaft e.V.

(Association of the German Trade Fair Industry)

Littenstraße 9

10179 Berlin

Phone: +49 30 24000-0

Email: info@auma.de

Further information at www.auma.de/de/ausstellen/foerderungen/foerderungen-im-ausland

Programme to promote the participation of young innovative companies in leading international trade fairs in Germany (MjiU)



Financial framework

€2.5 million (2020)



Programme orientation/objectives

This programme operated by the Federal Ministry for Economic Affairs and Energy enables German companies to participate in leading international trade fairs in Germany at favourable conditions. The aim of the programme is to specifically promote the new product and process developments of young innovative companies by supporting their participation in trade fairs. The export-oriented leading German trade fairs provide an excellent platform for breaking onto international markets and hence for the growth of young innovative companies in Germany.

The programme is based on the 'Guidelines for the Promotion of the Participation of Young Innovative Companies in Leading International Trade Fairs in Germany'. Funding support is available to companies with their registered office and business operations in Germany that have developed new or significantly enhanced products, processes and services and have launched them on the market. The new developments or improvements must differ in essential functions from previous products, processes or services. The company must be working in the industrial or crafts sector and meet the criteria for a small enterprise as defined by the EU.

The selection of trade fairs and events for participation is made annually by the Federal Ministry for Economic Affairs and Energy.



Application

To participate in the joint stand of the supported trade fair, exhibitors must register with the trade fair organiser no later than eight weeks before the start of the trade fair. The registration includes an application for funding required for participating in the trade fair, which must be submitted in writing to the Federal Office for Economic Affairs and Export Control (BAFA).



Contact and further information

Bundesamt für Wirtschaft und Exportkontrolle (BAFA)
(Federal Office for Economic Affairs and Export Control)

Referat 414 – Außenwirtschaft, Messen

Frankfurter Straße 29 – 35

65760 Eschborn

Phone: +49 6196 908-2409

Email: mpiu@bafa.bund.de

Ausstellungs- und Messe-Ausschuss der Deutschen Wirtschaft e.V.
(Association of the German Trade Fair Industry)

Littenstraße 9

10179 Berlin

Phone: +49 30 24000-0

Email: info@auma.de

Further information at www.foerderdatenbank.de/FDB/Content/DE/Foerderprogramm/Bund/BMWi/teilnahme-junger-unternehmen-leitmessen.html

List of abbreviations

AI	Artificial intelligence
AMP	Foreign Trade Fair Programme
ERP	Energy Research Programme, www.energieforschung.de
ERP	Funding programmes from the Special Fund of the European Recovery Programme (ERP), e.g. ERP Digitisation and Innovation Loan of the Kreditanstalt für Wiederaufbau (KfW)
EXIST	‘Business Start-ups in Science’ funding programme, www.exist.de
IGF	Collective Industrial Research
LCA	Life-cycle assessment
MEP	Market Entry Programme for small and medium-sized enterprises, www.ixpos.de/markterschliessung
MjiU	Programme to promote the participation of young innovative companies in leading international trade fairs in Germany
NFST	New vehicle and system technologies funding programme, www.fahrzeugtechnologien.de
R&D	Research and development
SME	Small and medium-sized enterprises
WIPANO	‘Knowledge and Technology Transfer using Patents and Standards’ funding programme, www.innovation-beratung-foerderung.de/INNO/Navigation/DE/WIPANO/wipano.html

