



THE ADAPTATION SECTOR AT THE GLOBAL LEVEL

Markets, developments and prospects
for North Rhine-Westphalia

INHALT

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DEAR READERS,

2023 broke another dubious record in North Rhine-Westphalia and was once again the warmest year since weather records began. The temperature increase in our federal state is already increasingly exceeding the limit of 1.5 degrees Celsius set in the Paris Climate Agreement.

The consequences are clear: the climate crisis is hitting us with full force and has serious consequences for people, the environment, infrastructures and companies. Heat, dryness and drought, heavy rainfall and flooding - we have suffered painfully in recent years. We must expect extreme weather to occur more frequently in the future: The climate crisis will make storms more frequent and more severe. There will be more days with temperatures above 40 degrees and longer periods of drought. In order to keep our future liveable, we need to invest even more in preventive measures in addition to our commitment to climate protection.

The good news is that we can effectively counteract the climate crisis and increasing extreme weather events with flood protection measures, extensive unsealing measures, the renaturation of rivers,

massive greening of our cities and much more. This comprehensive transformation has only just begun, and the investments required are enormous. This offers considerable potential for business models. We see companies that take on these challenges and offer adaptation solutions as part of a promising new 'adaptation sector'.

This brochure shines the spotlight on this new sector for the first time and shows that North Rhine-Westphalia is already home to a large number of companies in the climate adaptation industry. As the state government, we are committed to ensuring that NRW is and remains an attractive location and that our companies find good conditions for trading their climate adaptation products internationally.

Oliver Krischer

Minister for the Environment, Nature and Transport of the State of North Rhine-Westphalia

Stakeholders from science, business and politics emphasize the need to actively exploit the potential of the adaptation sector and implement concrete measures to promote it. The findings of this analysis of global markets are seen as a positive impetus that will make it possible to identify promising growth opportunities, adapt strategies and strengthen NRW's global presence.



DEAR READERS,

Numerous municipalities, organizations, companies and citizens are already involved in the field of climate impact adaptation, from the education to the construction sector. However, compared to the need for adaptation that already exists today and, above all, that which will arise in the medium and long-term future, there is still a large implementation gap. The demand for adaptation solutions is growing significantly - and will undoubtedly have to increase enormously in the coming years in order to meet the need for adaptation. At the same time, supply is also growing: more and more companies are developing new products and services to tackle climate change, numerous new start-ups and existing players are expanding the business in climate change adaptation. After all, climate change is not only real in Germany - the need for adaptation solutions is already there worldwide and is expected to grow strongly in the coming years and decades!

The adaptation sector in Germany is booming - especially in North Rhine-Westphalia, the pioneering federal state. It is therefore not surprising that climate adaptation solutions 'made in NRW' are sold all over the world. But who are the biggest trading partners for

climate adaptation goods from NRW? Which market is growing the fastest? Where does NRW get relevant supplies from? And which goods are in particular demand internationally? We answer all these questions in this brochure, which for the first time looks at the foreign trade links of the up-and-coming sector of the climate adaptation economy!

Use this information to deepen your knowledge of international relations in this sector, to underpin expansion decisions or to enter the conversation with potential trading partners.

Whichever way you drive the adaptation sector forward: Only with more supply will we be able to meet the demand and the need for adaptation worldwide in order to shape a climate-resilient future. Let's tackle this task together!

I wish you an informative read and look forward to hearing from you if you have any questions or comments for us in the Network Climate Change Adaptation & Businesses.NRW!

Kindly Irene Seemann

Network Manager
Network Climate Change Adaptation & Businesses.NRW



to the network

ZUSAMMENFASSUNG DER KERNERGEBNISSE

Die Klimaanpassungswirtschaft ist eine zunehmend relevante Querschnittsbranche, die sämtliche Technologien und Dienstleistungen zum Umgang mit den Klimawandelfolgen in sich vereint. Die vorliegende Broschüre beschäftigt sich erstmals mit den globalen Handelsverflechtungen dieser Güter und zeigt die Rolle von NRW als wichtigem Player in diesem Gefüge auf.

In NRW waren im Jahr 2021 ca. 190.000 Personen in der Branche beschäftigt. **Damit ist die Anpassungswirtschaft in NRW in ihrer Größe in etwa so bedeutend wie die Chemie- und Pharmabranche zusammen gerechnet und stellt sich mit einem Wachstum von 1,6 % p.a. sogar noch etwas dynamischer dar.**

Größte Teilbereiche der Anpassungswirtschaft in NRW sind die Energieeffizienten und Resilienten Gebäude, sowie die Infrastrukturen für Wasser, Abwasser und Überflutungsschutz. In beiden Teilmärkten exportierte NRW im Jahr 2021 jeweils Waren im Wert von ca. 1 Mrd. €. **Schaut man sich alle Teilmärkte der Klimaanpassungswirtschaft an, ist NRW Netto-Exporteur:** Den ca. 3 Mrd. € an Exporten standen ca. 2,8 Mrd. € an Importen gegenüber.

Damit entfallen circa 2 % der global gehandelten Güter der Klimaanpassung auf den Export aus NRW. Im Jahr 2021 wurden global insgesamt ca. 150 Mrd. € an Gütern der Klimaanpassung gehandelt.

Größte Player sind hier wenig überraschend die USA und China: ca. ein Viertel der auf dem Weltmarkt gehandelten Güter der Anpassungswirtschaft kommen aus China (Tendenz steigend) – während mit den in den USA produzierten Gütern circa 20 % der weltweiten Nachfrage gedeckt werden.

Interessante Entwicklungen in Märkten zeigten sich auch in Ländern in Osteuropa (z.B. in Polen und Ungarn), sowie in Südostasien (bspw. Indien, den Philippinen, Bangladesch und Vietnam), die in den vergangenen Jahren ein starkes Wachstum der Im- bzw. Exporte zu verzeichnen hatten.

Das Wachstum der Exporte der Anpassungswirtschaft in NRW liegt dabei über dem Wachstum der Exporte der Gesamtwirtschaft. Zwischen 2011 und 2021 nahmen diese jährlich um ca. 3,1 % zu.

Dies zeigt die steigende Bedeutung der Güter und Technologien, sowie auch die Krisenfestigkeit des Sektors während der Corona-Pandemie.

Auch innerhalb Deutschlands kommt NRW in der Anpassungswirtschaft eine besondere Rolle zu: Die deutschen Exporte 2021 betragen ca. 17 Mrd. €, **sodass ca. jeder sechste € der Exporte aus Nordrhein-Westfalen kam.**

EXECUTIVE SUMMARY

The climate adaptation economy is a new cross-sectoral industry that encompasses all technologies and services for dealing with the consequences of climate change. This brochure is the first to look at the flows of global trade in these goods and to analyze the role of NRW as an important player.

In NRW, about 190 000 people were employed in the adaptation economy in 2021. **This makes the adaptation economy in NRW roughly as important in terms of employment as the chemical and pharmaceutical sectors combined, while it grew somewhat more dynamic in the last decade, with an average rate of 1.6 % p.a.**

The largest sub-sectors of the adaptation economy in NRW are the markets 'energy-efficient and resilient buildings' and 'infrastructures for water, wastewater and flood protection'. In both submarkets, NRW exported goods worth around € 1 billion in 2021. **The federal state is a net exporter in the adaptation economy:** approximately € 2.8 billion in imports are offset by about € 3 billion in exports.

Thus, NRW has a share of around 2 % of the global climate adaptation market: In 2021 a total of around € 150 billion in adaptation goods were traded globally.

Unsurprisingly, the biggest players are the USA and China: around a quarter of all goods traded on the global adaptation market come from China - while the USA are responsible for around 20 % of total demand.

Beyond size, there are interesting developments to be observed in some Eastern european (e.g., Poland and Hungary), and Southeast Asian countries (e.g., India, the Philippines, Bangladesh and Vietnam), which exhibited strong growth in imports and exports in recent years.

Notably, growth of exports in the North Rhine-Westphalian adaptation economy is higher than the growth of total NRW exports. Between 2011 and 2021, the former increased by around 3.1 % annually. This is a testament to the increasing importance of goods, as well as to the sector's resilience during the Corona-virus pandemic.

The federal state also stands out in relation to the rest of the German adaptation economy: German exports in the adaptation economy in 2021 amounted to around € 17 billion, **meaning that around one in six euros of these exports came from North Rhine-Westphalia.**



[zum Netzwerk](#)

International cooperation on climate change adaptation is emphasized by business and political actors as crucial for the development of effective solutions, with joint analysis and transnational learning playing a central role. Companies emphasize the versatility of their products in a changing world, which can help raise awareness of climate adaptation and promote regional resilience.

THE NKU SUPPORTS COMPANIES IN THEIR TRANSFORMATION TOWARDS A RESILIENT FUTURE

The Network Climate Change Adaptation & Businesses.NRW (NKU) began its work in November 2021. It is a partner and link between companies and other stakeholders such as research institutions, associations and business development organizations on the topic of climate adaptation at the local and regional level in North Rhine-Westphalia.

The central aim of the network is to strengthen climate adaptation by companies in NRW.

It identifies companies that provide adaptation technologies and solutions and makes the diverse activities of climate adaptation 'made in NRW' visible. In this way, it promotes the potential of the climate adaptation sector and supports the development of new (international) markets.

It also activates companies in NRW to deal with climate risks and creates a platform providing targeted support and tailored information to ensure a better exchange among each other.

The network offers companies the following services, among others:

- A funding navigator to identify possible funding channels for adaptation measures.
- Various 'climate check tools' that companies can use to make an initial assessment of their own impact on climate change.

- Establishing contact between companies that want to adapt and those that provide adaptation goods.
- Monthly consultations on current developments and issues in the field of climate adaptation.
- The annual 'Climate Resilience Forum' as a meeting place for the adaptation industry.
- Analyses of the market situation, for example in the area of foreign trade.
- Research and promotion of best-practice examples as showcases and sources of inspiration.
- Numerous other events on the topic of climate adaptation in companies.

The ecosystem of NRW's adaptation sector also relies on international partners, companies and innovators from abroad to expand its capacities and services. We are therefore always happy to enter international collaborations. Together, the aim is to create a more resilient and sustainable world and a better future.

Do you want to make your company fit for climate change? Do you offer solutions for climate adaptation? Or are you interested in getting in touch with companies from the adaptation sector in North Rhine-Westphalia? Then visit us at:

www.klimaanpassung-unternehmen.nrw/en and become part of the network community or send us an e-mail at: netzwerk@klimaanpassung-unternehmen.nrw.

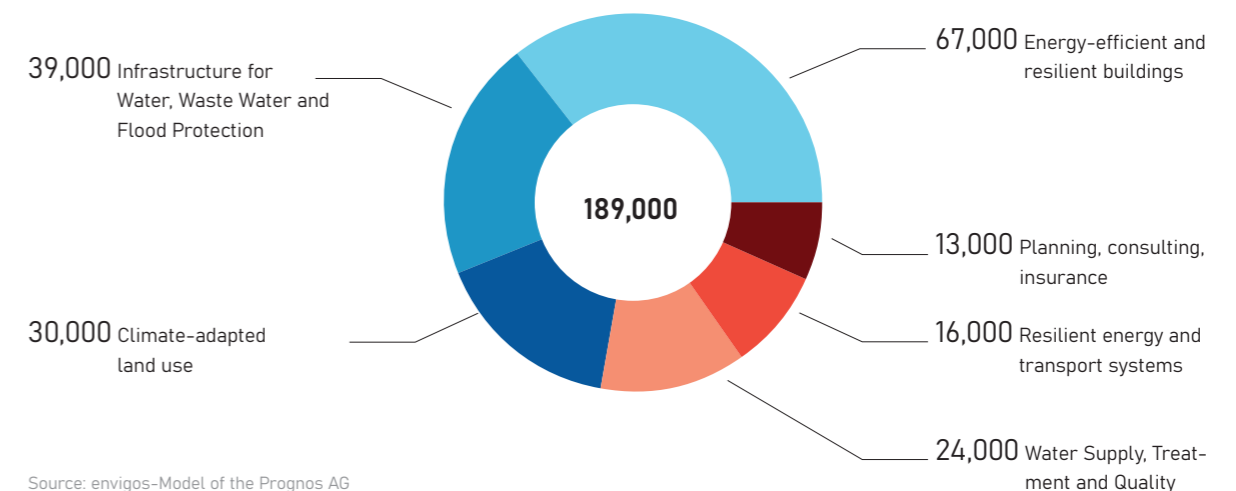
The best opportunity to get to know the vibrant and diverse adaptation sector in NRW is our annual 'Climate Resilience Forum' in Düsseldorf, the largest meeting for companies in the adaptation sector!



ESTABLISHING THE ADAPTATION SECTOR IN RESPONSE TO CLIMATE CHANGE

The transition to a sustainable and climate-adapted future is one of the most urgent challenges of our time. As the need for adaptation grows, so does the demand for adaptation solutions and thus their economic potential. The adaptation sector is an emerging sector that offers such solutions. It consists of products and services for the preventive avoidance or mitigation of potential damage. This can increase resilience to actual and expected climate impacts.

