Green Economy
Network.NRW

GREENTECH MADE IN GERMANY

North Rhine-Westphalia is leading the way for companies in international growth markets

A Measure of the Green Economy Strategy
green economy
Leading in North Rhine-Westphalia

Funded by
Ministry of the Environment,
Nature and Transport
of the State of North Rhine-Westphalia

Welcome to North Rhine-Westphalia

Among Europe's metropolitan regions, North Rhine-Westphalia (NRW) has one of the most powerful economies. Were it an independent country, it would be a world leader in terms of exports. The state is also a national leader, recognized as Germany's No. 1 industrial region. Industry sustains and drives forward research, growth and wealth in our state. Of Germany's top 100 corporations, 37 are based in North Rhine-Westphalia. We are home to the global players.

North Rhine-Westphalia

Capital	Düsseldorf
Area	34,113 km²
Population (2024)	18.2 million
Total workforce (2024)	9.7 million
Gross domestic product (GDP) at current prices (2023)	€839.1 billion
GDP growth compared to previous year	+5.7 %

At the same time, NRW also hosts a significant small and medium-sized business sector. Small and medium-sized enterprises (SMEs) account for 99 % of business enterprises and over 80 % of the total workforce. SMEs are the pillar on which our economy rests. If you think you can only become a market leader if based in New York or Tokyo, then come to North Rhine-Westphalia and think again. Hundreds of thousands of SMEs are daily proof that North Rhine-Westphalia is an SME powerhouse.

NRW also hosts a particularly high concentration of companies offering sustainable products and services. From large industrial sectors to businesses in agriculture and forestry, the region is a major hub for environmentally friendly and resource-efficient solutions. This makes NRW well-positioned to play a leading role in the global transition to a more sustainable future.

Are you looking for partners, markets or products in NRW?
The Green Economy Network.NRW is excited to collaborate with you! Learn more about the green economy in NRW and about collaboration opportunities in this brochure.

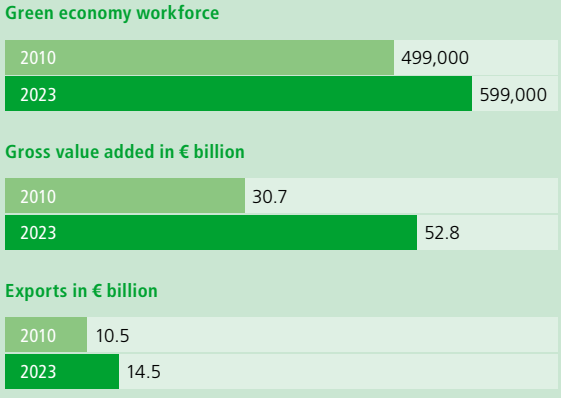
A regional frontrunner in the green economy

North Rhine-Westphalia has undergone a significant transformation from an economy traditionally reliant on coal mining and heavy industry to a leader in innovation and the green economy. In 2012, long before the European Green Deal, NRW became the first federal state in Germany to launch a dedicated green economy strategy. Since then, NRW's political environment has been characterized by its openness to both technological and social innovation, fostering a dynamic environment for sustainable development.

Key initiatives include research and development investments, start-up support, and annual Green Economy Summits.

For the past decade, NRW has been a top provider of eco-friendly, resource-efficient, and climate-conscious products, services, and technologies. In 2023, the green economy employed around 599,000 people, generating a gross value added (GVA) of just under €52.8 billion. This represents an average increase of €1.7 billion GVA every year since 2010. The export of green economy goods has also grown steadily in the past decade, amounting to a total value of €14.5 billion in 2023. NRW has ambitious goals for the sector, aiming for 800,000 employees and a GVA of €70 billion by 2030.

Workforce, gross value added, and exports of the green economy in NRW



Source: Prognos, based on data from the Federal Employment Agency, IT.NRW, and the Federal Statistics Office

The regular assessment of the green economy quantifies developments in eight submarkets reaching from environmentally friendly energy over various water related markets to the sustainable management of forests.

