

Environmental Technologies in Germany

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Germany is home to one of the most advanced environmental technologies markets worldwide, with new legislation creating new opportunities for investment.

With a global trade share of 14 percent in 2020, German greentech products are especially sought after. In 2016, the markets for environmentally friendly energy generation, energy efficiency, resource efficiency, sustainable mobility, sustainable water management, waste management and recycling accounted for 15 percent of German GDP. This is expected to increase to 19 percent by 2025.

Growing Markets: Water and Recycling

The circular economy and the sustainable water industry are expected to experience annual growth of more than five percent and six percent respectively – reaching a joint market volume of EUR 110 billion by 2030. Within the sustainable water industry, water efficiency – with expected annual growth rates of almost 40 percent until 2030 – represents the segment with the highest growth. With an estimated annual increase of almost 15 percent for the period 2016 to 2025, the market for recycling technologies offers the fastest-growing opportunities in the circular economy and waste management markets.

Environmental Technology Incentives

Incentives programs in Germany are designed to support a wide range of business activities at different stages of the investment process. There are a number of programs available to strengthen the increasingly important environmental technology market. At the federal level, the *Umweltinnovationsprogramm* (Environmental Innovation Program), for example, promotes the implementation of pilot projects with non-repayable grants of up to 30 percent of eligible costs. The federal government "New Urban Agenda" initiative aims to fund measures in order to develop and test locally adapted strategies for the sustainable development of urban regions and to increase urban resilience.

The Industry in Numbers

14 percent

German greentech products
global trade share

EUR 110 billion

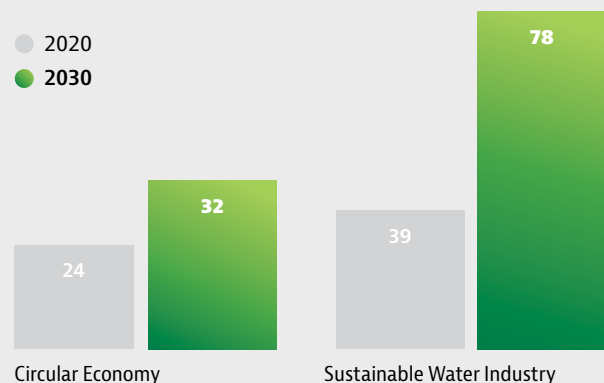
Circular economy and water industry
market volume by 2030

+15 percent

Recycling technologies annual
market growth 2016-2025

Germany's Environmental Technologies Markets in EUR billion

● 2020
● 2030



Source: BMU and Roland Berger 2021

MARKET OPPORTUNITIES

Water Technologies in Germany

Germany is home to Europe's biggest sustainable water management market. A commitment to sustainable water innovation also makes it the continent's leading exporter of water treatment technologies as well as a major provider of solutions that guarantee higher efficiency and water quality standards for water-intensive industries around the world.

Sustainable Water Management Market

Germany is Europe's largest exporter of water treatment technologies, with an export volume of more than EUR 1 billion in water and wastewater technologies in 2018. The German market for sustainable water management is Europe's largest with EUR 39 billion volume in 2020. German water protection policy sets the framework for development and innovation in the water sector. The Federal Water Act and corresponding legislation – including the Drinking Water Ordinance and the Waste Water Ordinance as well as a number of local federal state provisions – create the legal basis for a transboundary and sustainable water management market.

Energy-saving Technologies

The German climate protection plan is premised upon an increase in demand for energy-saving technologies. This has created significant market opportunities for providers of sustainable water technologies that optimize processes, reduce wastewater levels, and augment water supply and water management systems. According to the Federal Environment Agency (UBA), water abstraction levels in Germany dropped perceptibly in the last 20 years. More efficient production processes and the reuse of water have enabled the manufacturing sector to significantly cut costs.

Sewage Sludge Treatment and Phosphor Recovery

Some 34 percent of sewage sludge was used in agriculture and landscaping in 2016. Germany's sewage sludge ordinance (*AbfKlärV*) regulates the application of sewage sludge on agriculturally and horticulturally used soils. The use of sewage sludge for fertilization purposes is prohibited and phosphor and other nutrients should be recovered. No specific recovery technologies have been defined. This will allow new market players that provide innovative recovery procedures the opportunity to successfully enter the market.