NUMBER OF EMPLOYEES IN THE ADAPTATION SECTOR OF NORTH RHINE-WESTPHALIA IN 2021. CALCULATIONS BASED ON THE ENVIGOS-MODEL OF PROGNOSES AG



Source: envigos-Model of the Prognos AG

Climate change now affects all areas of life in Germany and North Rhine-Westphalia: Heat, drought, heavy rainfall, river flooding and storms affect a wide variety of areas of life and the environment through a multitude of interrelationships and dependencies: they cause direct damage (for example to buildings and infrastructure), but also indirectly cause health problems, result in increased susceptibility to pests and yield losses in agriculture and forestry. These progressive consequences of climate change make adaptation to change indispensable in addition to preventive climate protection.

In order to deal with the consequences of climate change and adapt to the new climate reality, innovative products and services are needed, which are subsumed under the term **climate adaptation sector**.

NRW is not only a pioneer in the development of adaptation products and services, but also in the definition and measurement of this segment of the economy. The adaptation sector comprises six subsectors (see diagram above).

Planning, consulting and insurance services play a special role in the context of this brochure: As they only comprise services and no tradable goods, this subsector is not quantified, but is described qualitatively on **page 36**.

In NRW, the number of companies offering products and services for adaptation to climate change is particularly high, accounting for 2 % of the overall economy (measured in terms of gross value added). One in five euros of the adaptation sector in Germany is generated in NRW.

SUBSECTORS, PRODUCTS AND SERVICES OF THE ADAPTATION SECTOR

The solutions provided by the adaptation sector for consequences of climate change can be structured into a total of six subsectors. These cover all economic sectors from the primary to the tertiary sector and increase resilience to all impacts of climate change, from low water and droughts to heavy rainfall and flooding.



Products in the **'Energy-efficient and resilient buildings'** subsector include all technologies for protecting buildings and their residents against the effects of heat, heavy rain, flooding, hail and storms. In particular, this includes green roofs and façades, insulation systems, shading systems and energy-efficient air conditioning for buildings.



The subsector for **'Infrastructures for water, wastewater and flood protection'** includes products and facilities for mobile and stationary flood protection (e.g. dykes, retention basins, backwater flaps, mobile flood barriers) to protect against heavy rainfall and flooding. This can mitigate or prevent damage to buildings and facilities as well as the health consequences of heavy rainfall and flooding.

The **'Water supply, treatment and quality'** subsector, in contrast to the 'Infrastructure for water, wastewater and flood protection' subsector, includes structures that serve to supply clean drinking water. Especially on hot days, the provision of water in drinking fountains and ensuring the quality of the water is important in order to prevent negative health consequences for the population. This also includes the continuous monitoring of water quality and quantities.



The **'Resilient energy and transport infrastructure'** subsector consists of services and products that are necessary to ensure the performance of infrastructures in the event of extreme weather or disasters. This includes technologies for the maintenance of rails and bridges as well as smart grids and decentralized energy storage systems that support a resilient electricity system that functions even under adverse conditions or can be restarted at an early stage.



Products in the subsector for **'Climate-adapted land use'** include a wide range of applications: From efficient irrigation technologies and the near-natural management of climate-adapted (mixed) forests to animal welfare-oriented husbandry (to also protect livestock from heat stress) and erosion control techniques enable a future-oriented and sustainable use of land and soil, thus reducing the effects of drought and flooding events.

The **'Planning, consulting, insurance'** subsector plays a special role: It includes mostly non-tradable services instead of tradable material goods (and is therefore not included in the quantitative evaluations in this brochure), but nevertheless represents an important part of the adaptation sector: Concept studies and infrastructure plans, as well as consulting services for companies, private individuals and administrations, play a fundamental role as 'enablers' of climate adaptation in preventing damage and building resilient systems. Natural hazard insurance services can also be found in this subsector.



THE ADAPTATION SECTOR AND ITS GLOBAL ACTIVITIES

The adaptation sector is a cross-sector industry represented in all parts of the world with a globally traded goods value of over € 153 billion in 2021. With an annual export growth of approx. +6.4 %, it is developing much more dynamically than the trade volumes of the economy as a whole (approx. +4.5 % p.a.). On the export market, China dominates the picture, with the USA being the largest import market.

Globally, the trade volume of the adaptation sector was around € 153 billion in 2021. A look at the ten largest export countries in the adaptation sector shows that they are responsible for almost three quarters of global trade. The import structures by country, on the other hand, are somewhat more diversified, with the ten largest buyer countries being responsible for only around 60 % of global trade.

In addition to the major industrial countries, the list of the largest exporting nations also includes some smaller or currently fast-growing countries such as Mexico, Vietnam, Poland and the Czech Republic. Traditionally strong exporting nations such as Japan and the UK, on the other hand, are ranked a little bit further down the list.

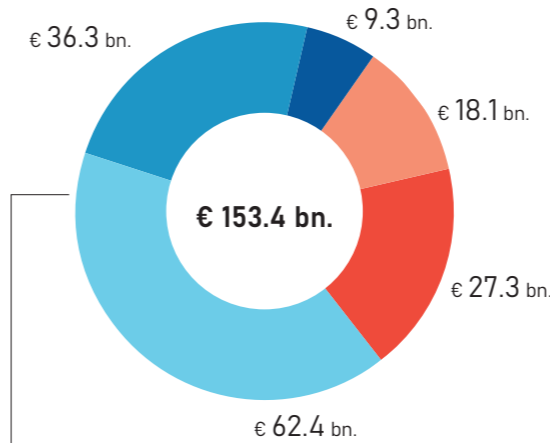
One country stands out in particular when looking at export flows: in 2021, China exported as much

as the entire German (the second strongest export country) adaptation sector with technologies in the energy-efficient and resilient buildings subsector alone. China is also experiencing extreme growth in the adaptation sector: in the decade from 2011 to 2021, the value of exported goods has more than doubled.

The smallest and at the same time most dynamic subsector are the technologies of 'Climate-adapted land use' with a global market volume of around € 9.3 billion and growth rates of around 13 % p.a. between 2011 and 2021.

The largest subsector, with a share of over 40 % of all exports, is the 'Energy-efficient and resilient buildings'. However, it can also be seen that no subsector has growth rates below 5 % p.a. for the period 2011 to 2021, which once again underlines the dynamics of

BREAKDOWN OF THE TOTAL VOLUME TRADED GLOBALLY IN THE ADAPTATION SECTOR IN 2021 BY SUBSECTORS



Source: World Trade Model of the Prognos AG

- Resilient energy and transport infrastructure
- Climate-adapted land use
- Energy-efficient and resilient buildings
- Water supply, treatment and quality
- Infrastructures for water, wastewater and flood protection

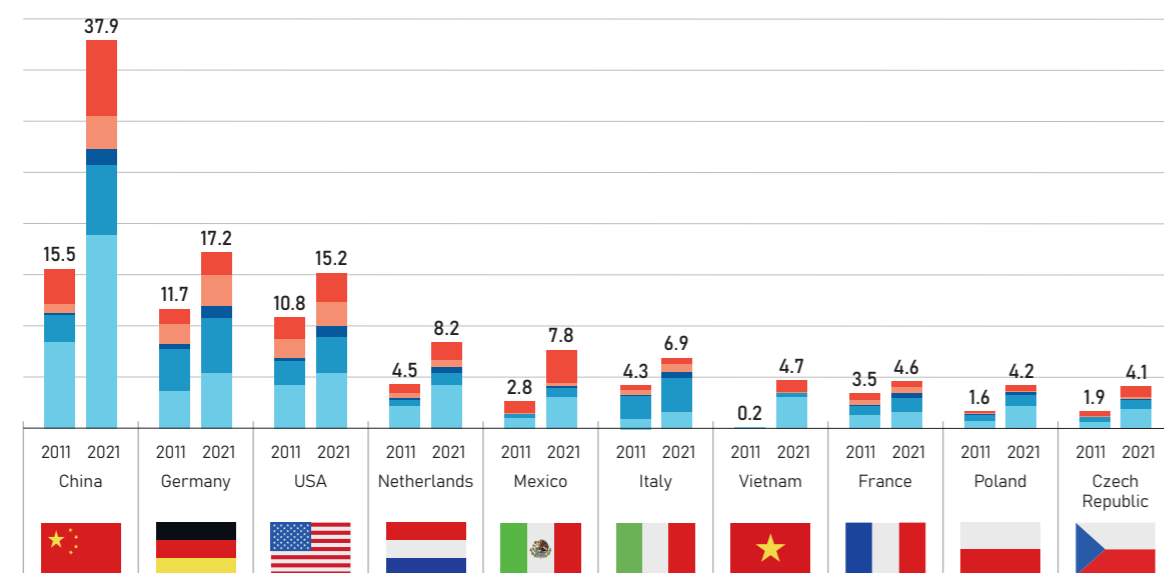
the adaptation sector and the demand for its technologies on a global level.

If one look at the import perspective instead of the export perspective, we see a role change between the USA and China:

In 2021, the USA imported more with its activities in the 'Energy-efficient and resilient buildings' subsector alone than China did in the entire climate adaptation sector.

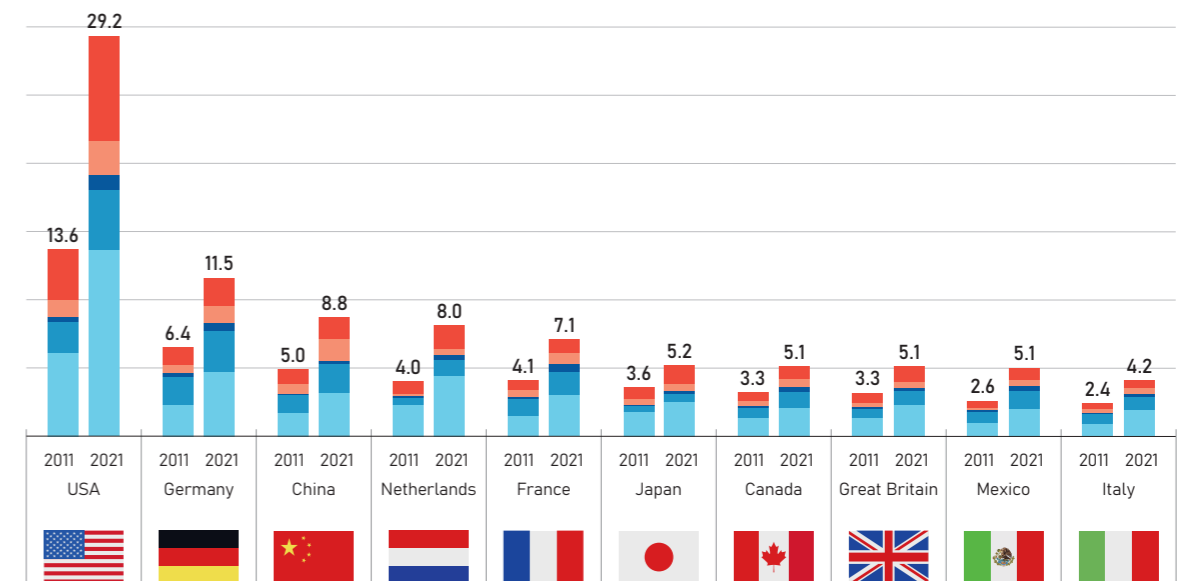
Although Germany is in second place for both imports and exports, it is a net exporting country with a positive export balance of around € 5.7 billion in 2021. Between 2011 and 2021, the export and import volumes of the adaptation sector increased by a similar amount in absolute terms.

