

INDUSTRY OVERVIEW

The Machinery & Equipment Industry in Germany

ISSUE 2025/2026



Germany – Innovative Excellence in Engineering

“We chose Germany as our location because it is our most important market in Europe – mainly due to our collaboration with leading car manufacturers.”

Michael Ryu,
General Manager & Head of Doosan Robotics Europe

Number 1

domestic industry sector by level and degree of innovation

EUR 8.4 bn

total domestic M&E R&D spending in 2023

EUR 263 bn

domestic M&E industry turnover in 2023

2.9%

value added share of German economy gross value added in 2021

10.5%

share of global machinery trade and world's 3rd most important supplier in 2022

81.3%

of machinery turnover generated from international exports in 2023

Machinery & Equipment (M&E) is the second largest and the most innovative industry sector in Germany. It is one of the technological motors that drive the country as a high-tech nation – and one that combines all of the key future technologies (including electronics, robotics, materials, and artificial intelligence).

The M&E sector is developing the climate-neutral manufacturing solutions to help Germany realize its climate goals. The industry will be transformed through the provision of “Carbon Contracts for Difference” to make climate-neutral manufacturing and production economically viable for the industry. The new industry-friendly funding and investment framework will help businesses make the transition to climate-neutral production. In 2023, mechanical and plant engineering was once again the most important driver of growth in German industry. Turnover increased to EUR 262.9 billion – a new record. The fourth industrial revolution is

already in full swing with the country's ambitious Industrie 4.0 initiative and AI deployment is increasing.

Artificial intelligence (AI) is a key technology for the competitiveness of the German economy. A survey by the Ifo Institute in June 2024 showed that the manufacturing industry is one of the pioneers in the use of AI and almost a third of the companies surveyed use AI (2024: 31 percent, 2023: 17.3 percent). AI also has numerous applications in mechanical engineering: predictive maintenance and quality control, automated design and production process optimization, robot control and automation, and real-time monitoring and analysis of machine data. The PwC Manufacturing Barometer 2024 survey of industry decision makers saw AI (52 percent), robotics (42 percent) and 3D printing (38 percent) identified as the most important future-oriented technologies. The importance of AI has subsequently increased by another seven percent since the last survey.

Germany's Machinery & Equipment Industry in Numbers

One of the World's Top M&E Manufacturers

With global machinery trade share of 10.5 percent, Germany's M&E industry sector ranks third behind China and the USA and is one of the world's leading suppliers of machinery. Germany's M&E sector, reached a record turnover of EUR 262.9 billion and also the export value reached a new high of EUR 208 billion in 2023. The EU recorded sales volume of EUR 908 billion in 2023 and machinery exports totaled EUR 618 billion in the same period. A decrease in demand, geopolitical uncertainties, together with high inflation and interest rates have created a difficult business environment for the M&E industry internationally. In the first nine months of 2024 the production of the M&E industry in Europe declined by - seven percent and in Germany by - eight percent compared to the previous year. Germany's VDMA Machinery and Equipment Manufacturers Association also expects a domestic decline in production in 2025.

Most Important Industry Sector

Machinery & equipment is Germany's largest sector by level of activity, boasting over 6,600 companies – of which nearly 90 percent are SMEs – along the value chain. The German M&E industry remains Germany's largest industrial employer: It currently employs a workforce of almost one million people. With total innovation expenditure of over EUR 17 billion in 2022, the M&E industry

counts among the most innovative industry sectors in the country. Within the mechanical engineering sector, the machine tools, conveyor systems and drive/propulsion systems sectors are amongst the most important in terms of annual turnover.

European FDI Magnet

Germany is the preferred M&E investment location in Europe, attracting around 25 percent of all M&E projects. This makes the M&E sector the largest industry sector in inward investment terms, with one in five of all M&E manufacturing and R&D investment projects.