Micropollutants and Microplastics

There is an acute need for cost-effective and energy-efficient solutions to eliminate micropollutants, especially in municipal waste water systems. In 2016, just eight percent of German surface water and 64 percent of groundwater bodies achieved

€ 39 bn

Sustainable water
technology market volume
in Germany in 2020

€ 110 bn

Investment since 1990 –
creating Europe's biggest
sustainable water
management

> 9,300

Number of public
wastewater treatment
plants in Germany

< € 1 bn

Export volume for
water and wastewater
technologies in 2018

Sources: BMU and Roland Berger 2021, BDEW 2017, VDMA 2019

"good status." The introduction of the "fourth purification stage" within treatment plants is currently being tested; applying technologies such as adsorption on active carbon, nanofiltration, and reverse osmosis. Marine litter presents another challenging issue, with several action programs to counter the problem set up under German leadership. The "oceans without polluting waste" national action plan includes efforts to reduce the discharge of microplastic particles.

Adapting to Climate Change

The minimum cost of not adapting to climate change in Europe has been estimated at EUR 100 billion a year in 2020, rising to EUR 250 billion in 2050. In Germany, climate change is creating increased demand for better monitoring of water resources and aquatic systems as well as weather extremes. According to the UBA, more than 90 percent of all major German cities are actively developing concepts and strategies to deal with climate change. Companies offering respective technologies should approach the market now to provide solutions for the future resilient city. The German Strategy for Adaptation to Climate Change sets out the optimal framework for projects and investments. Measures and sought-after technologies include optimized water resource monitoring, flood protection (e.g. "sponge city" concepts), rain water, and drinking water management solutions.



Please visit our website to find out more on adaptation to climate change in Germany.
www.gtai.com/climatechange

Waste Management & Recycling in Germany

Germany's leading global recycling industry status has its basis in progressive waste management legislation that allows companies to thrive. The provisions of the German Waste Management Act are helping make the country's circular economy market increasingly attractive for international investors.

Global Market Leader

In 2016, the German waste management and recycling markets totaled approximately EUR 20 billion – equivalent to 16 percent of global market volume. The German circular economy industry is expected to grow by 5.4 percent annually through 2025. In 2018, more than 417 million metric tons of waste was generated in Germany, with a recycling rate of just 70 percent. Building and construction materials represent the lion's share of waste; thereby making it one of Germany's most attractive recycling technology markets.

Progressive Environmental Regulation

The Waste Management Act (*KrWG*) enshrines the notion of product responsibility by defining responsibilities along the product life cycle and offering incentives to manufacture durable products. The act's goal is to turn a waste management culture into a resource management culture, minimizing waste generation and maximizing reuse and recycling. The five-step waste hierarchy – waste avoidance, re-use, recycling, energy recovery and disposal – is one of the key measures to achieve these goals. Based on this hierarchy, the law ensures that precedence is given to the environmentally best option, namely prevention of waste, reuse and recycling.

Packaging Recycling

Demographic changes have led to a constant increase in packaging waste. Domestic packaging waste volume reached its peak in 2016 with 18 million tons – of which 70 percent was recycled. In January 2019, Germany's new Packaging Act entered into force, stipulating higher recycling quotas for packaging. The task is especially challenging for plastics, with the recycling quota for plastic packing to be increased to 63 percent by 2022.

Plastics Recycling

According to the UBA, more than six million metric tons of plastic waste were produced in Germany in 2017, of which only 47 percent was recycled. While in the past a considerable amount of plastic waste was exported abroad, the German recycling industry now faces the challenge of raising domestic capacity, inter alia, the ban of plastics waste imports to China. According to the Federal Ministry for the Environment, only 12 percent of plastics used in manufacturing in Germany

in 2017 were recycled materials. Germany's new Packaging Act, effective since January 2019, aims at increasing this rate by rewarding producers that use recyclates. The ministry will also establish an initiative to enhance the use of recycled plastics in the manufacturing industry. As the UBA emphasizes, recyclers can also boost the use of plastic recyclates in the manufacturing industry by ensuring high quality of the recyclates. International companies with innovative technologies to recycle plastics waste and produce high-quality recyclates find optimal conditions for entering the German market.

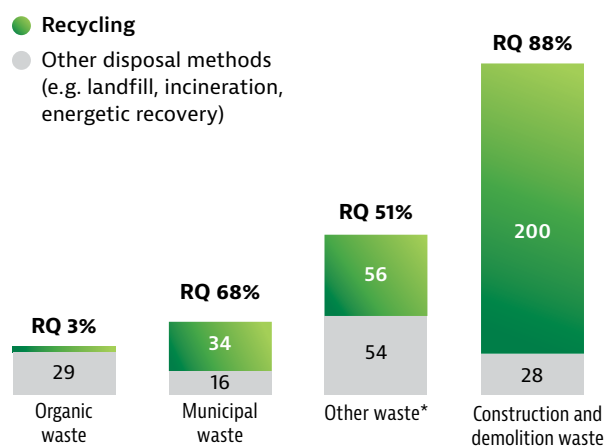
Minimum Recovery for Packaging Waste in Germany

	as of 2019	as of 2022
Plastic packaging	58%	63%
Aluminum	80%	90%
Tinplate and ferrous metals	80%	90%
Paper and cardboard	85%	90%
Glass	80%	90%
Beverage carton	75%	80%

