



Green tech: a thriving market in Germany



Green technology in Germany: Cultural and economic support for innovation

Germany offers a qualified workforce, a strong economy and decades of political stability, as well as a renewed environmental focus that has created **new impetus for green technologies**. But you don't have to take our word for it - studies from organizations such as KPMG, EY and the American Chamber of Commerce agree. The country is transitioning away from carbon-based energy sources and provides an environmentally friendly regulatory environment and generous subsidies. Leveraging cutting-edge technologies is a cornerstone of this energy transition, for example to make the power grid smarter or improve energy efficiency, to help ensure the country meet its Paris climate obligations.

The transition solves one problem by enabling renewable, low-emission power generation but creates others: For example, most of the wind power is generated in the North but a lot of the industry is in the South.

To clear this hurdle, Germany is investing more than EUR 35 billion in expanding its high-voltage transmission network. Smart grid technologies and Power-to-X will also help to integrate more renewable power. The country's recently announced hydrogen strategy will support the development of hydrogen-based technologies with EUR 9 billion until 2035 in addition to several programs that support innovative research projects and institutions.

Germany is also Europe's leading exporter of water and wastewater technologies. It's a field that is developing worldwide with new areas opening up, for example removing micropollutants from water. At home, Germany's push to improve its local environment is creating new impetus in water filtration and its efficient use. Recycling is another industry that is gaining momentum worldwide - and one that is part of German culture. A clear niche has opened up for creative approaches to reusing packaging and other waste products.

Germany works - Europe's biggest economy **remains the continent's economic motor and its transition to clean energy and a clean environment provide fertile ground for green technologies**. Germany welcomes international companies that are looking to enter its rapidly expanding green technology market and offers businesses professional assistance. Find out how Germany can work for you.

A guide to Germany

If you understand the German market, the new and broad opportunities for green technology are clear to see. But businesses entering a new market are faced with a number of fundamental decisions. Making the right calls requires knowledge, experience and perception.

Germany is one of the world's most attractive places to do business. Whether the survey is from KPMG, EY or the American Chamber of Commerce, managers agree that the country offers a broad field of highly qualified workers, has strong growth potential and offers political stability. Germany works for both companies and their employees. You can depend on that.

The country is an especially suitable location for green tech companies, with environmental technology and energy considered two of the top four growth drivers by managers questioned in the EY Attractiveness Survey (June 2019). Environmental technology came out ahead of pharmaceuticals and biotech but just behind the digital economy, which is no surprise considering the growing role digital technologies play in the energy and environmental technology industries, for example in smart grids, energy storage or water monitoring.

Germany is also **among the European leaders in research and development** and has a close-knit network of institutes and universities. In short, Germany is an ideal place to be for businesses that understand that innovation is the doorway to sustainable growth.

Where hard figures meet soft factors

Successfully entering a new market entails more than striving for profitability and a quick ROI – it requires an understanding of the people and the culture in that market. In its Logistics Performance Index, **the World Bank has repeatedly ranked Germany No. 1 in the world for infrastructure and logistics.** But just as important as the country's central location, which enables efficient links to European neighbors, are soft factors such as a culture of curiosity and a pioneering spirit. As far back as 1976 the federal government established precaution as an essential element of its environmental policy – one of the earliest political boosts to green business.

But Germany is more than just an early adopter – it's also a leader. New technologies can be developed and put to work, supported by a regulatory framework that guarantees companies long-term security and stability. Match this with the country's high quality of life and both companies and their employees quickly find themselves getting comfortable.

Find out more about entering the German market at germanyworks.com. Our experts are ready to help.

Many routes, one destination: A climate-neutral economy

When it comes to green technology, Germany has been an early adopter for decades. In 2015, delegations from around the world came together in Paris and agreed to reduce emissions and achieve climate neutrality in the second half of the century. The Paris Agreement has given fresh impetus to Germany's energy transition.