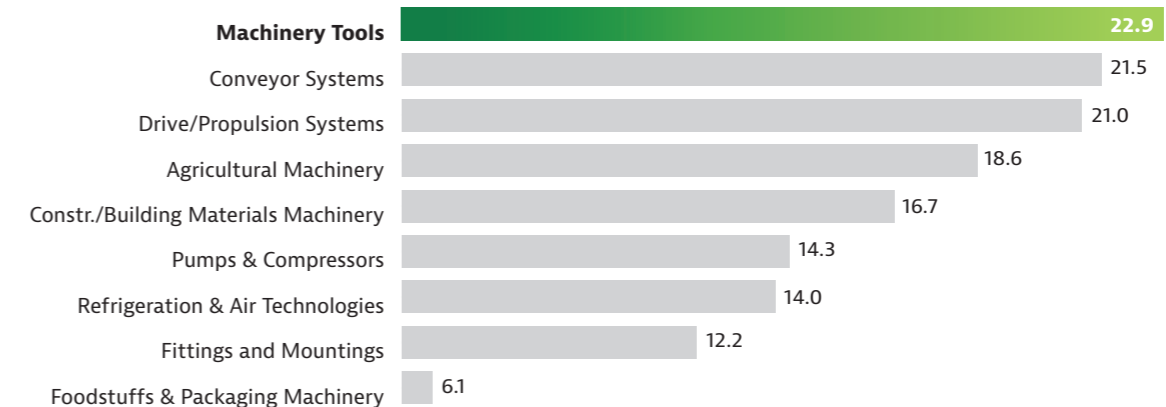
Germany is Europe's No. 1 machinery and equipment FDI location

TOP 5 M&E FDI Destination Countries in Europe number of projects

Destination Country	2020	2021	2022	2023	Total
Germany	101	127	112	57	397
United Kingdom	101	95	48	53	297
France	56	57	28	19	160
Spain	34	39	17	29	119
Poland	25	16	25	28	112
Europe total*	534	554	416	347	1.851

*All European countries
Sources: fDi Markets , GTAI FDI Competence Center, 02/2025

Mechanical Engineering Turnover by Sector 2023 in EUR billion



Source: Federal Statistical Office 2024

New Technology Trends

As the world's leading M&E market, Germany plays a significant part in setting new trends and developments. The country is pioneering the "decarbonization" of industry on the way to climate neutrality. This is being complemented by developments in advanced manufacturing and the deployment of digital and energy-efficient solutions in the future production space.

Additive manufacturing is finding increased industrial application beyond its rapid prototyping origins. According to the Wohlers Report 2024, Germany occupied third spot internationally – behind only the USA and China – in terms of distribution of industrial additive manufacturing installations in 2023. The M&E sector is the major application industry for additive manufacturing. Germany boasts engineering facilities that allow international investors to expand their operations to Europe. The German additive manufacturing market generated a revenue of EUR 2.1 billion in 2023 and is expected to reach EUR 9.9 billion by 2030 according to Grand View Research. The market is expected to grow at a CAGR of 25 percent up to 2030.

Energy-efficient Technology Investment

All industry sectors are increasing their investment in energy-efficient production. This is due in large part to Germany's ambitious "Energy Transition" project. Energy-efficient machinery, optimized components and systems have a decisive role to play in complying with climate protection and cost-saving goals. The government has set out funding as part of the "National Plan on Energy Efficiency 2050."

Industrie 4.0 – Lead Market and Provider

The German market for Industrie 4.0 solutions (software, IT services, and IT hardware) has continued to grow over the past decade. Industrie 4.0 is expected to increase M&E sector gross value added by EUR 23 billion through to 2025. As well as concentrated engineering and production-related IT competence, the country also boasts top class know-how in automation technology. More than a third of engineers active in the M&E sector are already dealing with matters IT and automation related. Nine out of ten companies currently use or plan to use Industrie 4.0 applications.