Source: Deutscher Bundestag, BMU 2019

Waste Type Volume and Recycling Quota (RQ) Levels in Germany in 2018

in million tons



*incl. production and manufacturing activities

Source: Federal Statistical Office 2021

Circular Economy: Niche Market Opportunities

Innovations and new technologies are changing the demand for resources worldwide. In Germany, the energy transition, digitalization and growing sustainability awareness among consumers has led to the development of a series of niche markets offering growing potential for innovative companies in the circular economy. The wind turbine and CFK recycling, electronics recycling, electric car battery recycling, and circular fashion markets present particularly attractive opportunities.

Wind Rotor Blade Recycling

Germany was a first mover in the development of the modern wind energy industry and is now seeking to extend its reputation by recycling as many wind power plant components as possible when they reach the end of their service lives. Beginning in 2020, many of the financially supported wind turbines will reach their maximum funding period of 20 years. The Federal Ministry for Economic Affairs and Energy observes that almost 12,000 onshore wind turbines – with a capacity of more than 14,000 MW – in total will be affected between 2021 and 2025. This creates significant potential for repowering and recycling. Where decommissioned parts such as rotor blades, nacelles, towers and foundations cannot be reused, the German Waste Management Act (*KrWG*) requires they be recycled and supplied to the secondary raw materials market. Wind energy is already a clean alternative. If this can be extended to the entire life cycle of all the components, it will become cleaner still. The developments in Germany's renewable energy industries have created an attractive niche for innovative recyclers and new potential for international companies.

Battery Recycling

The Federal Ministry for the Environment has calculated that, measured by vehicle weight, 89 percent of Germany's end-of-life vehicles were recycled or reused in 2017. With e-mobility on the rise, the CO₂ emissions over a vehicle's lifetime will be reduced considerably. However, the BMU notes that emissions made during the auto production and recycling process will increase, thereby becoming the largest contributors to the vehicle's carbon footprint.

Environmentally friendly and efficient battery recycling is an imperative for an emission-free transport system. It is believed that electric vehicle batteries need an upgrade after seven years – creating huge recycling potential. The rising popularity of e-bikes in Germany – with almost two million e-bikes sold in 2020 alone and 39 percent of the overall bicycle market – intensifies the need to develop improved recycling methods for batteries.

Textile & Clothing Recycling

Action needs to be taken to reduce the environmental impact of the textile industry along the whole supply chain. According to the UBA, measures range from environmental relief (by promoting the cultivation of organic cotton) to the use of recycling technologies for the production of chemical fibers or the recycling of purified process water and the utilization of waste heat during the textile finishing process. The opportunities in Germany – one of the largest clothing markets in Europe – are manifold for textile and clothing recyclers and circular fashion companies. The market is expected to grow even further, with sustainable fashion becoming an increasingly important market segment.

According to the Slow Fashion Monitor 2016, sustainability is important or even very important when making a purchasing decision for more than 73 percent of consumers. Among women, 53 percent are willing to pay more for environmentally friendly, sustainable, and fair-trade clothes. This offers new opportunities for the development, production, and sale of sustainable textiles and clothing recycling in Germany.

New Recycling Potential: Opportunities for Innovative Companies



2 million e-bikes sold in Germany in 2020



1 million tons of used textile waste generated each year in Germany



12,000 onshore wind turbines in Germany reach end of funding period in 2025



400 GWh electric vehicle battery demand in Europe by 2028

Sources: BVSE, ZIV 2021, BMWi, European Battery Alliance 2019

Supporting Innovation

Innovation is key to Germany's leading role in the global environmental technologies market. Attractive government support, a highly skilled workforce, and a diverse research landscape offer optimal conditions for international companies planning the set-up of research and development facilities in Germany. World-renowned research facilities, institutions and universities represent potential partners for successful research collaborations.