The "green tech" label can be applied to industries as varied as energy and water management through to recycling and waste management. These are all fields in which Germany's political leadership has set ambitious goals. This has created hundreds of niches for innovative companies with environmentally friendly ideas, products and services – things that are fast becoming the new standard.

renewables – **is the cornerstone of the country's decarbonization efforts.** Management consultancy KPMG says the country is attracting ever more international investors: "The conditions for the market could hardly be better." Germany offers the knowledge and support to make it as easy as possible for innovative companies to get started and get the job done, both economically and while being sensitive to the environment.

Germany's energy transition – the government-sanctioned switch from carbon-based energy sources to



Germany's energy transition is the cornerstone of the country's decarbonization efforts



The future package aims to make Germany the home of Power-to-X

Green outlook for the lignite coal regions

The country's approach to its remaining lignite coal regions is one example of how decisively Germany is breaking new ground: The structural changes represent massive challenges that are being met by the federal government with equally impressive support measures. **The government will provide as much as €40 billion in funding by 2038 to give the areas a sustainable future, including measures to attract innovative companies.** New legislation creates a framework for building new business-friendly infrastructure, strengthening research institutes and implementing environmental protection projects in the affected regions.

Funding for the future: €50 billion

The corona crisis called for rapid, short-term measures but Germany is already thinking beyond: The federal government has agreed on a large economic stimulus package. How large? € 130 billion.

€50 billion of this will be invested in modernization measures to ensure Germany emerges from the crisis in a stronger position. The so-called future package includes **the hydrogen strategy** – which **aims to make Germany the home of Power-to-X** – and energy efficiency measures to green the country's building stock, as well as investments in EV charging infrastructure, the expansion of wind and solar power and help for forests to adapt to climate change.

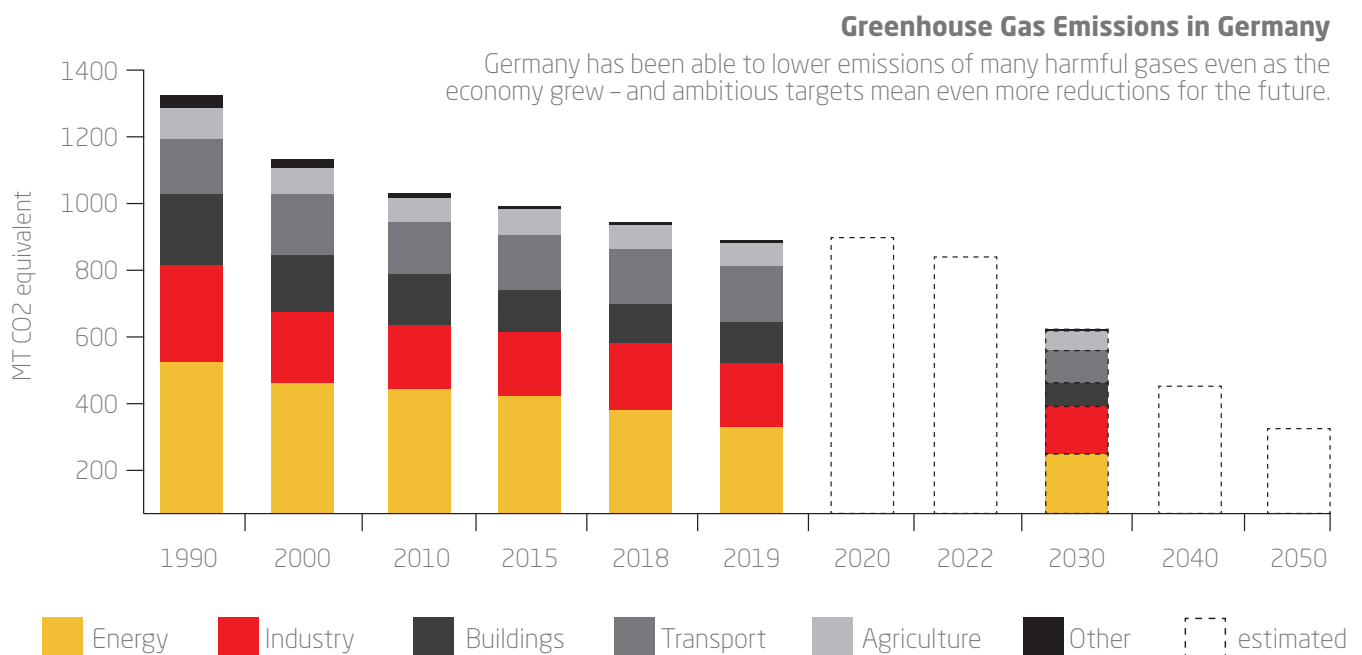
Furthermore, research will be expanded, for example, projects focused on the country's transition to green energy sources. The SINTEG (Smart Energy Showcase – Digital Agenda for the Energy Transition) project and its successor are testing transferable solutions for a secure, economical and environmentally friendly energy supply based on renewables in large-scale model regions. The program focusses on digitalizing the energy sector. The project suggests that new business models are opening up and with them new opportunities for business.