The sectors of the green economy in NRW include:

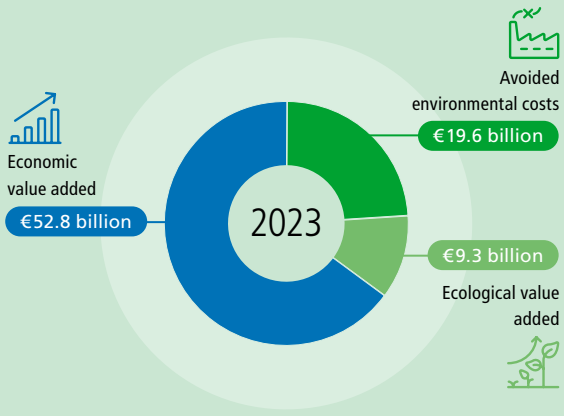
- Environmentally friendly energy conversion, transportation and storage
- Energy efficiency and energy conservation
- Materials, material efficiency and resource management
- Green mobility
- Water and sewage systems and management
- Pollution monitoring, mitigation and restoration technologies
- Sustainable forest management and wood industry
- Environmentally friendly farming

The economic and ecological value of the green economy

The green economy in North Rhine-Westphalia has maintained an annual growth rate of 4.3 %, consistently outperforming the broader economy. It also demonstrated resilience during the COVID-19 pandemic, avoiding the sharp declines in GVA and employment seen elsewhere. This steady performance has continued in the years that followed, reinforcing the green economy as a key pillar of economic stability in NRW.

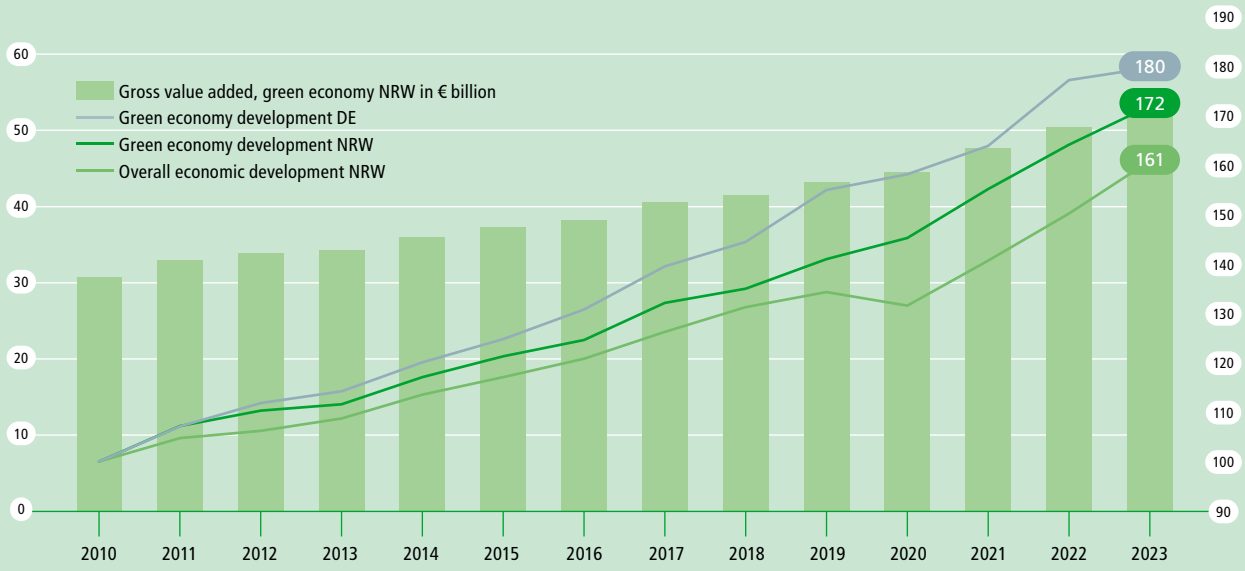
The green economy in North Rhine-Westphalia contributes not only to socio-economic growth but also to ecological sustainability, benefiting the environment, climate, and society as a whole. The environmental performance of the green economy consists of **avoided environmental costs** and **ecological value added**. Avoided costs refer to reductions in greenhouse gas emissions and pollutants, amounting to approximately €19.6 billion in 2023. Ecological value added encompasses services that offer direct environmental benefits, such as resource recovery through recycling and the preservation of natural landscapes and biodiversity. This aspect of the green economy amounted to approximately €9.3 billion in 2023. Taken together, the ecological added value of the green economy can be estimated at around €28.9 billion. This is in addition to the sector's economic GVA of €52.8 billion.