THE 10 LARGEST EXPORTING COUNTRIES IN THE ADAPTATION SECTOR BY SUBSECTOR, 2011 AND 2021 IN € BILLION



Source: World Trade Model of the Prognos AG

THE 10 LARGEST IMPORTING COUNTRIES IN THE ADAPTATION SECTOR BY SUBSECTOR, 2011 AND 2021 IN € BILLION



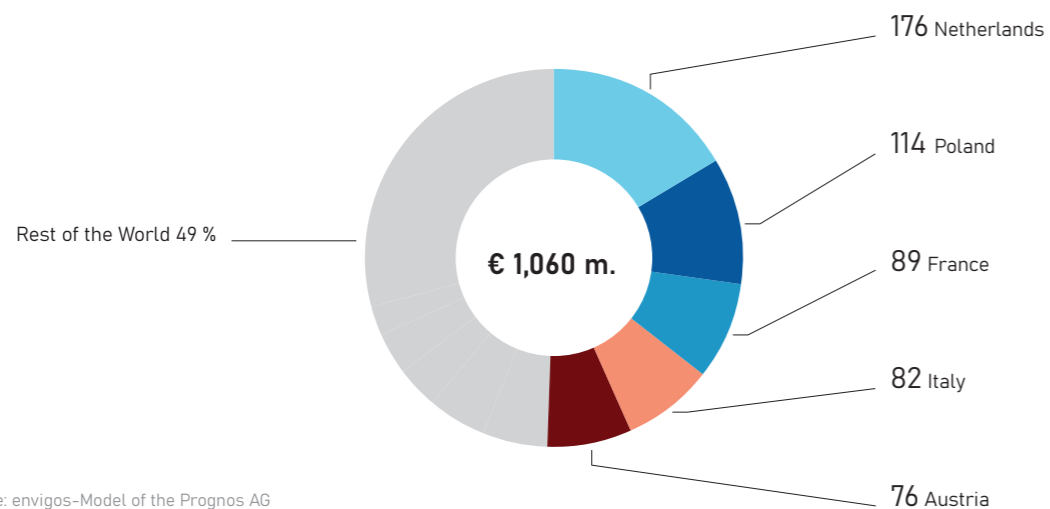
Source: World Trade Model of the Prognos AG



MARKET PROFILE 'ENERGY-EFFICIENT AND RESILIENT BUILDINGS'

The 'Energy-efficient and resilient buildings' subsector is the largest subsector in the global adaptation sector, with a trading volume of around € 62 billion and an annual growth rate of 6.9 %. It includes goods and technologies that help to protect buildings and their residents from the consequences of climate change. In addition to green roofs, these include smart home systems and shading systems

EXPORTS OF ADAPTATION GOODS FROM THE 'ENERGY-EFFICIENT AND RESILIENT BUILDINGS' SUBSECTOR FROM NRW, BY COUNTRY, 2021



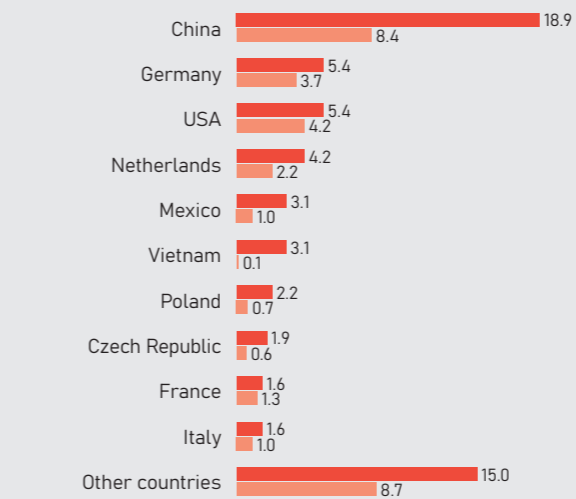
Source: envigos-Model of the Prognos AG

With an export volume of around € 1 billion, this subsector is the **second largest in NRW** in 2021, but has the lowest annual growth rate of 2 %. **The products are mainly exported to neighboring EU countries and China as well as to the United States**, which represent the strongest (and also fastest growing) sales market globally in 2021 with an import volume of al-

most € 14 billion. **After China, Germany is the world's largest exporter of goods in this subsector.** China is also the country with the highest export growth in the past decade, followed by Vietnam and Mexico. Vietnam is experiencing an extremely strong annual growth, as there were almost no exports from this country in 2011.

GLOBAL EXPORTS

Export values of the ten biggest export countries



■ 2021 ■ 2011 X.X Figures in € bn.

Source: World Trade Model of the Prognos AG

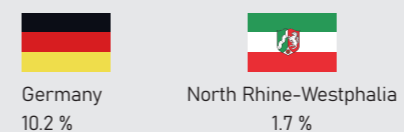
Countries with the biggest growth in absolute numbers



Countries with the biggest growth in relative numbers

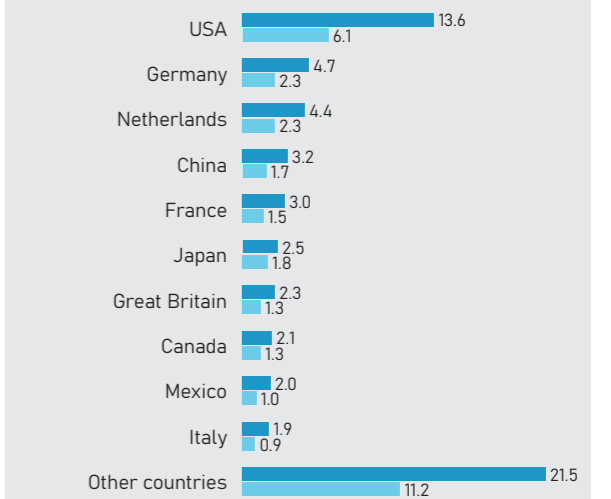


Global Market Share



GLOBAL IMPORTS

Import values of the ten biggest import countries



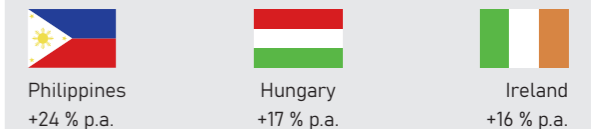
■ 2021 ■ 2011 X.X Figures in € bn.

Source: World Trade Model of the Prognos AG

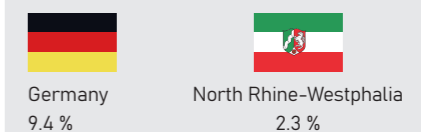
Countries with the biggest growth in absolute numbers



Countries with the biggest growth in relative numbers



Global Market Share

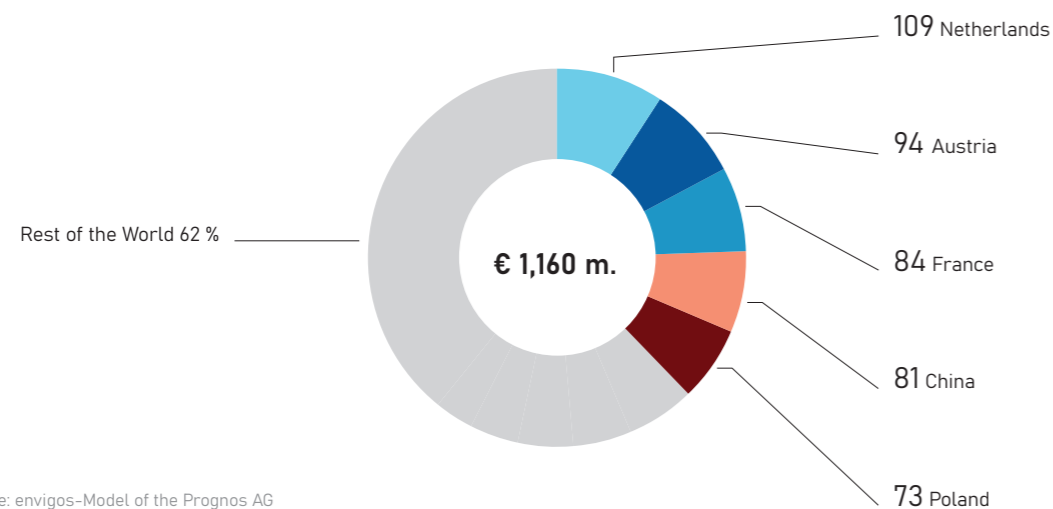




MARKET PROFILE 'INFRA-STRUCTURE FOR WATER, WASTE-WATER AND FLOOD PROTECTION'

'Infrastructure for water, wastewater and flood protection' is globally the second largest subsector in the adaptation sector with a trading volume of around € 36 billion. Compared to other subsectors, however, the lowest annual growth rates of 4.8 % are recorded in this sector. Products in this subsector include various water and wastewater infrastructure and treatment systems, as these play an important buffer role in the event of flooding. Mobile and stationary flood protection is also represented in this subsector.

EXPORTS OF ADAPTATION GOODS FROM THE 'INFRASTRUCTURE FOR WATER, WASTEWATER AND FLOOD PROTECTION' SUBSECTOR FROM NRW, BY COUNTRY, 2021



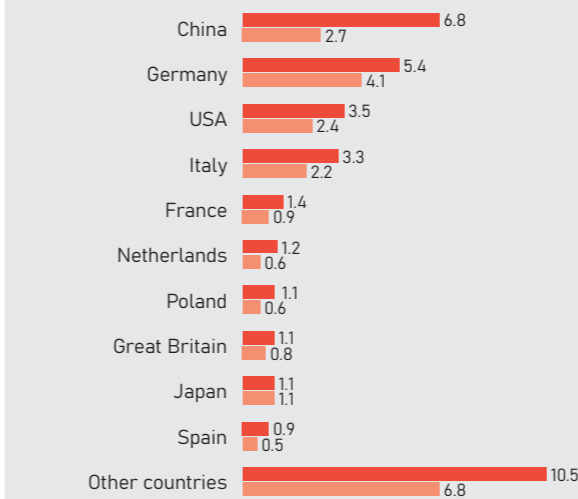
Source: envigos-Model of the Prognos AG

This subsector is the largest export market in NRW, with a volume of around € 1.16 billion. With annual export growth rates of 3.9 %, this subsector also takes second place in NRW, whereby NRW already had a global market share of over 3 % in 2021. Most exports from NRW go to the Netherlands (109 million) and other EU countries as well as China (81 million) and the United States (60 million). **In the last ten**

years, Germany has been replaced by China as the world's largest exporter in this sector and is now in second place. With € 4.4 billion in imports, the United States remains the most important sales market worldwide, while imports have doubled in the last decade. The comparatively small export nations of the Philippines and Vietnam show by far the highest relative growth rates.

GLOBAL EXPORTS

Export values of the ten biggest export countries



■ 2021 ■ 2011 X.X Figures in € bn.

Source: World Trade Model of the Prognos AG

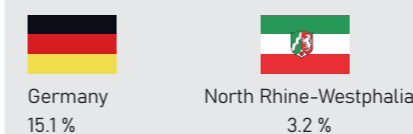
Countries with the biggest growth in absolute numbers



Countries with the biggest growth in relative numbers

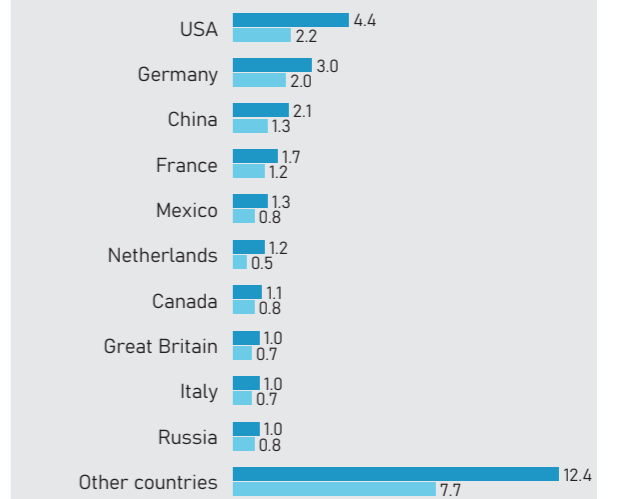


Global Market Share



GLOBAL IMPORTS

Import values of the ten biggest import countries



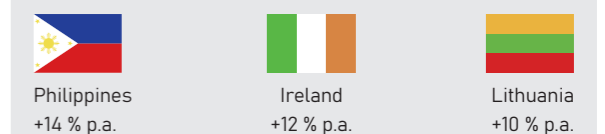
■ 2021 ■ 2011 X.X Figures in € bn.

Source: World Trade Model of the Prognos AG

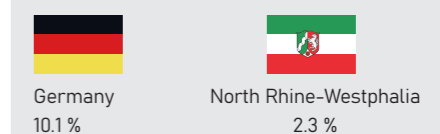
Countries with the biggest growth in absolute numbers



Countries with the biggest growth in relative numbers



Global Market Share

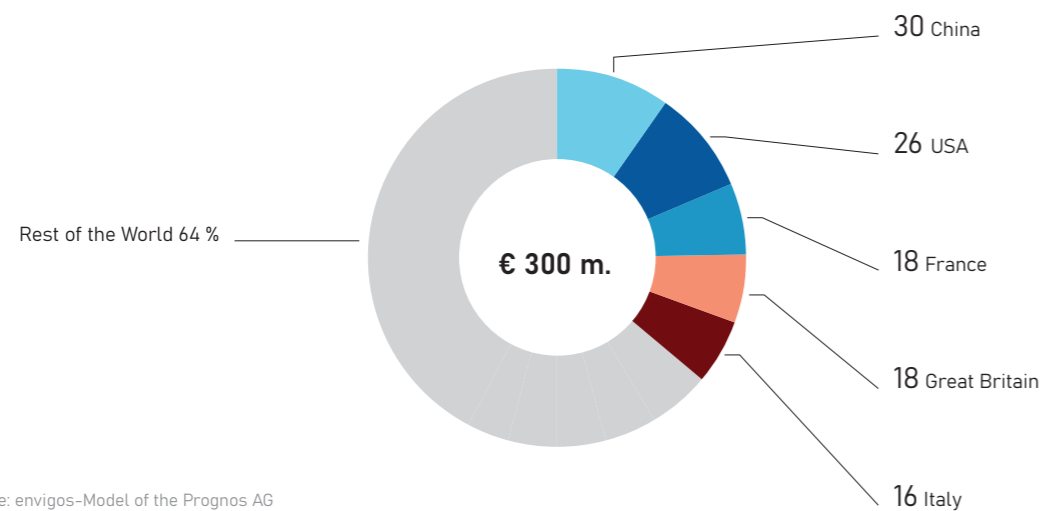




MARKET PROFILE 'WATER SUPPLY, TREATMENT AND QUALITY'

From a global perspective, the subsector 'Water supply, treatment and quality' is the second smallest in terms of trading volume, with a volume of around € 18 billion and a growth rate of around 6 %. The products in this sector are intended to ensure a sustainable future water supply, e.g. through water treatment technologies, the monitoring of water quantities and quality, and the efficient dosing of water quantities for processes and irrigation.