The best resource for the energy transition: A new way of thinking.

The German energy sector – particularly the electricity market – has changed dramatically over the last 20 years: From fossil-based, centralized power generation with only a few large market players to more decentralized, renewable power generation with many new market participants, including consumers as producers. There are plenty of challenges but also opportunities for innovators.

Over the last three decades, the share of renewable energy in Germany's gross electricity production rose from 5 percent in 1990 to about 40 percent in 2019. The transition was driven by a feed-in tariff for renewables and reinforced by the government's decision to phase-out nuclear- and coal-based power production. The transformation continues as national targets require renewables to meet at least 80% of the country's gross power consumption by 2050.

Given their successful role in power generation, **integrating renewables into other sectors** – namely heat and transportation – **while increasing energy efficiency is now paramount**. While this creates new, unique challenges, experience shows there is plenty of space for creative solutions, innovative market entrants and fresh collaborations with international partners.



Source: Federal Environment Agency, March 2020. NB: 2019 data is preliminary. Maximum emissions for 2020, 2022 and 2030 from KSG, Anlage 2 zu § 4. Targets for 2040 and 2050 are from Klimaschutzplan 2050.

Power distribution: The journey from North to South.

Integrating renewables into Germany's electricity grid remains a significant undertaking. While conventional power production is generally predictable, centralized and large-scale, renewable energy generation is mostly decentral, fluctuates and often contributes in smaller individual amounts. Germany's South is an industrial powerhouse and accounts for much of the national power consumption. However, most of the wind-power generation occurs in the North, which raises transmission issues. Expanding high-voltage infrastructure is expected to require an investment of more than €35 billion. But there are also other solutions that are being implemented.

The investment for the high-voltage power lines will sum up to more than

EUR 35 billion

When grids become intelligent, users become flexible

Energy storage and Power-to-X technologies are just two of those new solutions. Both technologies are now instrumental in enabling higher shares of fluctuating renewable energy on the grid. Industrial battery systems for example allow peak shaving and load shifting, lowering grid fees for businesses. Other IT or even AI-based solutions are becoming more common, for example in monitoring, anticipating renewable power fluctuations and predictive maintenance. Smart meters – digital meters equipped with a communication gateway – can help optimize energy production and consumption, while virtual power plants can pool small-scale energy producers and incentivize flexibility. These can all reduce loads on the grid.

Clean transportation will need green hydrogen and battery-based e-mobility

Power-to-X processes can also help reduce grid congestion and the need for balancing measures by putting surplus renewable generation to use. Power-to-gas technology for example produces green hydrogen through electrolysis. This in turn can be fed into the national gas network, which can operate with a mix of up to 10 percent hydrogen. This makes the gas mix greener, which in turn helps the transportation and industrial sectors to lower their carbon footprints – all while alleviating strain on the power grid. Green hydrogen will play an essential role in decarbonizing industries such as steel and certain modes of transportation, e.g. aviation and road freight.

Battery-based e-mobility will play the leading role in a greener transportation sector. The **German government has already introduced** various purchase grants and tax benefits to accelerate the uptake of electric vehicles. The country's charging infrastructure grew 50 percent in the last year and now includes 27,000 public and semi-public charging stations. The goal is to reach 1 million charging points by 2030 fed from smart grids and energy storage.