Connectivity Driving Change

Production technology stands on the verge of radical change with the arrival of the Internet of Things and services in the factory. Automation and electrification linked to intelligent control systems is directing new product development and has enormous market potential for the future. Germany's lead market for 5G networks and applications ambitions have led to the creation of a number of 5G production test beds in real-world scenarios. The 5G Alliance for Connected Industries and Automation working group of the German Electro and Digital Industry Association (ZVEI) promotes the successful industrial implementation of 5G.

Artificial Intelligence Leader

Artificial intelligence (AI) continues to transform the global tech landscape. The AI industry is experiencing significant growth and transformation. By 2030, the market is expected to be valued at almost EUR 30 billion. Germany is well known for its strong academic research in AI, with several universities and research institutes recognized internationally.

German companies are among the leaders in Europe in applying AI technologies. Artificial intelligence is considered by 70 percent to be the most important technology for future proofing German industry. Germany is already a global leader in AI research and use cases in the manufacturing and health sectors. Significant potential is also seen in energy management and analytics in warehouse management, machine configuration and robotics application scenarios. Both "cloud AI" (processing data centrally) and "Edge AI" (processing data directly at or near the data source) offer business opportunities for international market entrants. Proximity to key industries – including the automotive, medical technology and electronics sectors – provides ample opportunity to bring AI technologies into use more quickly.

Innovative R&A Sector

The robotics and automation (R&A) industry is one of the most innovative in Germany's mechanical engineering sector. Germany is one of the world's five major markets for industrial robots. Germany has the highest density of industrial robots in Europe and German OEMs count among the world's leading R&A companies. Human-robot

collaboration (HRC) and machine vision (MV) technologies are considered major strengths in a global hub that boasts R&A players from all market segments. Demand for products "made in Germany" is still very high: Around 50 percent of German R&A manufacturing turnover is generated in international markets. The fast-growing service robot sector is providing opportunities to companies delivering innovative service robot applications – 80 percent of the world's service robot suppliers are SMEs, reflective of Germany's strong *Mittelstand*.

Electronics

Germany is an important location for the high-end production of complex electronic components. The ambitious development of semiconductor-based applications in the automotive, energy and manufacturing sectors is critical to the country meeting its climate goals. Total industry turnover reached EUR 238 billion in 2023 according to industry association ZVEI, representing growth of six percent compared to the previous year. Germany's ambitions are helping attract more and larger investment projects, such as TSMC and Infineon's mega investments.

Chemicals & Plastics

The chemical and pharmaceutical industry is one of the most important M&E application industries. Germany is the European chemicals market leader, with total turnover of around EUR 225 billion in 2023. Almost forty highly developed chemical parks with excellent infrastructure represent an optimal base for chemical processors, refiners, and end-product producers. The country is also home to Europe's leading plastics processing industry. With industry turnover in 2023 of over EUR 70 billion, the domestic plastics industry counts as one of Germany's most significant industry sectors. The plastics machinery sector is a major supplier to the chemicals and plastics processing industry – with every fourth plastics machine produced in the world coming from Germany. Major opportunities also exist in areas as diverse as chemical recycling and the recycling economy as the country pursues its climate-neutrality goals – emphasizing the important role of the M&E industry to the circular economy.

Key Application Industries

Germany's highly industrialized environment and continuous investments in new technologies and sustainable production are the main reasons for the continued success of the M&E industry. Germany's chemicals, electronics, automotive, and the food & beverage sectors are the four largest client sectors driving market growth.

Almost 14 thousand companies, employing a combined workforce of nearly 3 million, are active in these four sectors – generating combined turnover of around EUR 1.240 billion in 2023. Further important growing potential and applications for the M&E sector are also opening up in the thriving renewable energies and resources sector.

Automotive

The automotive industry represents Germany's largest industry, with a turnover of EUR 558.1 billion in 2023. It is the European car production leader: Germany is Europe's electric mobility champion and the world's second-biggest electric car market, production hub, with 1.27 million units produced in 2023. Total internal R&D investment in 2023 topped EUR 31 billion, making the auto industry the country's most innovative industry sector. Significant investment is being made in battery cell R&D and production (as well as autonomous driving applications) to establish the country as an electric vehicle battery leader.