EXPORTS OF ADAPTATION GOODS FROM THE 'WATER SUPPLY, TREATMENT AND QUALITY' SUBSECTOR FROM NRW, BY COUNTRY, 2021



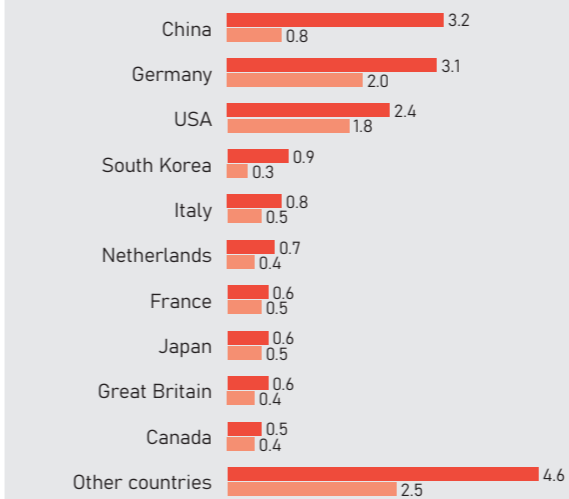
Source: envigos-Model of the Prognos AG

With an export volume of around € 300 million and average export growth of 3.2 % in NRW, this **subsector ranks third place**. The products from NRW are mainly exported to China, the United States and EU countries. **Globally, Germany is the second largest exporter in this sector, slightly behind China and ahead of the**

USA. These three countries have also recorded the highest absolute growth in exports and imports over the past 10 years. **However, the USA remain the most important sales market**, while Vietnam, Greece and India will become increasingly important as sales markets with high import growth rates.

GLOBAL EXPORTS

Export values of the ten biggest export countries



■ 2021 ■ 2011 x.x Figures in € bn.

Source: World Trade Model of the Prognos AG

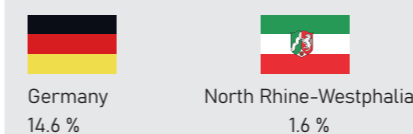
Countries with the biggest growth in absolute numbers



Countries with the biggest growth in relative numbers

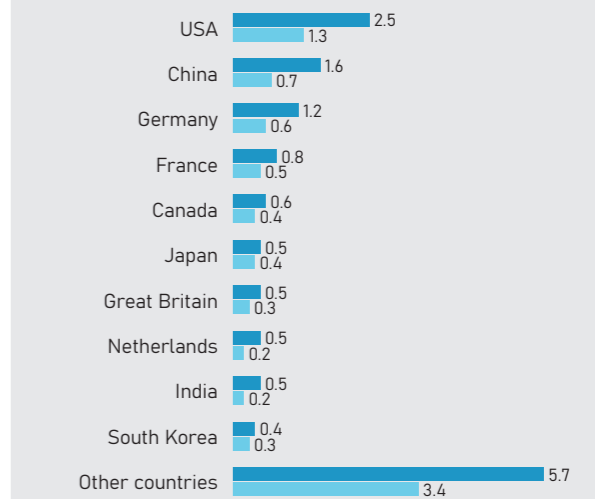


Global Market Share



GLOBAL IMPORTS

Import values of the ten biggest import countries



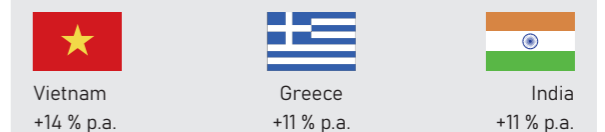
■ 2021 ■ 2011 x.x Figures in € bn.

Source: World Trade Model of the Prognos AG

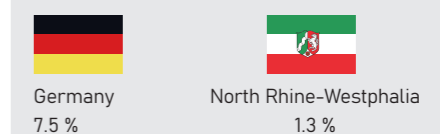
Countries with the biggest growth in absolute numbers



Countries with the biggest growth in relative numbers



Global Market Share

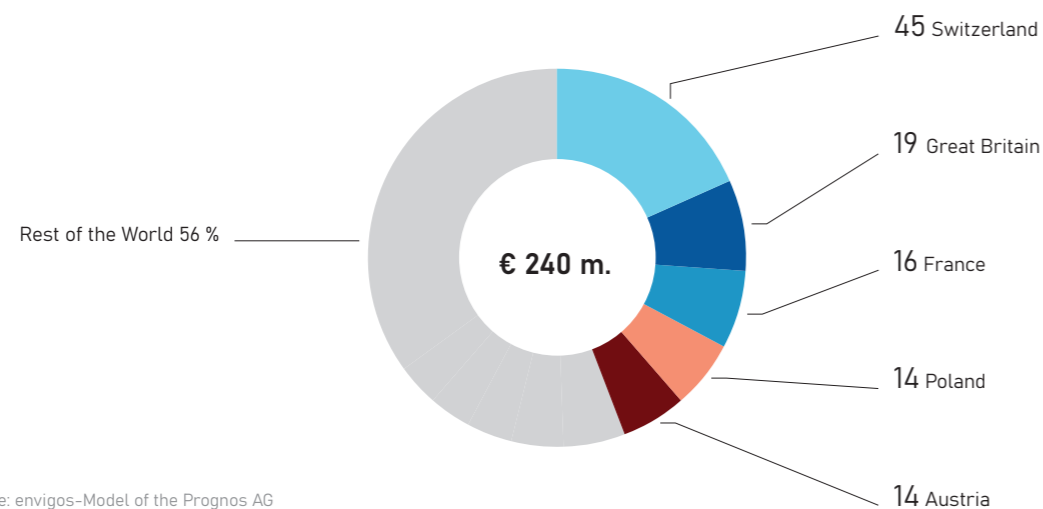




MARKET PROFILE 'RESILIENT ENERGY AND TRANSPORT INFRASTRUCTURE'

The 'Resilient energy and transport infrastructure' subsector plays a key role in the development of resilient energy systems and transport infrastructures that can withstand the challenges of climate change. In 2021, the global export volume of this sector reached around € 27 billion, which is associated with an average annual growth of 6.1%. From innovative rail maintenance technologies and low water adapted inland waterway vessels to robust and, in extreme cases, quickly deployable power systems, the products of this subsector play a key role in preparing the world for climate change while shaping sustainable energy and transport policies.

EXPORTS OF ADAPTATION GOODS FROM THE 'RESILIENT ENERGY AND TRANSPORT INFRASTRUCTURE' SUBSECTOR FROM NRW, BY COUNTRY, 2021

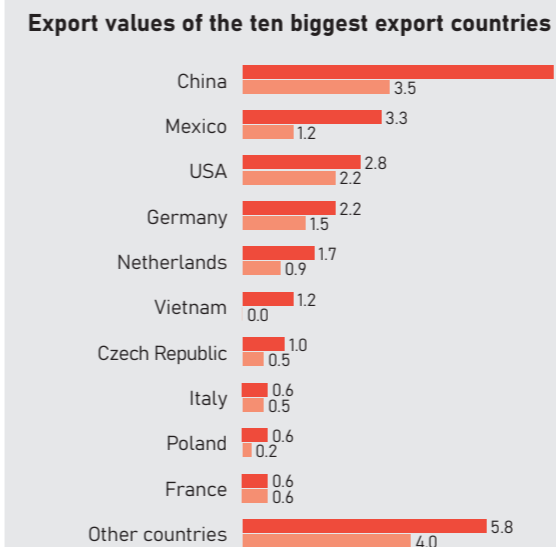


Source: envigos-Model of the Prognos AG

With an export volume of around € 240 million and an annual growth rate of 2.9 %, this market is the second smallest subsector in NRW. NRW exports primarily to other European countries, with Switzerland representing the most important sales market with an export volume of around € 45 million. **The global export volume of this market is dominated by China, but the**

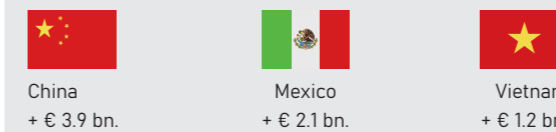
United States and Mexico also play a key role. The latter almost tripled its export volume between 2011 and 2021. The USA also currently dominates the import volumes in this subsector, having more than doubled them in ten years and are now almost four times as high as the import volumes of Germany, the second largest importer globally.

GLOBAL EXPORTS



Source: World Trade Model of the Prognos AG

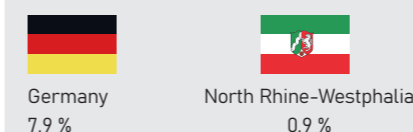
Countries with the biggest growth in absolute numbers



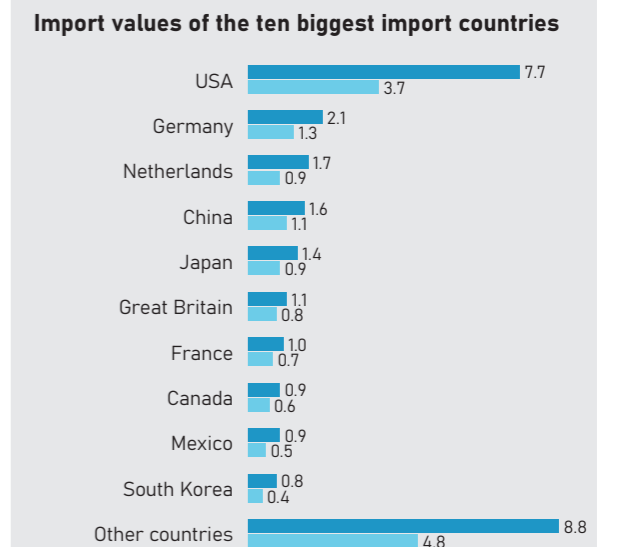
Countries with the biggest growth in relative numbers



Global Market Share



GLOBAL IMPORTS

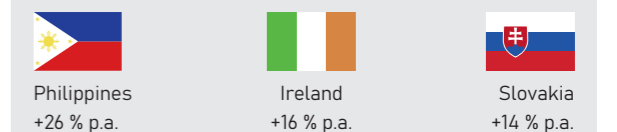


Source: World Trade Model of the Prognos AG

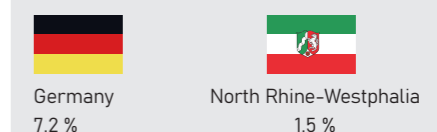
Countries with the biggest growth in absolute numbers



Countries with the biggest growth in relative numbers



Global Market Share

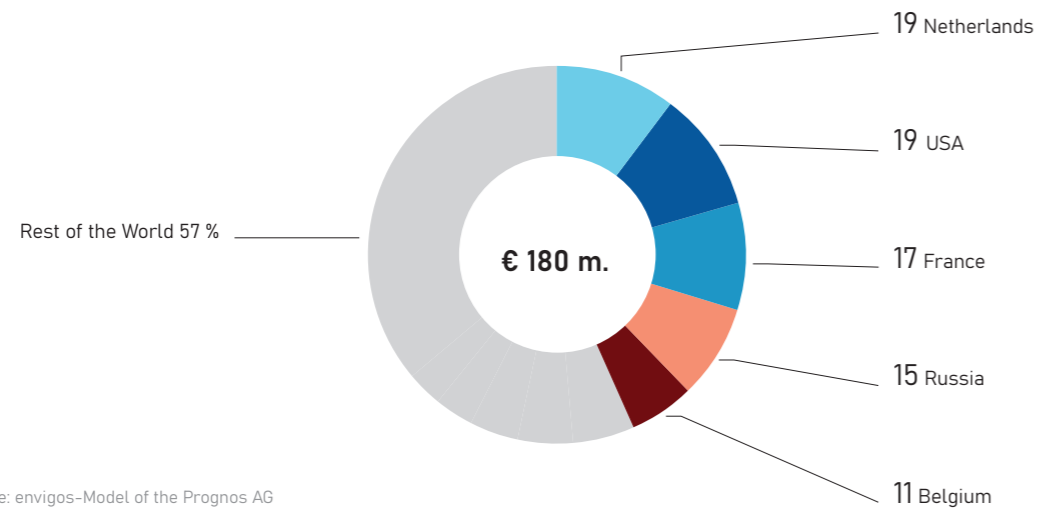




MARKET PROFILE 'CLIMATE-ADAPTED LAND USE'

The 'Climate-adapted land use' subsector is heavily affected by climate change due to rising temperatures and extreme weather events. With an export volume of around € 9 billion, this subsector has the smallest share of the adaptation sector worldwide, but with an annual growth rate of 13.4 %, it is also the most dynamic. This involves a wide range of products, from animal welfare-oriented goods to heat-resistant stable construction techniques and innovative irrigation technologies.