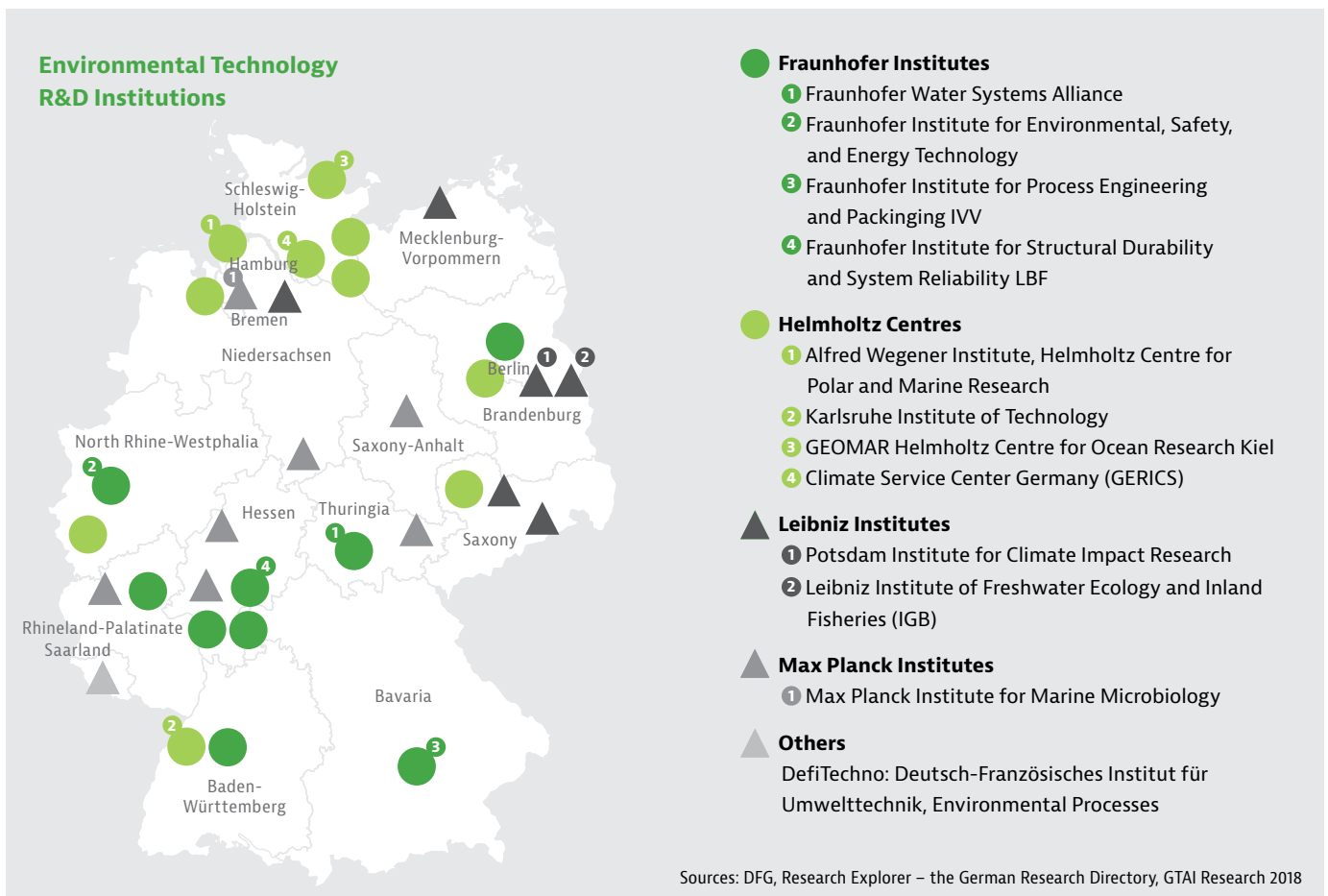
Research and development (R&D) activities in the area of environmental technologies are supported by a number of government programs within Germany's overarching High-Tech Strategy which seeks to provide innovative technological solutions to global challenges.

To date, the Federal Ministry of Education and Research has invested approximately EUR 100 million in sustainability research. Within the framework of the "Research for Sustainability" (FONA) program, numerous cooperation networks focus on areas including sustainable water management,

marine and polar research, climate commodities, energy and resources, biodiversity, land, and soil. Some EUR 4 billion will be invested in the renewal of the program for the period 2020 to 2025. The program especially welcomes "funding newcomers" under the umbrella of the "KMU-Innovativ" FONA initiative. Since its launch in 2007, more than EUR 1.2 billion has been granted to 1,700 projects involving a total of 2,900 SMEs.

The UFORDAT database (doku.uba.de) lists more than 120,000 research projects of more than 10,000 institutions conducting research in the fields of water, soil, air, nature, noise and energy as well as climate change, biodiversity, resource efficiency, and sustainability.

➔ Whichever way you choose to bring your innovation to Germany, GTAI can support you. Contact us at invest@gtai.com



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