Food & Beverages

The food and beverages sector provides further profitable market opportunities for M&E companies in Germany. The industry generated around EUR 200 billion turnover in 2023. Robust competition within the food retail market has led to very high automation standards in production. In terms of machine production, the food processing and packaging machinery industry ranks third in the German machinery industry (nearly EUR 14 billion in 2023).



Visit our 3D printing website for current additive manufacturing developments www.gtai.de/3D-printing



Download our Robotics & Automation Industry fact sheet for more R&A developments: www.gtai.de/robotics

International R&D Leadership

Germany is Europe's biggest investor in innovation. Total R&D spending of EUR 130 billion (3.1 percent of GDP) in 2023 makes it Europe's biggest research spender. Internationally, only the US, China, and Japan have larger R&D budgets.

German patent figures pay testimony to the innovation work done in German companies. With almost 25,000 patents granted at the European Patent Office in 2023, Germany ranks second internationally after the US. The country's share of patents is more than twice as large as that of France, the second leading innovation nation in Europe. With its world-class R&D environment and strong export orientation, Germany combines two essential locational factors making it a major source country for innovative products.

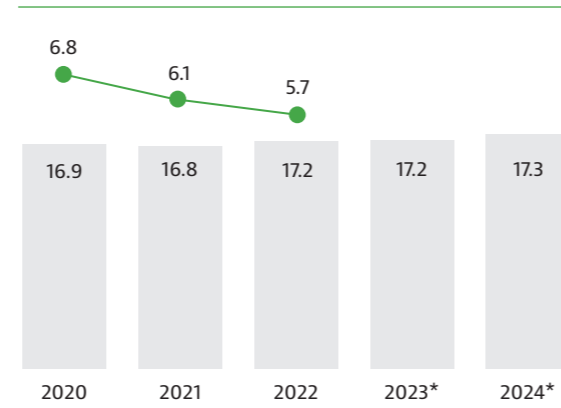
Public Cluster Funding

The federal and state governments promote powerful cluster structures, where universities, research institutes, companies and other relevant players work together. The "go-cluster" program provides a stimulus to improve cluster management and help turn German clusters into highly effective international clusters. With the Future Cluster Initiative the Federal Ministry of Education and Research is supporting research-strong regions throughout Germany under the motto "Clusters4Future" with new and courageous approaches in the field of knowledge and technology transfer.

R&D Incentive Programs

International reports and studies regularly identify Germany as one of the world's most innovative locations. Germany's government is seeking to consolidate the country's internationally leading innovation position through the provision of innovation-friendly framework conditions and market-oriented support programs. All research programs financed by the German federal government are part of the federal Future Research and Innovation Strategy. This defines six priority areas for tackling specific challenges anticipated in the years ahead. A number of different R&D programs with specific R&D topics are available within the six priority areas. To further increase the attractiveness of Germany as a research location, companies with tax status in Germany and performing

M&E Innovation Expenditures in Germany in EUR billion



*forecast
Source: ZEW 2022

R&D activities are eligible for a tax credit of up to EUR 2.5 million annually. The Research Allowance Act provides tax credits to companies performing R&D activities in Germany.

M&E Technology Investment

The M&E industry counts as one of the most innovative sectors in the domestic economy. According to the Centre for European Economic Research's Machinery Industry Innovation Report 2023, almost 72 percent of M&E companies were active innovators in 2022 – compared to 51 percent for the overall German economy. In 2022, innovation spending grew by two percent on the previous year to EUR 17.2 billion. Product innovation accounted for 14.9 percent of all turnover. With an innovation expenditure share of 5.7 percent of turnover, the M&E industry counts among the country's five most innovative industry sectors.