Better heaters make a better climate.

One-in-four central heating systems in Germany still burns oil. The building sector alone is currently responsible for around one-third of energy consumption and greenhouse gas emissions. Most buildings in Germany were built before the introduction of energy efficiency standards and there is massive potential for boosting efficiency by renovating existing stock.

Around three quarters of the energy used in Germany's industrial sector is for heating, and mostly high-temperature process heat. **Germany has the largest industrial sector in Europe**, which makes waste heat reduction, recovery and storage a cornerstone of the decarbonization process. **Huge efficiency savings remain unexploited.** New business models such as energy efficiency contracting will also evolve in the coming years.

Creating clarity: Water technology has a bright future

There is change afoot in Germany's water sector. From water efficiency to filtration – interest in new solutions has never been so great making the market rife for new entrants.

Water is a precious resource. How can water use be reduced? How can phosphates be recovered and micropollutants filtered out of waste water? And what happens to sewage sludge? The answers we have today leave room for improvement. The industry is looking for new and innovative products and solutions.

Germany recognized this growing demand early and **has invested more than €70 billion in its public water supply and wastewater management** since 1990, creating Europe's most important market in the process. In 2018, manufacturers in the sector had a turnover of €17.2 billion – a number that continues to grow.

Figures from the Mechanical Engineering Association of Germany (VDMA) show exports of water and sewage treatment equipment totaled € 1.1 billion in 2018, making Germany Europe's largest exporter of the technology. This implies a 15.2 percent global market share, making **Germany the most popular supplier in the world**. Fertile ground for water management companies looking to put a 'Made in Germany' label on their products.

Flowing smoothly: A clear regulatory framework

Companies need reliable regulations to grow. German policy has been pioneering in shaping the market for en-

vironmental technologies and will remain both predictable and innovative going forward.

The general conditions are as clear as the water we all need. And the government's climate protection plan sets ambitious step-by-step targets. This will allow companies to operate across borders and rely on future market growth.

Growth through conservation

Consumers in Germany have been removing less and less water from the environment for the last 20 years, according to the German Environment Agency. To continue this positive trend, **Germany is looking for companies that can optimize industrial processes, reduce wastewater and ensure that water can be reused**.

Saving water generally means saving energy, too. For that, Europe and the world need companies looking to grow with efficient and innovative solutions – within Germany and beyond.

Sludge can make you money

Germany's sewage sludge ordinance is very clear. Highlights of this ordinance include a further significant reduction of pollutants in the soil and phosphorus recovery. Moreover, no specific recovery technologies have been defined. There is plenty of scope for the application and development of innovative recovery procedures.

Why microparticles should not be swimming in the water

Almost everyone has seen images of dead marine animals with their stomachs full of plastic bottles and bags. While microplastics aren't as apparent to the naked eye as these plastics, they are just as dangerous. **Germany is committed to the global fight against these pollutants** and launched a national action plan to this end. At home in Germany, the groundwater and surface water are unfortunately not free of micropollutants either. Companies that have mastered reverse osmosis, that want to build a nanofiltration plant or that can filter water with activated carbon have a market waiting for them here. And other growth markets continue to emerge in Germany. Are you involved in monitoring water resources? Great. Do you have concepts ready to combat flooding? Perfect. Do you use rainwater in green buildings? Brilliant! **Become part of Germany's world-leading ecosystem for environmental technologies.**

Water matters to everyone - including the IT industry

Protecting one of our most basic resources, water, is not only the role of those who work in the sector. The digital revolution in industry – Industry 4.0 – is well underway in the environmental technologies sector, too. "Water 4.0" is the name given to the interconnection of real water systems with virtual models. For example, networked solutions make it possible to measure water needs in real time and to determine if and where a leak has sprung. And predictive technologies are becoming more accurate than ever. IT companies have a clear opportunity here to capture completely new markets with their software and process knowledge.