Performance of the green economy in NRW
in € billion (2023)



Source: Prognos/IÖW, own calculation

Indexed development of gross value added for the green economy in NRW and the green economy in Germany (DE) (Index: 2010 = 100)



Source: Prognos, based on data from the Federal Employment Agency and IT.NRW

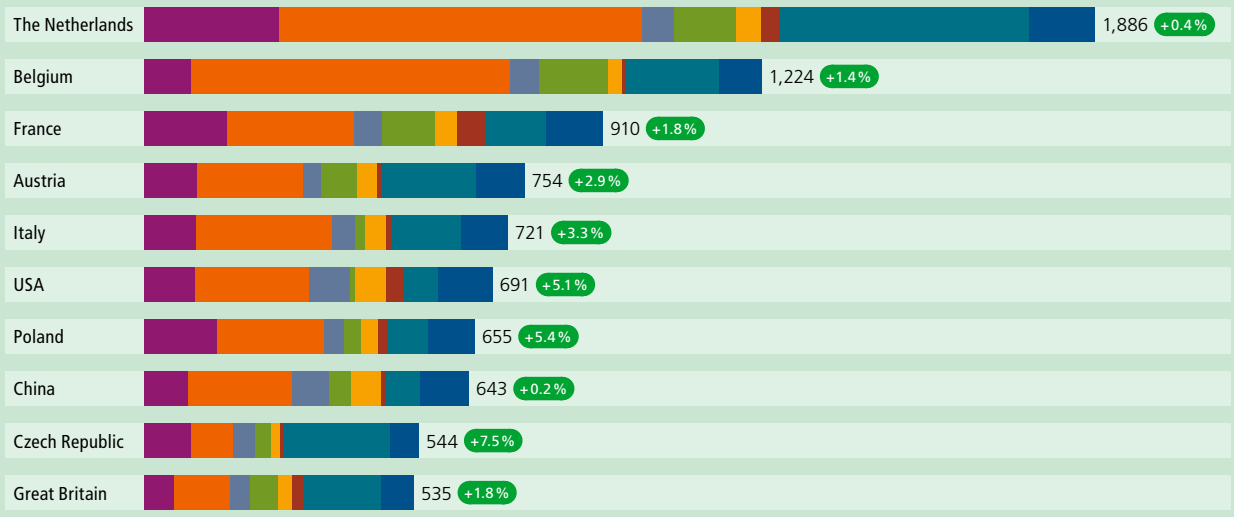
"Greentech made in NRW" provides solutions worldwide

Despite global market uncertainties—including inflation, geopolitical tensions, supply chain disruptions, and volatile energy and raw material prices—demand for environmental goods continues to rise steadily. In 2023, the global market for these goods reached a record volume of approximately €1.5 trillion. Since 2018, the green economy has been growing faster than the global economy as a whole. This also holds true for North Rhine-Westphalia: with an average annual growth rate of 2.5 %, the green economy export rate surpasses the overall export economy's growth rate of 1.9 % per year.