Germany is Europe's biggest research spender, with total R&D spending of EUR 130 billion in 2023

M&E Innovation Clusters

The decentralized nature of the M&E industry has allowed innovation clusters to develop strong science and industry networks. This has helped them to secure an internationally leading position in various technology fields and consolidated their international benchmark status.

Germany's industry cluster concept has created an environment in which operators from all sectors are able to flourish in close proximity with other important actors. The "go-cluster" excellence program brings together almost 70 innovation clusters from across Germany. This German government program connects the most efficient national cluster management organizations. These clusters are pioneers of innovation and demonstrate Germany's high level of expertise in a number of technology areas. The "go-cluster" program also has an excellent international network and is a member of the European Clusters Labelling Excellence Structure (www.eucles.be) as well as a partner of the European Clusters Alliance www.clustersalliance.eu.

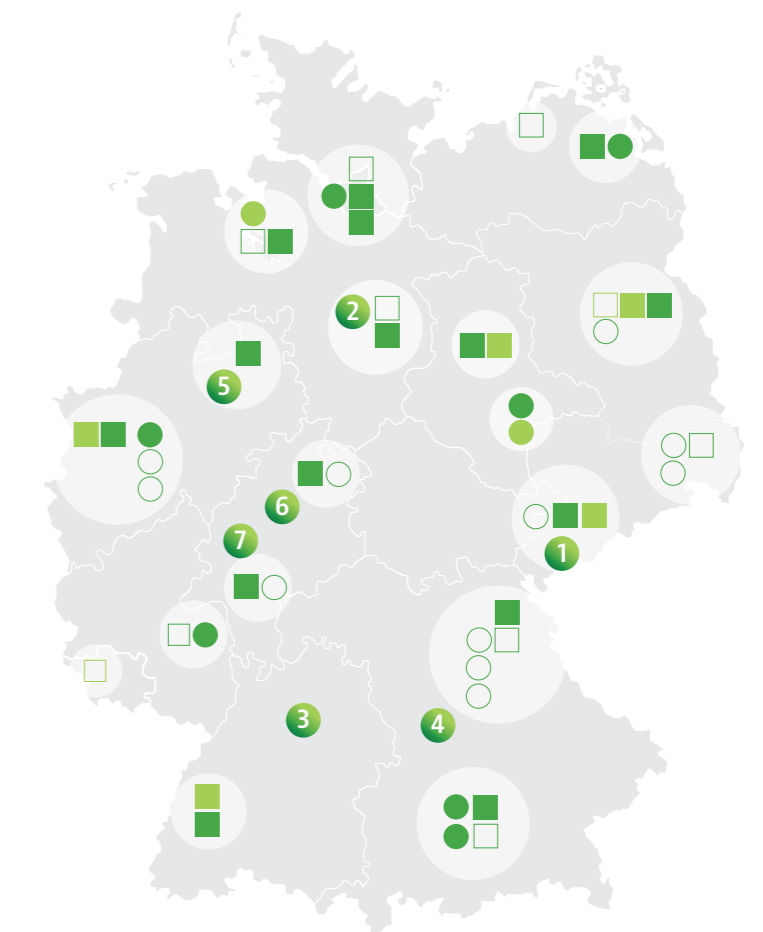
Clusters4Future

As a further flagship measure of the German government's High-Tech Strategy, the Clusters4Future initiative will make a special contribution to knowledge and technology transfer across the country. Created to establish a new generation of regional innovation networks, the cluster competition will help Germany build on and consolidate its strong position among the world's innovation leaders and master the challenges in important future fields.

Fraunhofer Innovation Cluster

As part of Europe's largest applied science research organization, institutes belonging to the Fraunhofer-Gesellschaft are active in developing new technologies for industry and the public sector. More than 30,000 Fraunhofer employees develop cutting-edge technologies in 76 research institutions spread across Germany (20 Fraunhofer research institutes specialized in matters purely M&E related). Fraunhofer innovation clusters are based on established networks of research institutions, investors and companies that lead to new business ideas and start-ups and help close the gap between science and industry.