EXPORTS OF ADAPTATION GOODS FROM THE 'CLIMATE-ADAPTED LAND USE' SUBSECTOR FROM NRW, BY COUNTRY, 2021



Source: envigos-Model of the Prognos AG

Although this subsector **has the smallest share of the adaptation sector** with an export volume of around € 180 million in **NRW**, it **has the highest growth rates at 5.4 % per year**. In 2021, NRW mainly exported to neighboring EU countries such as the Netherlands and France, but also to the United States. Globally,

Germany is positioned as the third largest exporter after China and the USA. Small markets that already rely on innovative irrigation techniques, such as Israel and Turkey, show high relative growth rates, but China also managed to increase its exports in this area eightfold between 2011 and 2021.

GLOBAL EXPORTS



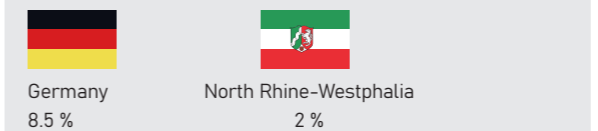
Countries with the biggest growth in absolute numbers



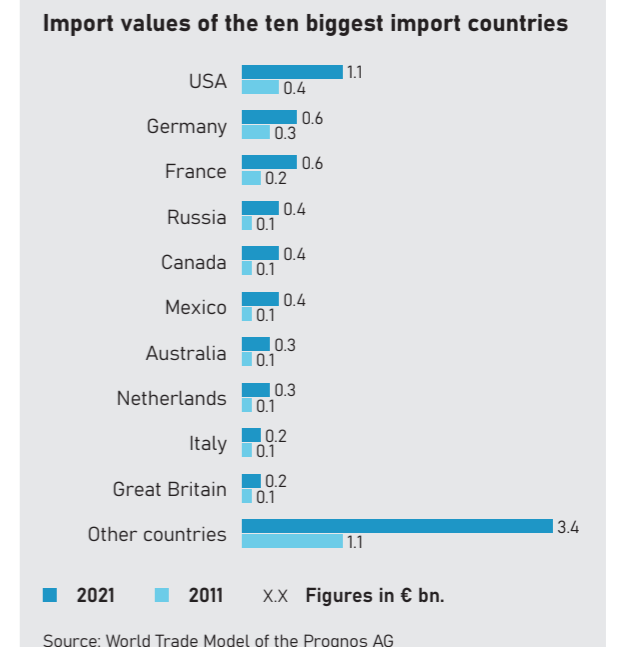
Countries with the biggest growth in relative numbers



Global Market Share



GLOBAL IMPORTS



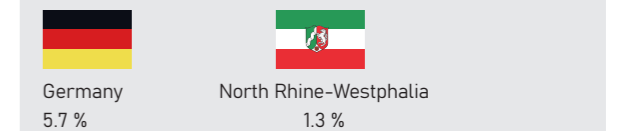
Countries with the biggest growth in absolute numbers



Countries with the biggest growth in relative numbers



Global Market Share





CHINA'S INTERNATIONAL TRADE IN CLIMATE ADAPTATION GOODS

China has expanded its global market leadership in trading climate change adaptation goods and technologies. Chinese climate adaptation exports have more than doubled from 2011 to 2021, with an average annual growth rate of 9.4 %, from an already high total value of around € 15.5 billion to a volume of around € 38 billion.

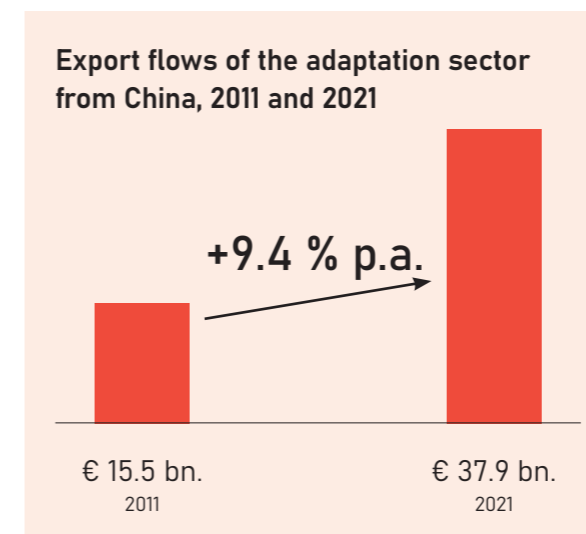
China is by far the world's largest exporter of climate adaptation goods. The most important buyers of Chinese exports in the adaptation sector in 2021 were the USA with imports worth around € 6.4 billion, followed by Hong Kong with imports worth just under € 3.9 billion. Japan (approx. € 1.9 billion) and the Netherlands (approx. € 1.7 billion) follow at a considerable distance. **Germany imported climate adaptation goods with a total value of around € 1.2 billion**

from China in 2021. Overall, Chinese exports are more diversified than US exports in particular. Of the latter, a significantly larger share is accounted by a small group of countries.

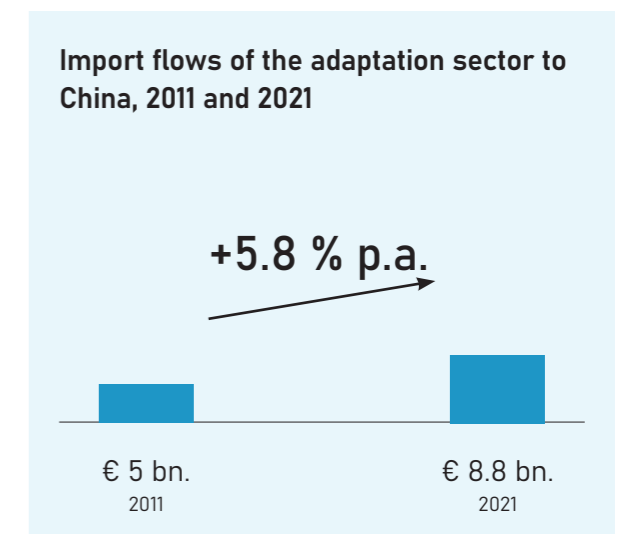
Almost half of Chinese exports in the field of climate adaptation in 2021 were courtesy of the 'energy-efficient and resilient buildings' subsector (approx. € 18.9 billion).

As a result, China alone provides over 30 % of international demand in this segment. Exports worth around € 7.4 billion in the 'Resilient energy and transport Infrastructure' subsector and exports worth just under € 6.8 billion in the 'Infrastructure for water, wastewater and flood protection' subsector follow a long way behind. This represents just over a quarter and more than a fifth of global trade in these two subsectors. **China's climate adaptation exports showed a significant growth in the period from 2011 to 2021.** The previously mentioned subsectors have grown by an average of 8.5 %, 7.9 % and 9.8 % per year since 2011.

The most important suppliers of climate adaptation goods for China in 2021 were **Germany, with an import volume of around € 1.2 billion, the USA (€ 930 million) and Japan** - China's most important supplier in 2011 - with exports worth around € 900 million. In contrast to the exports, the share of Chinese imports in global imports is comparatively low in relation to the size of the country. By far the largest import subsector of the Chinese adaptation sector are the 'Energy-efficient and resilient buildings' with a total volume of around € 3.2 billion in 2021, followed by the subsector for 'Infrastructure for water, wastewater and flood protection' (around € 2.1 billion).

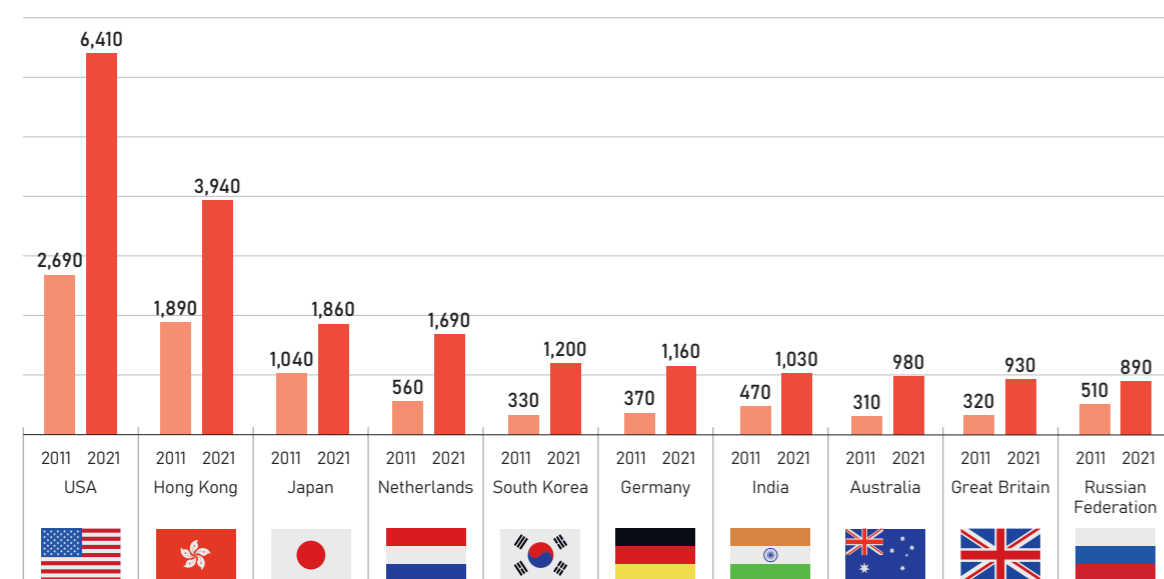


Source: World Trade Model of the Prognos AG



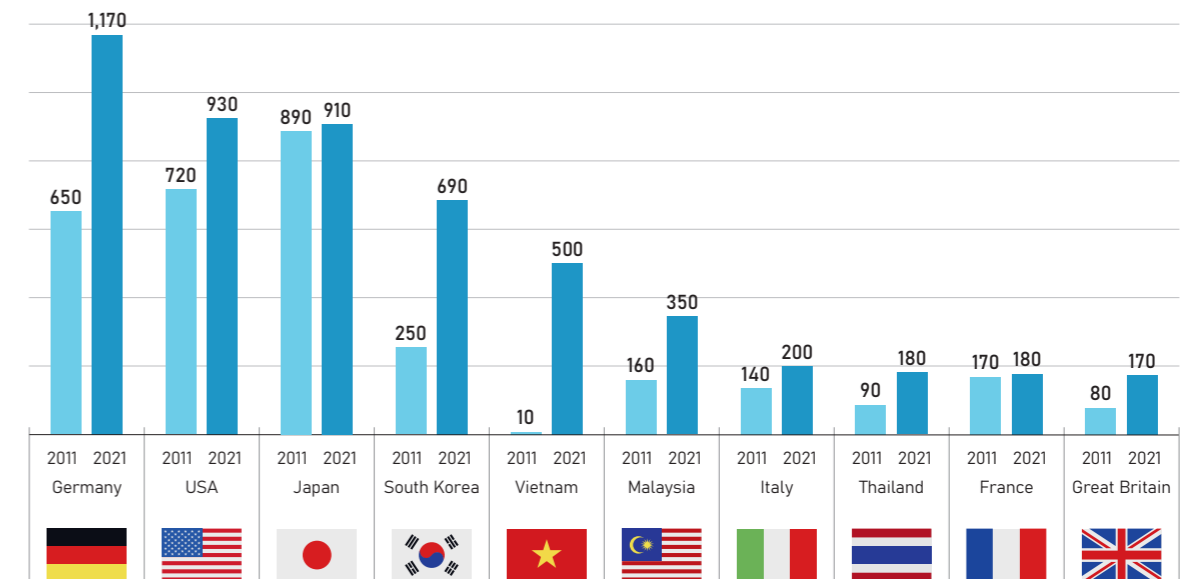
Source: World Trade Model of the Prognos AG

THE TEN LARGEST EXPORT COUNTRIES IN THE ADAPTATION SECTOR FROM CHINA, 2011 AND 2021, IN € MILLION

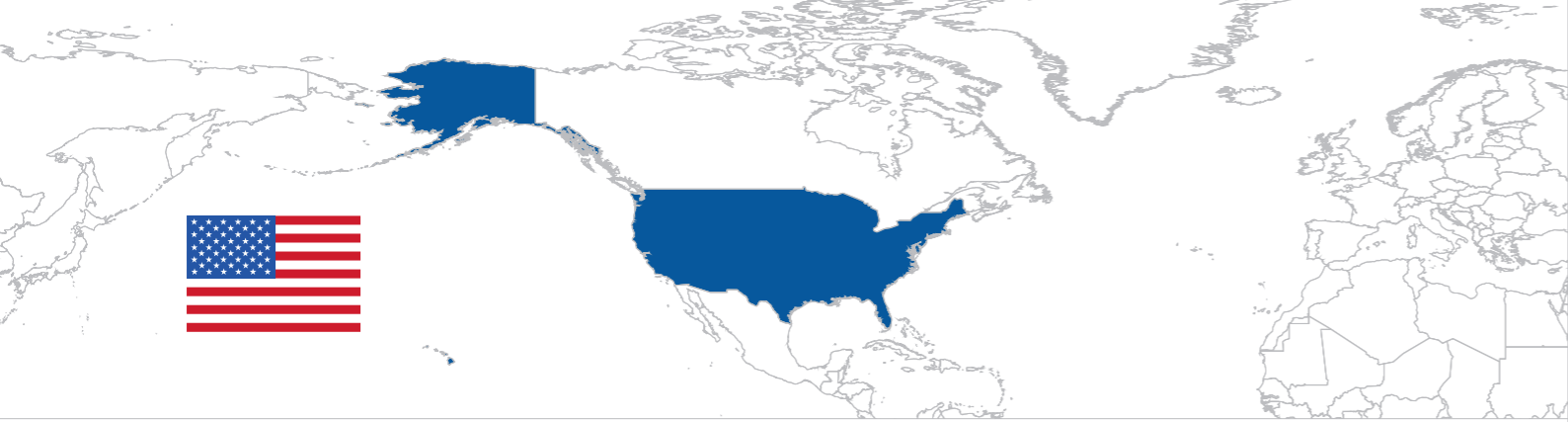


Source: World Trade Model of the Prognos AG

THE TEN LARGEST IMPORT COUNTRIES OF THE ADAPTATION SECTOR TO CHINA, 2011 AND 2021, IN € MILLION



Source: World Trade Model of the Prognos AG



THE USA'S INTERNATIONAL TRADE IN CLIMATE ADAPTATION GOODS

With imports worth around € 29.2 billion in 2021 and growth averaging 7.9 % per year since 2011, the USA has been both the world's largest and most dynamic sales market for climate adaptation goods.