Material recycling, including secondary raw materials, is the most important export field in terms of volume. This is followed closely by **goods for water and sewage networks as well as by process control and MCR technology.**

Europe is the primary destination for North Rhine-Westphalian green economy exports, accounting for more than 75 % of the total exported goods. The Netherlands is the most important export destination, followed by Belgium and France. However, countries like Poland and the Czech Republic display a more dynamic growth as export destinations with growth rates of 5.4 % and 7.5 % respectively. There has also been a notable increase in exports to Asia, which now accounts for 16 % of NRW's total exports. There is a strong potential to increase exports to this part of the world, particularly to countries such as Singapore, Vietnam, South Korea, Thailand and India.

The most important purchasing countries for North Rhine-Westphalian green economy exports in 2023, in € million, and growth 2010–2023 in % annually.



Source: Prognos, own calculation based on data from the Federal Statistics Office

Energy efficiency and energy conservation
Materials, material efficiency and resource management
Pollution monitoring, mitigation and restoration technologies
Environmentally friendly farming
Sustainable forest management and wood industry
Environmentally friendly energy conversion, transportation and storage
Green mobility
Water and sewage systems and management

The 20 most successful export fields of the North Rhine-Westphalian green economy.
Export value 2023 in € million and average growth 2010–2023 in % annually.

Ranking 2023	Technology field	Key goods	Sub-market	2023	2010 –2023
1	**Material recycling**	Secondary raw materials (waste and scrap from iron, steel, aluminum and copper)		2,937	0.4 %
2	**Goods for water and sewage networks**	Pipe and hose systems and their parts for water infrastructure		1,200	2.6 %
3	**Process control and MCR technology**	Circuits, instruments, devices and equipment for controlling energy-efficient production, industrial robots		869	9.0 %
4	**Drive technology**	Biofuels, fuel cells, biodiesel, hybrid drives, batteries and e-mobility		797	13.5 %
5	**Systems engineering**	Machines for the production, treatment or processing of paper or cardboard and products thereof, mechanical engineering products for classifying, separating, sorting waste		722	1.2 %
6	**Alternative vehicles**	Locomotives, freight wagons and their running gear parts		677	–1.2 %
7	**Insulation materials**	Mixtures and goods made of mineral materials for heat, cold or sound insulation purposes and similar products		609	0.9 %
8	**Vehicle technologies**	Apparatus for filtering or purifying gases by catalytic processes, exhaust silencers and low-rolling resistance tires		552	4.3 %
9	**Measurement and control technology**	Digital processing units, measuring instruments and technology		547	14.2 %
10	**Wood-based materials**	Chipboard, fiberboard and composite panels made of wood		457	0.4 %
11	**Building technology**	ICT for smart homes, efficient power generators, light-emitting diodes (LEDs), exhaust gas heat exchangers, heat recovery, etc.		400	4.5 %
12	**Wastewater treatment**	Devices and their parts for filtering or purifying water, other liquids or gases		391	3.1 %
13	**Filter technology and catalysts**	Devices for filtering or purifying air and gases		339	7.3 %
14	**Green agricultural technologies**	Ecologically advantageous agricultural machinery, plant protection products for organic farming		309	5.9 %
15	**Materials made from renewable raw materials**	Bioplastics, natural fiber-reinforced plastics, composites		307	1.2 %
16	**Bicycles, bicycle components and accessories**	Bicycles, e-bikes and bicycle accessories		282	5.2 %
17	**Timber building materials**	Doors and frames made of wood, floor panels, timber products, raw wood and prefabricated buildings made of wood		273	7.2 %
18	**Compressed air and pump systems**	Energy-efficient pump systems (incl. circulation pumps)		267	2.9 %
19	**Exhaust gas recirculation systems**	Control valves and parts of devices for filtering or purifying liquids or gases, air handling equipment		253	2.8 %
20	**Waste heat utilization**	Heat pumps and machines for cooling		211	12.6 %