Selected M&E Industry-related Clusters in Germany



- go-cluster
- Fraunhofer Innovation Cluster
- Production Technology
- Automation and Transportation Technology/Aerospace
- Materials Technology
- Electronics/Measurement/Sensors

- Selected: Cluster4Future
- 1 SmARThI (Smart Robotic - Robot Valley Saxony)
- Selected: International Cluster & Partner Countries
- 2 CFK Valley/Japan
- 3 Leichtbau BWE/France, Canada
- 4 Cluster Mechatronic & Automation/Netherlands
- 5 its OWL/Canada
- 6 Wetzlar Network/Czech Republic
- 7 Software Center Darmstadt/Brazil, Singapore, USA

Sources: Fraunhofer Innovation Clusters, go-cluster BMBF, GTAI Research (02/2025)

Creating Investment Stability

The German market is open for investment in practically all industry sectors, and business activities are free from regulations restricting day-to-day business. German law makes no distinction between Germans and foreign nationals regarding investments, available incentives or the establishment of companies.

The FDI legal framework in Germany favors the principle of freedom of foreign trade and payment. Generally, there are no restrictions or barriers to capital transactions or currency transfers, real estate purchases, repatriation of profits, or access to foreign exchanges.

Sound and Secure Legal Framework

According to the 2024 International IP Index issued by the US Chamber of Commerce, Germany is one of the world's best locations in terms of planning and operating security. Germany is also one of the world's leading nations in terms of intellectual property protection and protection from organized crime. German regulatory authorities are highly professional in their operations. The German legal system also counts as one of the world's most efficient and independent. Social, economic, and political stability provides a solid base for corporate investment projects. Contractual agreements are secure and intellectual property is strictly protected in Germany.

First Choice Business Location

Germany is a very attractive location for international investors as a number of current studies impressively show. The combination of a strong economy, innovative technologies and a stable political landscape makes Germany a preferred destination for foreign direct investment (FDI). Not surprisingly, six German cities – Berlin, Munich, Frankfurt, Düsseldorf, Hamburg and Cologne – are among the top 20 European cities with the most FDI projects. The Kearney FDI Confidence Index 2024 confirms this assessment and positions Germany as a top location in the European Union for future investments from abroad.

According to data produced for the Financial Times' fDi Markets database, Germany was the world's third leading FDI project destination location in 2023. The AmCham Business Barometer 2024 highlights the positive regard in which US

companies active in Germany hold the country. Asked about their opinion on the German business environment, 58 percent of US company respondents rated Germany as being a "good" or "very good" business location.

Reliable Logistics Infrastructure

Germany's infrastructure excellence is confirmed by a number of recent studies including the World Bank's 2023 Logistics Performance Index. The World Bank ranked Germany third worldwide – behind the significantly smaller countries of Singapore and Finland – for its overall logistic performance. Accumulated in this score for Germany are high marks for the quality of the physical infrastructure (roads, air transport, railroads and ports) as well as customs infrastructure, tracking & tracing and international shipments. Further indicators where Germany secured the top slot were "logistics competence" and "timeliness."

Visa Reform for Skilled Employees

A reform of the Skilled Immigration Act has further opened the German labor market to qualified professionals from outside the EU. Qualified professionals include university graduates and persons who have successfully completed quality vocational training. Foreign qualification – both academic and vocational – must be checked for equivalence with German qualifications and officially recognized. A new feature is the possibility to do this after entry into Germany. For this purpose, skilled workers and employers must agree on a recognition partnership. In specific cases, even job experience and qualification obtained and recognized abroad may be adequate.

The EU Blue Card allows qualified professionals with a German university degree (or a proven comparable qualification) to be fast-tracked into employment in Germany. Through the reform, the EU Blue Card is now available to a greater number of skilled workers as the statutory minimum salary threshold has generally been lowered. In addition, the scope of the EU Blue Card for professions in special demand has been significantly expanded.