Compared to its role as the world's largest importer, the importance of climate adaptation exports from the USA is lower, but they are not negligible. In most subsectors, the United States are responsible for around 10 % of global exports. By far the most important buyers of US exports from the adaptation sector in 2021 were the NAFTA countries Canada (approx. € 3.4 billion) and Mexico (almost € 2.4 billion), followed by China with an export volume of approx. € 1 billion. In comparison, the USA exported

climate adaptation goods worth around € 500 million to Germany.

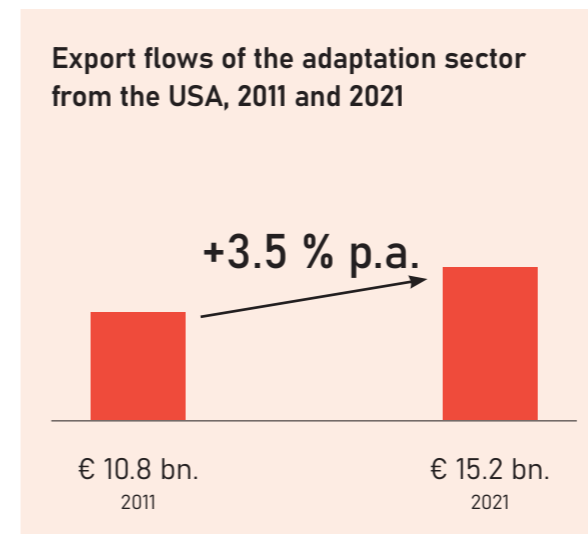
With sales totaling just under € 5.4 billion, climate adaptation goods in the 'Energy-efficient and resilient buildings' subsector made up the strongest export sector of the US adaptation sector. However, as this market is very large globally, the USA only has a global market share of around 9 % despite its export strength. This is followed by the subsectors

of 'Infrastructure for water, wastewater and flood protection' (just under € 3.5 billion) and 'Resilient energy and transport Infrastructure' (around € 2.8 billion).

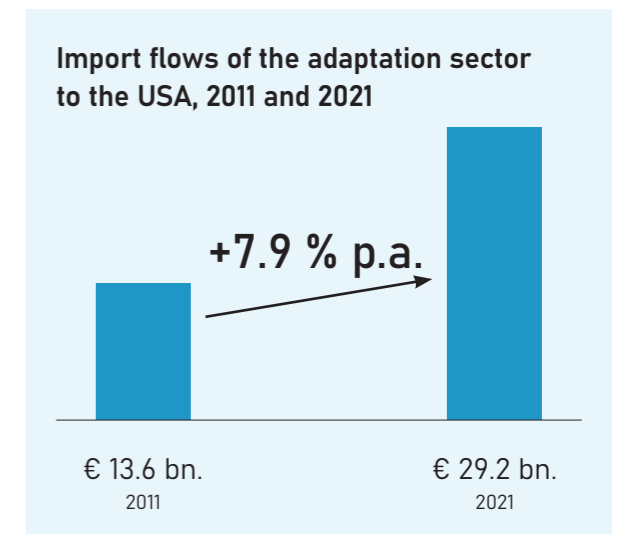
As the world's largest importing country of climate adaptation goods, the global market share of US imports is large across all subsectors. By far the most important suppliers to the USA in the field of climate adaptation in 2021 were Mexico, with total exports worth around € 6.5 billion, and China with around € 5.8 billion, followed by Vietnam (approx. € 2.5 billion), Canada (approx. € 2.3 billion), Thailand (approx. € 1.3 billion) and Malaysia (approx. € 1.1 billion). Only after the NAFTA countries (traditionally close trading

partners of the USA) and some ASEAN countries comes Germany, with exports to the USA worth only around € 1 billion.

The 'Energy-efficient and resilient buildings' and 'Resilient energy and transport infrastructure' subsectors accounted for the majority of US imports of climate adaptation goods in 2021, with volumes of around € 13.6 billion and € 7.7 billion. In these sectors, the USA imported 22 % and 28 % of all goods traded on the global market. Following the smallest, but fastest growing import subsector with 12 % average annual growth, 'Climate-adapted land use', this subsectors also developed very dynamically with average annual growth rates of 8.3 % and 7.5 % respectively.

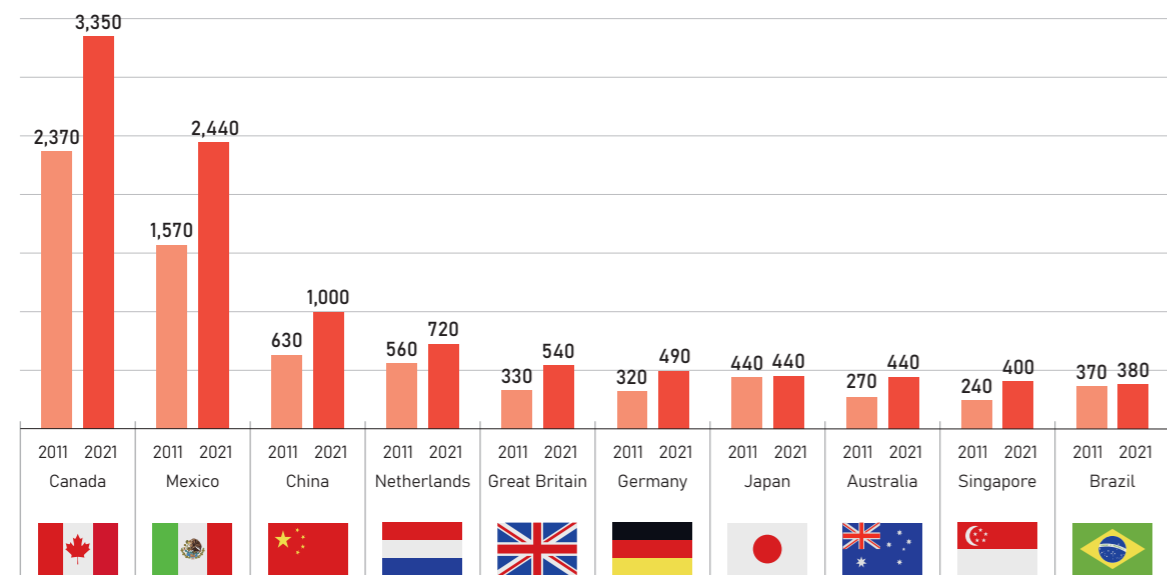


Source: World Trade Model of the Prognos AG



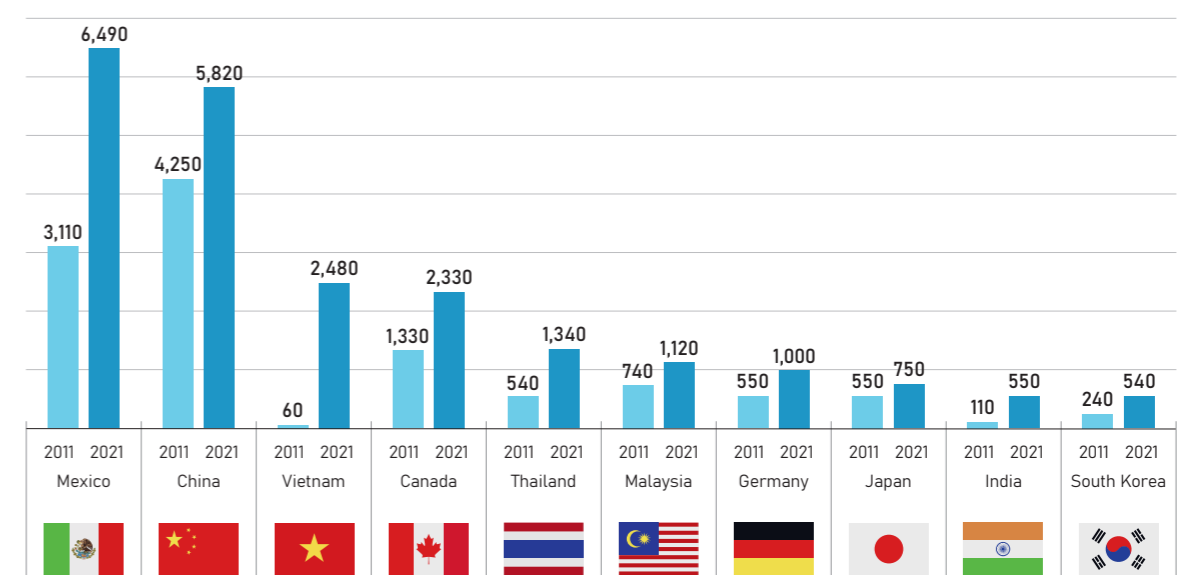
Source: World Trade Model of the Prognos AG

THE TEN LARGEST EXPORT COUNTRIES IN THE ADAPTATION SECTOR FROM THE USA, 2011 AND 2021, IN € MILLION



Source: World Trade Model of the Prognos AG

THE TEN LARGEST IMPORT COUNTRIES OF THE ADAPTATION SECTOR TO THE USA, 2011 AND 2021, IN € MILLION



Source: World Trade Model of the Prognos AG



THE NETHERLANDS' INTERNATIONAL TRADE IN CLIMATE ADAPTATION GOODS

The Netherlands - a country with a population of 17.6 million - is the fourth largest importer and exporter of climate adaptation goods in the world after the USA, China and Germany. This puts the small country ahead of most of the large OECD countries and emerging economies.

The export profile of the Netherlands reflects the country's European integration. The most important buyer (in 2021) is Germany with exported goods worth around € 1.8 billion, followed by France (approx. € 800 million), Belgium (approx. € 670 million) and the UK (approx. € 630 million). Dutch exports are concentrated in the 'Energy-efficient and resilient buildings' subsector, which accounts for more than half of the total value of the country's climate adap-

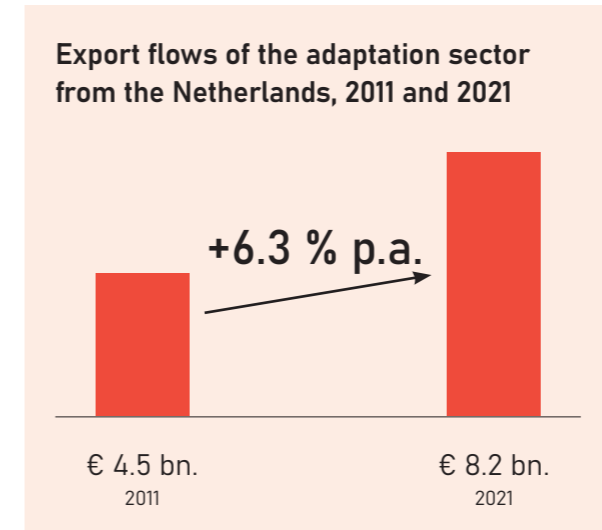
tation exports with a volume of € 4.2 billion. The subsector 'Resilient energy and transport infrastructure' is the second-largest export subsector for climate adaptation, with a volume of € 1.7 billion. Both export subsectors have developed well with average growth rates of 6.4 % and 6.3 % respectively since 2011. Due to the size of the Dutch economy, the global market shares of Dutch exports are significantly lower than those of the two largest economies in the world

(China: € 37.9 billion, USA € 15.2 billion, Netherlands € 8.2 billion in 2021).

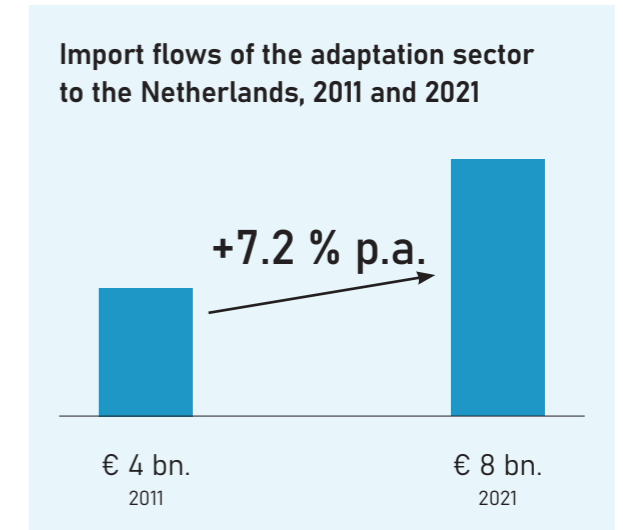
Nevertheless, the country achieves shares of approx. 7 % and approx. 6 % of global exports in its strongest export subsectors. In addition, the Netherlands can partially compensate for their size in the global market of 'Climate-adapted land use'. Here they achieve a global market share of 6.5 %.