Source: Prognos, own calculation based on data from the Federal Statistics Office

Materials, material efficiency and resource management
Water and sewage systems and management
Energy efficiency and energy conservation
Green mobility
Sustainable forest management and wood industry
Pollution monitoring, mitigation and restoration technologies
Environmentally friendly farming

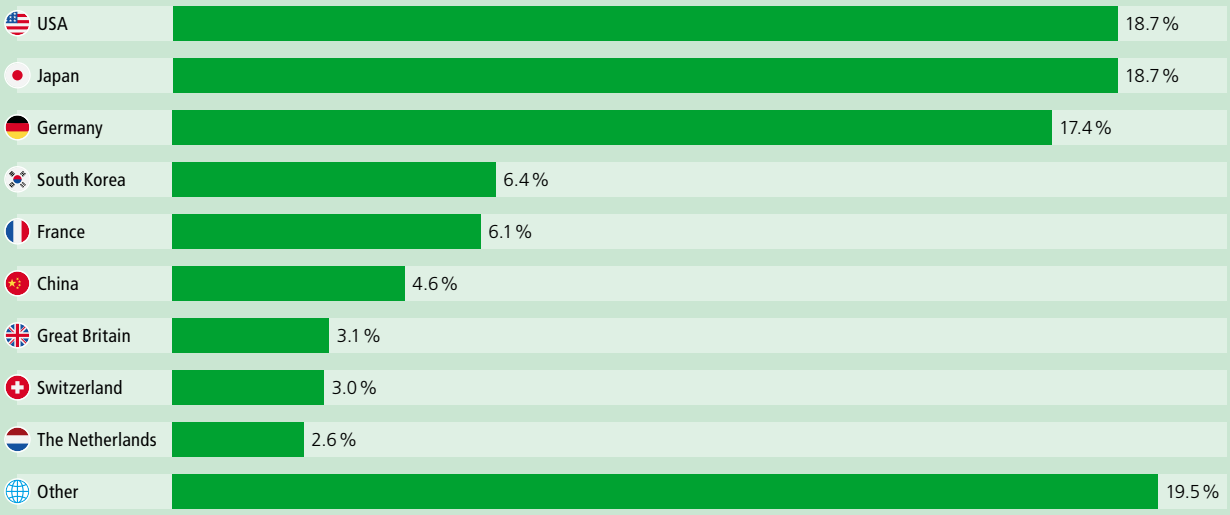
Innovation in NRW – the story of a successful transition

Forward-thinking technologies and innovative services are key to driving the global shift toward sustainable, climate-neutral, and circular economies. With 17.4 % of global patent applications, Germany ranks third internationally among innovation players in the green economy. Only the United States and Japan have higher shares with 18.7 % each.

In a national comparison, North Rhine-Westphalia ranks third among the 16 federal states, with 14.9 % of all German patent applications. The highest shares of environmental patents can be found in the submarkets materials, material efficiency and resource management (26 %), water management (23 %), and environmentally friendly agriculture (20 %). In these submarket segments, NRW offers particularly promising innovations for the successful implementation of transformation processes, with local companies and organizations playing a crucial role in shaping these future-focused solutions.

Technology from NRW: Primobius, a subsidiary of plant manufacturer SMS group, handed over a newly built battery recycling factory to Mercedes-Benz in 2024.

Country shares of total green economy patents between 2010 and 2021



Source: Prognos, own calculation based on PATSTAT, 2024

Deep Dive #1: Battery recycling

The growing demand for raw materials and used batteries requires innovative recycling solutions. The rise of electric mobility and energy storage is driving battery demand, relying on critical materials like lithium, cobalt, and nickel. Battery recycling plays a crucial role in addressing challenges such as material shortages, resource dependency, environmental impact, and production costs. In addition, the new EU Batteries Regulation strengthens the market for battery recycling.