➔ For detailed information on German residence titles, please see our online "Investment Guide to Germany": www.gtai.de/visa

Best Practice Example: Wheel.me Service AS Norway

Germany Trade & Invest provides a range of inward investment services to international investors. After careful consultation with the individual investor, a support program of consultancy and information services is drawn up to help set the stage for investment success.

Norwegian robotics and IoT company Wheel.me was established in Oslo in 2013. The company claims to be the provider of the world's first autonomous wheel whose patented system consists of a robot component, indoor navigation technology and data analytics. The innovation allows almost anything to be easily transformed into an autonomous robot and with no need to change design or form factor. Large-scale industrial application areas include the transportation of parts within manufacturing facilities and the autonomous movement of patient beds and equipment in hospitals.

Project Information

Wheel.me AS required a new manufacturing site to meet new customer demand in Europe as well as to serve its existing international customer base. Germany Trade & Invest was informed of the company's investment plans by the German Chambers of Commerce Abroad (AHK Norway) in Oslo. The company also advised of its plan to enter the German market providing rental management solutions.

Germany Trade & Invest Support

Germany Trade & Invest provided an overview of the market and identified a number of potential market-entry strategy options. Germany Trade & Invest worked closely with partners from the German Chambers of Commerce Abroad as well as local economic development agency partners Hessen Trade & Invest and Frankfurt Rhein-Main on behalf of the investor. Contact with potential partners and multipliers was initiated and all necessary legal and financial information made available in customized form.

In a brief period, Germany Trade & Invest's industry experts and economic development agency partners set up visits to potential production sites. Supplementary support services specific to company formation, personnel recruitment, incentives application processes, and company expansion

procedures were also provided. After a comprehensive site-selection process, the company chose the Frankfurt (Main) area in Hessen as its preferred location

"Being strategically located in Frankfurt in Hessen – the most important region for excellent international connections – was an obvious choice. The German culture of quality and excellence is what 'made in Germany' is all about. Wheel.me AS shares this same commitment to quality and competitiveness."

Daniel Hessen, Chief Commercial Officer,
Wheel.me Service AS, Norway, 2023

Investment Project Time Line

November 2021

Initial investor contact with Germany Trade & Invest established.

January 2022

First online meeting to discuss investor requirements. Frankfurt (Main) area in Hessen identified as site.

February 2022

Contact to Hessen Trade & Invest (HTAI) and FrankfurtRheinMain economic development agencies initiated and support services secured. Rental of office space in Frankfurt (Main).

March 2022

Preparation of the company formation (GmbH) in Frankfurt region.

April 2022

Germany Trade & Invest provides further support with marketing and testimonial activities. Project handover HTAI.

2022-2024

Market expansion within Germany (e.g. in Berlin) and other European countries. Participation at internationally leading trade fairs with application industries in Germany.

2025-2027

Investment expansion and further plans for own production facility and R&D project realization in Germany.