Dutch climate adaptation imports are much less dependent on the European domestic market. By far the most important supplier to the Netherlands is the world export leader China, with exports to the Netherlands worth around € 2.1 billion, follo-

wed by Germany (approx. € 1.1 billion) and the USA (approx. € 800 million). The strong concentration of imports in the 'energy-efficient and resilient buildings' subsector is remarkable. With around € 4.4 billion, this accounts for more than half of the Netherlands total climate adaptation imports. With an average growth of 6.9 % per year, this market has developed well since 2011, although it lags behind the smaller import subsectors in terms of dynamics. The second largest import subsector in 2021, but the slowest in terms of growth dynamics, was the subsector 'Resilient energy and transport infrastructure' with imports worth around € 1.7 billion, an average growth of 6.3 % and a global market share of 6 %.

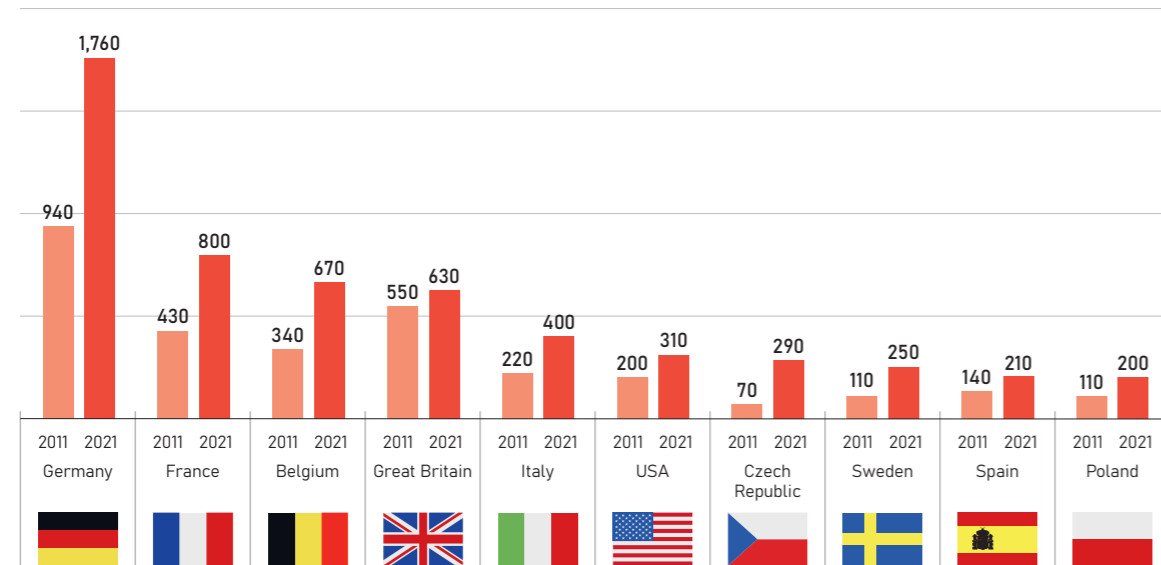


Source: World Trade Model of the Prognos AG



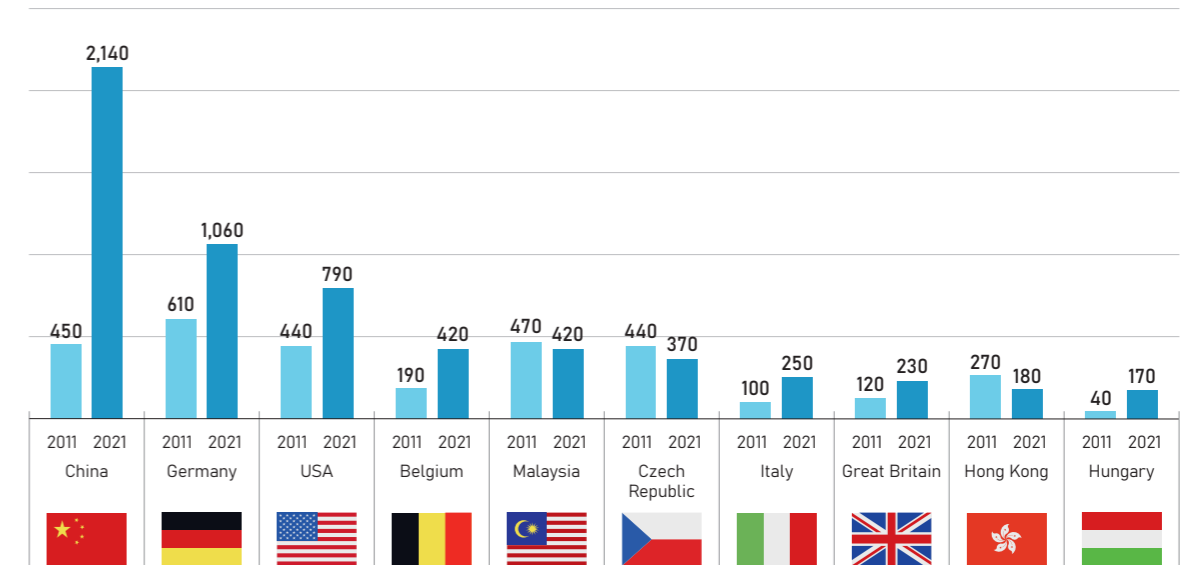
Source: World Trade Model of the Prognos AG

THE TEN LARGEST EXPORT COUNTRIES IN THE ADAPTATION SECTOR FROM NETHERLANDS, 2011 AND 2021, IN € MILLION



Source: World Trade Model of the Prognos AG

THE TEN LARGEST IMPORT COUNTRIES OF THE ADAPTATION SECTOR TO THE NETHERLANDS, 2011 AND 2021, IN € MILLION

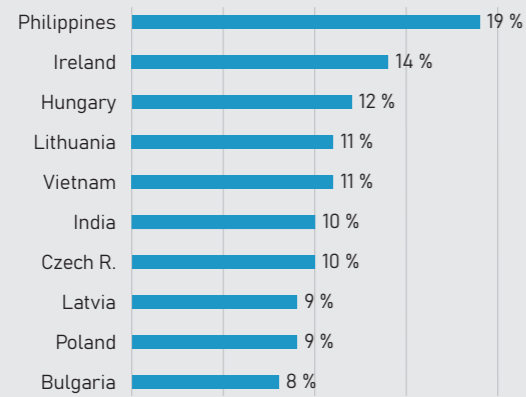


Source: World Trade Model of the Prognos AG

THE ADAPTATION SECTOR OPENS UP OPPORTUNITIES FOR ADDED VALUE IN NEWLY DEVELOPING MARKETS

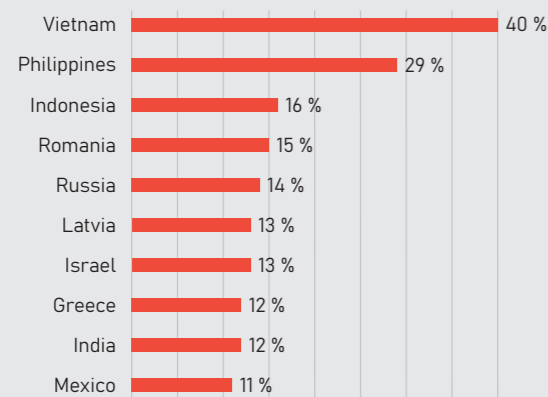
Beyond the large and established import and export markets for climate adaptation goods, there are a number of sales markets that are smaller in terms of volume but growing particularly strongly, especially in Southeast Asia and (Eastern) Europe. These markets are also affected more than average in terms of the impacts of climate change and are therefore expected to increase their demand even further in the coming years.

The ten countries with the highest relative annual growth in climate adaptation imports between 2011 and 2021



Source: World Trade Model of the Prognos AG

The ten countries with the highest relative annual growth in climate adaptation exports between 2011 and 2021



Source: World Trade Model of the Prognos AG

Dynamic markets in Southeast Asia

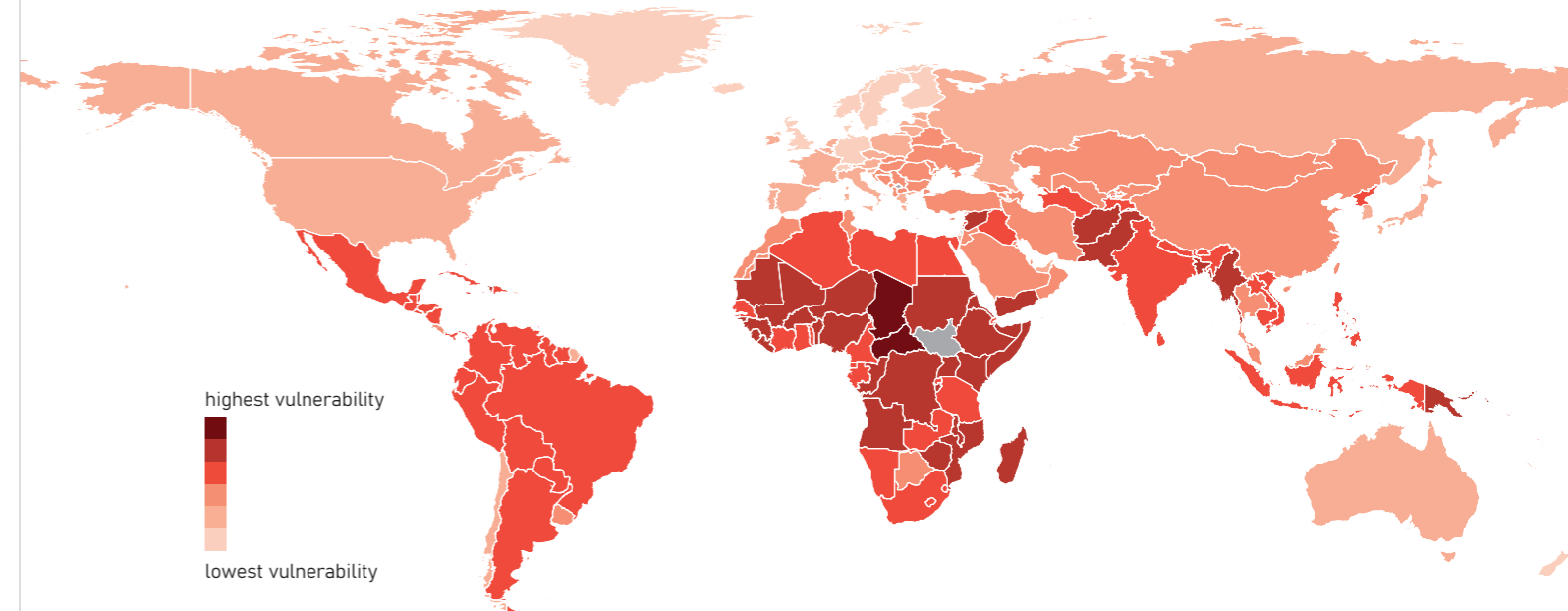
In Southeast Asia, the Philippines show a particularly strong dynamic with an average growth in their climate adaptation imports of 19 % per year, as well as the Indian and Vietnamese import markets with an average growth of 10 % and 11 % per year since 2011. These countries stand out from the (Eastern) European emerging markets insofar as not only their imports of climate adaptation goods have grown dynamically, but also their exports: With average export growth rates of 40 % (Vietnam), 29 % (Philippines) and 12 % (India) per year, the growth of these countries was considerably higher than the global average.

Indian and Vietnamese exports also recorded significant absolute growth (from € 500 million to € 1.6 billion and from € 200 million to € 4.7 billion respectively). Due to the fact that the Philippine market was still extremely small in 2011, the strong relative growth only resulted in an additional market volume of around € 500 million. A similar pattern can be seen for the absolute sizes of the import markets for the three countries. Although the Philippines recorded by far the strongest relative growth, the value of its climate adaptation imports only increased from € 100 million to € 800 million. In contrast, the volume of Indian imports increased by around € 2 billion (from € 1.1 billion in 2011 to € 3.1 billion in 2021), while Vietnam imported around € 900 million more climate adaptation goods in 2021 than in 2011.

Dynamic markets in Europe

In Europe, Ireland, Hungary and Lithuania stand out as dynamic sales markets for climate adaptation goods in terms of imports, with average growth rates of 14 %, 12 % and 11 % per year since 2011.

Notre Dame Global Adaptation Index



Globally scaled ranking of national vulnerabilities according to the ND-GAIN Index of the Notre Dame Global Adaptation Initiative

Lithuanian imports remain limited in absolute volumes (€ 500 million in 2021). In comparison, Ireland's climate adaptation imports reached a total value of € 1.2 billion in 2021, while Hungary's imports reached a total volume of € 1.6 billion.