North Rhine-Westphalia is at the forefront of battery research and recycling, with a strong network of universities, institutes, start-ups, and companies. Projects like DemoRec and REVAMP, led by RWTH Aachen and Fraunhofer IPT, focus on automating and optimizing recycling processes, including sensor-based disassembly and Second-Life applications for used batteries. Companies such as Cylib and Accurec Recycling are advancing sustainable methods like hydrometallurgical recycling, which efficiently recovers valuable materials for new battery production.

NRW's innovation ecosystem, supported by initiatives like the Fraunhofer Research Institution for Battery Cell Production (FFB) in Münster, positions the region as a global leader in battery recycling. With a growing cluster of research and industry players, NRW offers significant potential for collaboration and innovation, advancing circular economy solutions and sustainable battery technologies.

The NRW state government is committed to making battery recycling a core component of its research and development strategy, ensuring that future battery technologies are designed for optimal recyclability.

Deep Dive #2: Pioneering recycling solutions for renewable energy

As renewable energy expands rapidly in Germany, wind turbines and solar panels from the first generation are reaching the end of their lifespan, creating a growing need for innovative recycling solutions. Wind turbines typically last 20–30 years, while solar panels last 25–30 years. This growing volume of waste requires efficient methods to recover valuable materials and minimize environmental impact.

Germany is expected to dismantle up to 1 million tons of solar panels by 2030, with up to 4.3 million tons projected by 2050. Companies in NRW, such as Reiling and PV Cycle, have already positioned themselves in this emerging market. Reiling, a recycling leader, has developed a three-step process to recover materials like glass and aluminum from old solar modules. Their PV Recycling Center in Münster processes 50,000 modules annually, contributing to a circular economy by recovering critical materials like silicon and silver.

Wind turbine recycling poses challenges, particularly with rotor blades made from composite materials. The German Federal Environment Agency estimates that up to 50,000 tons of rotor blade material will need recycling annually by the 2030s. Current recycling methods are limited, with most blades being incinerated in the cement industry, a process that generates high CO_2 emissions. However, projects like BladeReUse and rethink*rotor are exploring innovative solutions, such as repurposing rotor blades for infrastructure projects like noise barriers.

NRW is home to numerous research institutions, energy providers, and innovative companies leading advancements in the recycling of wind turbines and of photovoltaic systems. With expertise in dismantling wind turbines and solar panels, NRW has the potential to become a leader in the circular economy for renewable energy systems, positioning itself at the forefront of this growing global market.

Deep Dive #3: Smart monitoring of water systems

Efficient water management is crucial for economic growth, but climate change presents new challenges such as water scarcity, fluctuating availability, and threats to water quality. While water management systems were traditionally designed based on predictable rainfall patterns, climate change has disrupted these patterns, with wetter winters and prolonged dry periods becoming more common. To prevent shortages and respond to extreme weather, real-time data is essential.

NRW is a leader in developing innovative solutions for water management challenges. Sensor networks and IoT play a critical role in gathering real-time data to manage water systems more efficiently. Companies like Okeanos, based in Bochum, have developed smart sensors such as the "Floodlight" system, which uses AI to predict and warn of flood risks. Another example is fuseki GmbH's digital platform, which supports AI-based systems for stormwater management, helping cities like Duisburg protect against flooding and improve wastewater management.

Other NRW-based companies focus on optimizing resources. Cologne's Lisios GmbH has created a water alarm system to detect leaks early, preventing damage and unnecessary water loss.

NRW boasts extensive expertise in water management, supported by major organizations such as the Emschergenossenschaft and Lippeverband, Germany's largest wastewater treatment operators. Leading water suppliers like Gelsenwasser AG and institutes like the Research Institute for Water Management and Climate Future at RWTH Aachen University (FiW) and IWW Water Centre drive innovation in this sector. The region also fosters innovation through initiatives like the Competence Center for Digital Water Management (KDW), established in Essen in 2020, which promotes digitalization across NRW's traditionally structured water industry. NRW's blend of strong infrastructure, cutting-edge research, and innovative start-ups positions it as a leader in the future of water management.