Germany Trade & Invest Helps You

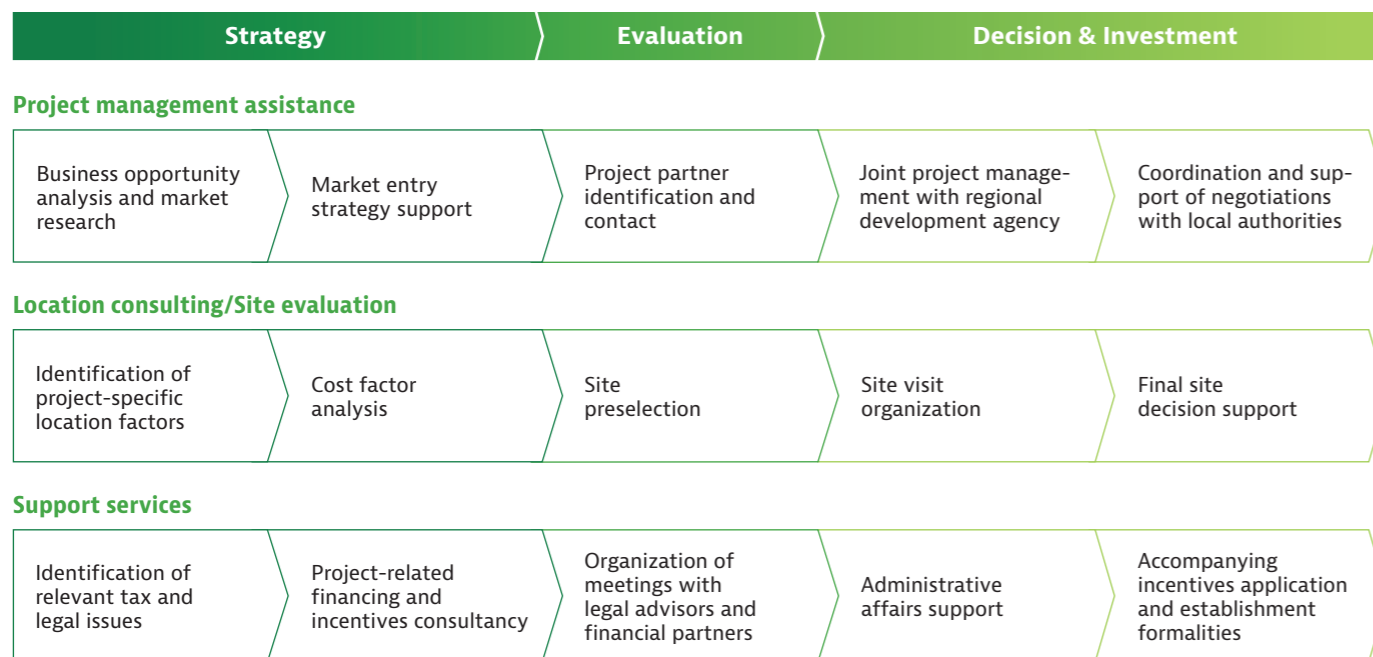
Germany Trade & Invest's teams of industry experts will assist you in setting up your operations in Germany. We support your project management activities from the earliest stages of your expansion strategy.

We provide you with all of the industry information you need – covering everything from key markets and related supply and application sectors to the R&D landscape. Foreign companies profit from our rich experience in identifying the business locations which best meet their specific investment criteria. We help turn your requirements into concrete investment site proposals; providing consulting services to ensure you make the right location decision. We coordinate site visits, meetings with potential partners, clusters,

universities, and other institutes active in the industry related research. Our team of consultants is at hand to provide you with the relevant background information on Germany's tax and legal system, industry regulations, and the domestic labor market. Germany Trade & Invest's experts help you create the appropriate financial package for your investment and put you in contact with suitable financial partners. Our incentives specialists provide you with detailed information about available incentives, support you with the application process, and arrange contacts with local economic development corporations.

All of our investor-related services are treated with the utmost confidentiality and provided free of charge.

Our support services for your investment project



Investor Consulting



Peggy Görlitz is the senior manager responsible for machinery and equipment in Germany Trade & Invest's Mechanical & Electronics Technologies (MET) team. She is an acknowledged industry expert with a

wealth of 30 years' experience and a proven track record in helping international companies set up their business operations in Germany.

For questions on how to establish your business or service center in Germany, please contact Peggy Görlitz at peggy.goerlitz@gtai.de and Marie-Christin Menke at marie-christin.menke@gtai.de

For more information about the machinery & equipment industry in Germany, please visit our website at www.gtai.de/machinery



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Germany Trade & Invest (GTAI) is the economic development agency of the Federal Republic of Germany. The company helps create and secure extra employment opportunities, strengthening Germany as a business location. With more than 50 offices in Germany and abroad and its network of partners throughout the world, GTAI supports German companies setting up in foreign markets, promotes Germany as a business location and assists foreign companies setting up in Germany. All investment services and related publications are free of charge.

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