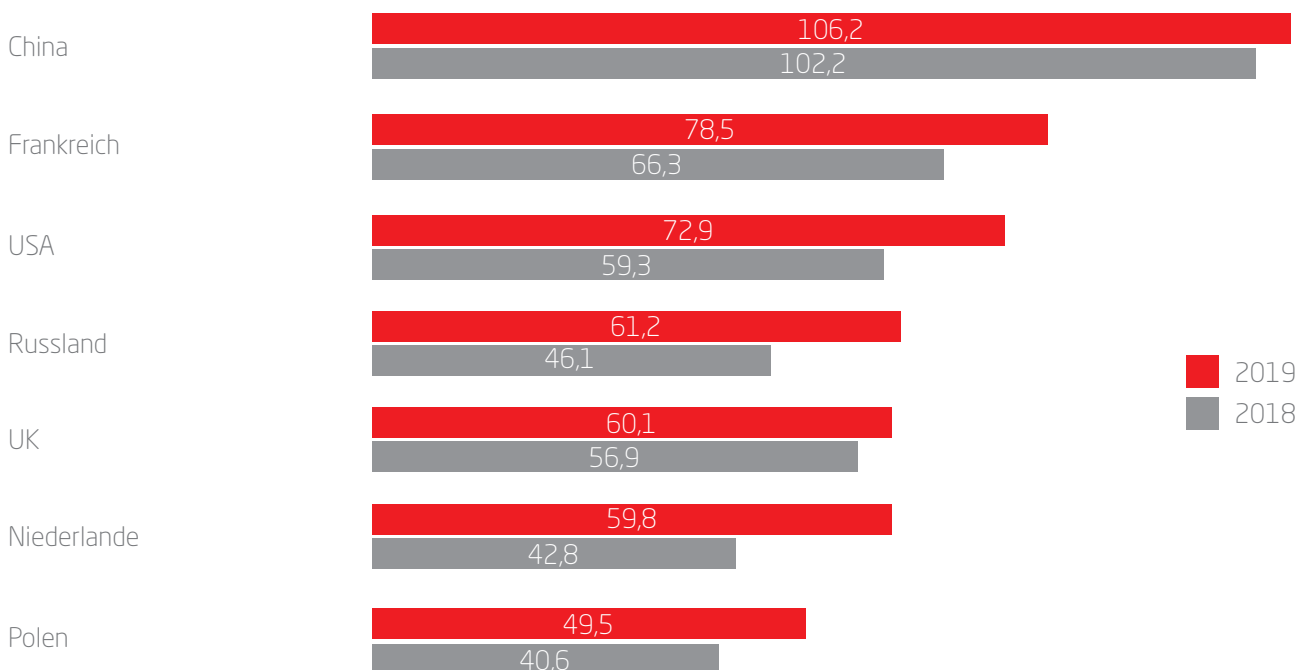
The market volume for sustainable water technology was

EUR 28 billion

in Germany in 2016, which represents a global market share of four percent.

Top export markets for German recycling technology

(in billion €)



Why the circular economy of tomorrow is a complete success

The German waste management sector has a vision: Closed material cycles from production to reuse. In Germany, 98% of municipal waste is already recycled. But that's just the beginning.

Separating trash into color-coded bins is part of German culture. As much as 81 percent of all waste is recycled in the country, but many believe that with the help of modern technology all waste could be returned to the product cycle. **Companies that expand to Germany are joining the global market leader.** An impressive 25% of the market for waste disposal technology comes from Germany. From low-tech to high-tech, from capture to re-cycling – many niches are available to companies that are working on developing the recycling infrastructure of the future. One thing is certain: Germany's circular economy is growing.

What companies can rely on

The German Waste Management Act assigns responsibility for products by defining liabilities throughout product lifecycles and providing incentives for manufacturing long-lasting products. The aim is to transform a culture of waste management into a culture of resource management by minimizing waste generation and maximizing reuse and recycling. The law favors the most environmentally friendly option.