The Green Economy Network.NRW is ready to collaborate with you!

Green Economy
Network.NRW

The **Green Economy Network.NRW** is a hub for companies providing green technologies and services made in NRW. The network serves as a central point of contact for associations, universities, and economic development agencies in NRW. It also identifies international market opportunities and promotes innovative technological solutions in the region and abroad.

- Innovation screenings and promotion
- Intersectoral dialogue with green economy partners
- International events and trade fairs to foster regional and international exchange

The Green Economy Network.NRW plays an important role in implementing the Green Economy Strategy of North Rhine-Westphalia's regional government. The strategy supports businesses and regions in successfully expanding into national and international green economy markets and harnessing the potential of environmental protection for economic growth as well as employment.

Contact points to set up your business in NRW:

NRW.Global Business, the state-owned trade and investment agency, is the partner for all companies when it comes to investment projects and settling in North Rhine-Westphalia, developing growth markets and networking with international business partners. NRW.Global Business conducts international location marketing for North Rhine-Westphalia and promotes worldwide foreign direct investment. The experts analyse investment plans, identify suitable locations and accompany an investment project from the first step to successful settlement and beyond.

In its capacity as the promotional bank for North Rhine-Westphalia, **NRW.BANK** supports innovative green economy businesses in all financing-related matters – with promotional loans, equity finance and comprehensive, provider-independent and free promotional advice.

IHK NRW is the state association of the 16 chambers of commerce and industry (CCI) in North Rhine-Westphalia, representing the interests of the CCIs and their member companies. In foreign trade promotion, the CCIs accompany enterprises in their foreign business activities as a reliable partner and offer a broad range of information and advisory services.

Find your best match among the green economy partners in NRW:

Greentech.Ruhr is a project of the economic development agency of the Ruhr region dedicated to the transformation of the former leading coal and steel area into a green innovation hub.

KUER.NRW supports start-ups in the sectors of climate, environment, energy efficiency and resource conservation – from brainstorming and the preparation of a business plan to the founding of the company, market launch and financing.

The **Effizienz-Agentur NRW** provides consulting services for resource efficiency, assistance with funding, and networking opportunities, thereby helping companies implement circular design and circular economy approaches.

:metabolon is a cutting-edge waste plant and research facility with tested practices and internationally renowned research infrastructure that can be of interest to any business working with waste treatment and circularity.

The **Network on Climate Adaptation & Business.NRW (NKU)** connects key stakeholders in the field of climate adaptation. It supports the development of innovative solutions to climate adaptation and offers support for companies that aim to increase the resilience of their branches or supply chains to changing climatic conditions.

Circular Valley is a global hub for the circular economy, connecting businesses, start-ups, scientists, and policymakers to promote sustainable economic models. It offers mentoring, networking, and resources to help develop innovative circular solutions, focusing on reducing waste and pollution across industries.

The **Competence Center for Digital Water Management (KDW)** in North Rhine-Westphalia focuses on promoting digital solutions and cybersecurity within the water management sector. It provides industry-specific networking, training, and resources to strengthen the sector's resilience and innovation. KDW also offers workshops, e-learning, and career opportunities aimed at driving the digital evolution of water management.

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The Green Economy Network North Rhine-Westphalia

The Green Economy Network.NRW (KNUW), which is funded by the Ministry of the Environment, Nature and Transport of the State of North Rhine-Westphalia, supports the development of the green economy in NRW by providing opportunities for networking, information, research and development, internationalisation, and market development. The Green Economy Network.NRW organises the annual Green Economy Summit as the industry meeting place for North Rhine-Westphalia's green economy. The aim is to stimulate cooperation and networking, and to promote the transfer of knowledge and market-ready technological solutions.

Further information
www.knuw.nrw/green-economy-network-nrw.html

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