In this context, other laws dictate how matters are handled in the individual sectors. The volume of household packaging waste peaked at 18 million metric tons in 2016. **In January 2019, the new Packaging Act, which stipulates higher recycling rates for packaging, came into force** in Germany. The task is particularly demanding when it comes to plastics: By 2022, the recycling rate for plastic packaging should be at least 63%.

By 2022, the recycling rate for plastic packaging should be at least

63%

Wanted: Companies with ideas. Reward: Markets with guaranteed growth

Plastic waste has long been exported abroad. But no longer. For example, the Chinese government will no longer accept foreign plastic waste. And the 187 parties to the Basel Convention, including Germany, agreed to regulate the disposal and export of toxic plastics in May 2019. From 2021, only sorted, cleaned and recyclable plastics will be freely tradable.

Simultaneously, the German recycling industry is facing new challenges. In 2017, less than half of plastic waste was recycled. This is more than just a hurdle to be cleared – it is a market that's guaranteed to grow. **Doors in Germany are open for businesses with innovative technologies** to turn plastic waste into valuable, recycled materials.

Turning old into new: How wind turbines can be recycled

Where there's wind in Germany there's almost always a wind turbine waiting to take advantage of it. And the number of offshore wind parks continues to grow. But what happens when after 20 or 30 years the turbines wear out and need to be dismantled? The environment could suffer under the leftover cooling fluids, grease,

waste oil or even the dust generated by cutting up rotor blades. The German Environment Agency as well as the association RDR Wind e.V. saw the challenge before it arose and have been working on stopping wind turbines from becoming an environmental burden at the end of their service lives. They have developed economically attractive models and recommendations for companies that dismantle, recycle and repower wind turbines – just another building block in an environmentally friendly economy and a new market for innovative companies.

Making demands and providing support to give everyone an opportunity

The German cabinet is considering an amendment to the Circular Economy Act. While it would make demands of companies, it would also provide help. For example, companies that produce disposable plastic products would have to help foot the bill for cleaning public spaces. But products made from recycled materials would be given priority in public procurement. The cabinet's efforts would not only harmonize national and EU law, but also create new opportunities for everything from small firms to multinationals. Linking environmentally friendly concepts with economic growth makes sense for everyone.



Let us help Germany work for you

Any time you enter a new market you should seek the best information straight from the source. The Germany Works. campaign is that source. We can deliver information about your industry in Europe's biggest economy – at no charge.

Germany drives the European economy but much of that economic performance comes from the more than 36,000 internationally controlled companies that employ more than 3.6 million people in the country. Germany **demonstrates exceptional opportunities for green technologies**. Let Germany Works. be your first stop on a successful commercial journey. We are the doorway to a valuable network of business intelligence, experts and local partners.

From analysis to financing - we offer a broad portfolio of support

Visit germanyworks.com to learn more about the opportunities in Germany, the information available and the support we offer. Germany Works. is provided by Germany Trade and Invest (GTAI), the German government's economic development agency. GTAI can provide industry analyses, information on legal and corporate issues and can point interested companies to subsidies

and financing. The economic and financial environments are changing rapidly in the corona era and our consultants are on hand to help you navigate the effects when expanding your business.

Has germanyworks.com piqued your interest? At GTAI, we understand the German market and we know the relevant institutions. Whether you're just looking for know-how or looking to contact an industrial association, a local chamber of commerce or an economic development agency in one of Germany's 16 states, we're connected. Our experts are ready to show you why Germany is the right location for your business and how you can enter the market.

Germany works, so let it work for you.

Would you like to learn more about green tech in Germany? Then get in touch with:



Thomas Grigoleit

Germany Trade and Invest
Friedrichstraße 60
10117 Berlin
+49 30 200 099 224
thomas.grigoleit@gtai.com



Doerte Schütz

Germany Trade and Invest
Friedrichstraße 60
10117 Berlin
+49 30 200 099 456
doerte.schuetz@gtai.com

Appendix

GTAI:	Factsheet Environmental Technologies in Germany. Seen 10th August 2020 on https://www.gtai.de/gtai-en/invest/service/publications/environmental-technologies-in-germany-64484
GTAI:	Closing the E-Mobility Loop: An Unparalleled German USP. Seen 10th August 2020: https://www.marketsgermany.com/battery-recycling/
GTAI:	Wind Energy – A Sustainable Business in a Stable Investment Environment. Seen 10th August 2020 on https://www.gtai.de/gtai-en/invest/industries/energy/wind-energy-68392.pdf
GTAI:	GTAI: Energiewende zu Ende gedacht: Was geschieht mit den alten Windkraftanlagen? Seen 10th August 2020 on https://www.gtai.de/gtai-en/invest/industries/energy/france-et-allemande-plus-que-des-partenaires-commerciaux-205114.pdf
AmCham Germany:	Transatlantic Business Barometer 2020. Seen 10th August 2020 on https://www.amcham.de/fileadmin/user_upload/Publications/Business-Barometer/2020/Transatlantic_Business_Barometer_2020_ENG_WEB.pdf
Bundesministerium für Wirtschaft und Energie:	Wärmeerzeugung aus Erneuerbaren Energien. Seen 10th August 2020 on https://www.bmwi.de/Redaktion/DE/Publikationen/Energie/waermeerzeugung-aus-erneuerbaren-energien.html
DWA:	Water Management, Wastewater Treatment – International Special Edition. Seen 10th August 2020 on https://en.dwa.de/files/_media/content/05_PUBLIKATIONEN/Mediadaten/KA%20International/KA%20International%202018-2019%20Gesamt.pdf
DESTATIS / Statistisches Bundesamt:	Auslandskontrollierte Unternehmen. Seen 10th August 2020 on https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Unternehmen/Auslandskontrollierte-Unternehmen/_inhalt.html
Ernst & Young:	Standort Deutschland 2019 – Neuer Schwung? EY Attractiveness Survey Deutschland, Juni 2019. Seen 10th August 2020 on https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKE-wiC5dngpfnoAhUGy6QKH5aAEoQFjAAegQIAhAB&url=https%3A%2F%2Fassets.ey.com%2Fcontent%2Fdam%2Fey-sites%2Fey-com%2Fde%2Fnews%2F2019%2F06%2Fey-standortstudie-deutschland-2019.pdf%3Fdownload&usq=AOvVaw3qe2Xy3j-pRq_cEriyKLhH
European Commission:	Circular Economy Action Plan. Seen 10th August 2020 on https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf

Appedix 2

Fraunhofer Institut:	Eine Wasserstoff Roadmap für Deutschland. Seen 10th August 2020 on https://www.ise.fraunhofer.de/content/dam/ise/de/documents/publications/studies/2019-10_Fraunhofer_Wasserstoff-Roadmap_fuer_Deutschland.pdf
German RETech Partnership:	Eine moderne Abfallwirtschaft - Ziele und Wege. Seen 10th August 2020 on https://www.retech-germany.net/themen/der-weg-zur-modernen-abfallwirtschaft
German RETech Partnership:	RETech – das Exportnetzwerk der Entsorgungs- und Recyclingbranche. Seen 10th August 2020 on https://www.retech-germany.net/fileadmin/retech/05_mediathek/retech_publikationen/RETech_Flyer_deutsch_01.pdf
German Water Partnership:	Wasser 4.0 – Water made in Germany. Seen 10th August 2020 on https://germanwaterpartnership.de/wp-content/uploads/2019/05/GWP-Broschüre_WASSER-4.0_de.pdf
KPMG:	Business Destination Germany 2020. Seen 10th August 2020 on https://hub.kpmg.de/studie-business-destination-germany-2020?utm_campaign=Business%20Destination%20Germany%202020&utm_source=AEM
Umweltbundesamt, AGEE:	Erneuerbare Energien in Deutschland. Daten zur Entwicklung im Jahr 2019. Seen 10th August 2020 on https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2020-04-03_hgp-ee-in-zahlen_bf.pdf
The World Bank:	LPI – Logistic Performance Index. Seen 10th August 2020 on https://lpi.worldbank.org/international/global