Poland and the Czech Republic are a special case. Although their import growth rates are slightly weaker than those of most countries mentioned above, they still grew strongly by 9 % and 10 % and, above all, developed much more dynamically than those of the ten largest importers in the world (see page 13).

At the same time, Polish and Czech climate adaptation imports were already at a high level in absolute terms compared to other emerging markets in 2011, with a volume of around € 1.4 billion and € 1.2 billion. In 2021, they reached a total value of around € 3.3 billion and € 3 billion respectively. **Alongside India, Poland and the Czech Republic recorded the highest absolute growth of all the countries mentioned and have been approaching the top ten global import markets since 2011.** However, the same picture also emerges for Polish and Czech exports, with even stronger relative (average annual growth of 10 % and 8 %) and absolute growth (around € 2.6 billion and € 2.2 billion) for Poland. As a result, the total value of Poland's climate adaptation exports in 2021 amounted to almost € 4.2 billion, while Czech exports reached a total value of around € 4.1 billion.

Future market developments in the context of climate change

Climate change will continue to progress in the upcoming years, but its effects will vary from region to region. **In particular, countries in the global south are disproportionately affected by its consequences and are currently still lacking in adaptive capacity.** It can be assumed that demand for technologies and services in the adaptation sector will increase here. Based on the most comprehensive international index for analyzing climate change vulnerabilities, ND-GAIN (see map above), large and economically strong countries in Southeast Asia are particularly vulnerable. These include, for example, **India, Indonesia, the Philippines, Vietnam and Bangladesh**, but also smaller countries such as **Cambodia and Myanmar**. In addition to being highly affected, these countries are also characterized by the fact that they are rapidly growing export markets from which NRW imports more goods than it exports to these regions. **Therefore, disruptions in these countries can have a major impact on international supply and value chains.**

In addition, the three economically strongest nations in Africa – **Nigeria, Egypt and South Africa** – also all occupy low places in the international ranking of national vulnerabilities and could therefore be showing an increasing demand of adaptation products.

NRW'S ADAPTATION SECTOR PROVIDES ITS SOLUTIONS ON A GLOBAL SCALE

The economic strength of North Rhine-Westphalia's adaptation sector is also reflected in its global export activities. Between 2010 and 2021, the annual export volume of adaptation products rose from € 2.1 billion to almost € 3 billion. This makes the adaptation sector a growth motor for exports, which account for around 1.5 % of NRW's total exports.

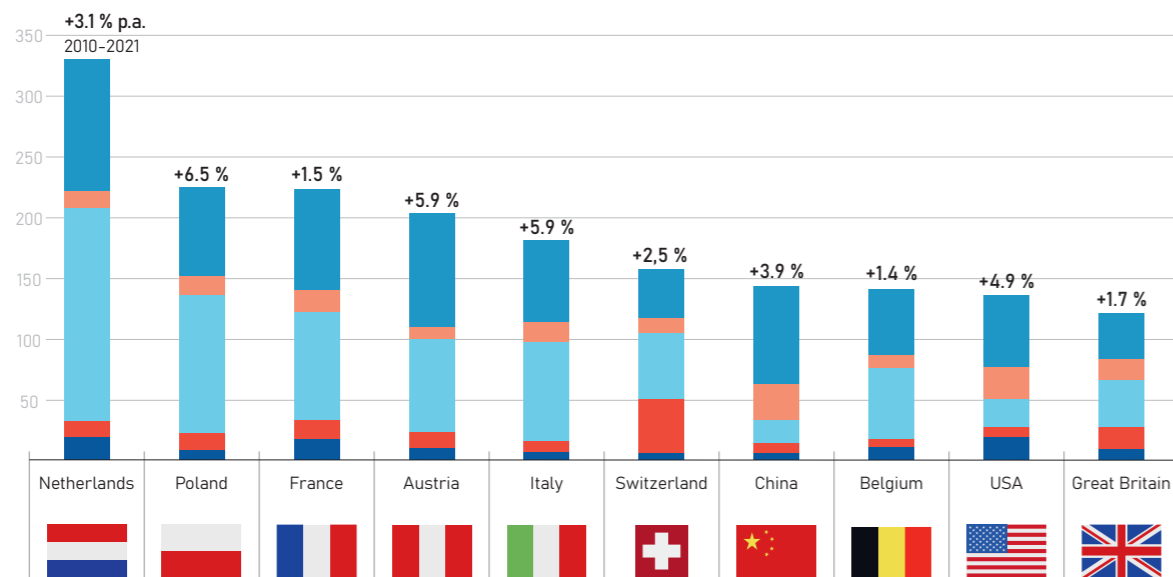
Trade links of the North Rhine-Westphalian adaptation sector

In 2021, North Rhine-Westphalia almost reached the pre-crisis level of 2019 (€ 3.1 billion) with an export volume in the adaptation sector of around € 3 billion. Most exports were made to neighboring and other EU countries. Outside of Europe, China and the United States of America are the most important export countries for NRW in the adaptation sector. The majority of goods (worth a total of € 330 million) were exported to the Netherlands, primarily in the 'Energy-efficient and resilient buildings' and 'Infrastructure for water, wastewater and flood protection' subsectors.

Poland and France, the second and third largest customer countries for NRW's adaptation sector, received around goods worth € 220 million each, or just under two thirds of the export volume compared to the Netherlands.

In the subsector 'Water supply, treatment and quality', around € 30 million went to the USA and China respectively. Around € 19 million in products from the 'Climate-adapted land use' subsector were delivered to the Netherlands and the USA in 2021 and € 45 million from the 'Resilient energy and transport systems' subsector to Switzerland. The import side also shows that NRW is particularly closely linked to the United States and China as well as to neighboring European countries.

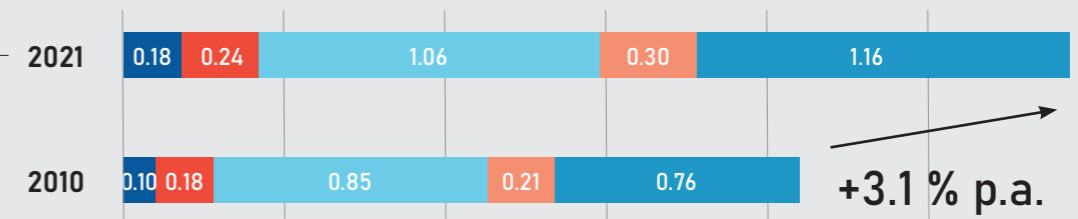
THE TEN LARGEST TRADING PARTNERS OF NRW'S ADAPTATION SECTOR BY EXPORT VOLUME IN € MILLION, 2021



Source: envigos-Model of the Prognos AG

	DEVELOPMENT OF EXPORTS			SHARE OF WORLDWIDE EXPORTS		SHARE OF NRW IN EXPORTS FROM GERMANY
	NRW	GER	World	GER	NRW	
	2011-2021 % p.a.	2011-2021 % p.a.	2011-2021 % p.a.	2021	2021	2021
Climate-adapted land use	+5.4 %	+5.2 %	+13.4 %	8.5 %	2.0 %	23.1 %
Resilient energy and transport infrastructure	+2.9 %	+3.7 %	+6.1 %	7.9 %	0.9 %	11.2 %
Energy-efficient and resilient buildings	+2.0 %	+4.4 %	+6.9 %	10.2 %	1.7 %	16.6 %
Water supply, treatment and quality	+3.2 %	+5.0 %	+6.0 %	14.6 %	1.6 %	11.2 %
Infrastructures for water, wastewater and flood protection	+3.9 %	+4.6 %	+4.8 %	15.1 %	3.2 %	21.2 %
Adaptation sector total	+3.1 %	+4.5 %	+6.4 %	11.4 %	1.9 %	16.9 %

Export volume of the North Rhine-Westphalian adaptation sector in € billion by subsector, 2010-2021



Source: envigos-Model of the Prognos AG

- Resilient energy and transport infrastructure
- Climate-adapted land use
- Energy-efficient and resilient buildings
- Water supply, treatment and quality
- Infrastructures for water, wastewater and flood protection

grown even more strongly in the last ten years with 6.4 %, which is due to the high growth rates in China and the countries of Eastern Europe and Southeast Asia.

In terms of the growth of the five subsectors, the 'Climate-adapted land use' subsector stands out the most with an annual growth of 5.4 % in NRW. The other four subsectors also recorded high growth rates of 2 % to 4 % between 2011 and 2021. Differences between the subsectors can be found primarily in their shares of the German and global adaptation sector.

World market shares and export growth rates of the adaptation sector in NRW

In terms of export volume, NRW's adaptation sector has a share of around 2 % of the global market. For Germany, this means that North Rhine-Westphalia generates around one in six euros from the export of adaptation products made in Germany.

Between 2011 and 2021, North Rhine-Westphalia recorded a positive development of its export activities in the adaptation sector (+3.1 % export volume p.a., even despite the Coronavirus pandemic). However, exports in the German adaptation sector as a whole are growing even faster: with a growth rate of 4.5 %, this is more dynamic than the NRW figures. In global terms, exports from the adaptation sector have

NRW is particularly strongly positioned on the global market (with a share of approx. 3.2 %) in the 'Infrastructure for water, wastewater and flood protection' subsector and particularly weak (<1 %) in the 'Resilient energy and transport infrastructure' subsector.

While NRW accounts for almost one in four euros of exports from Germany in the 'Climate-adapted land use' and 'Infrastructure for water, wastewater and flood protection' subsectors, its share in the 'Water supply, treatment and quality' and 'Resilient energy and transport infrastructure' subsectors is only around 11 % in each case.

Trade balances of the adaptation sector

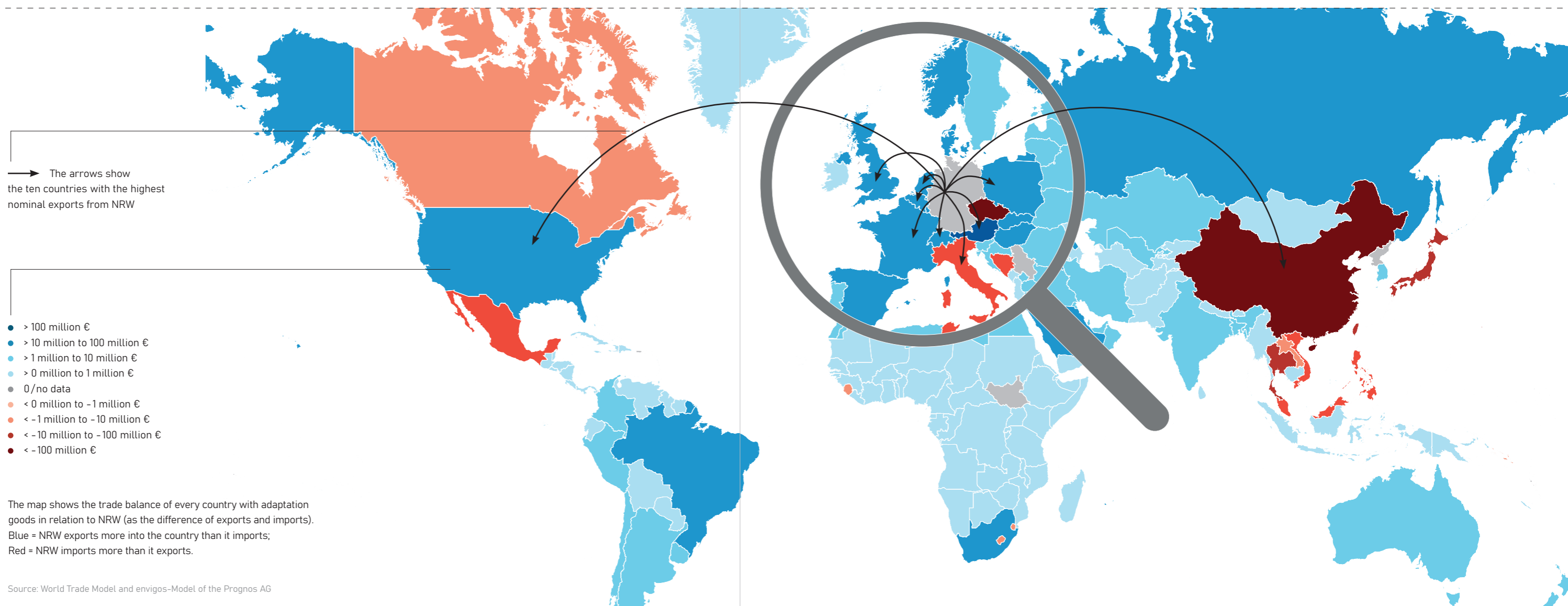
A look at the world map of imports and exports of adaptation goods shows that North Rhine-Westphalia is a net exporter. Exports of around € 3 billion in 2021 are offset by imports of around € 2.8 billion. With the exception of a few countries (China in particular stands out here), NRW has an export surplus in the adaptation sector to most countries in the world. 8 of the 10 countries to which the largest quantity of adaptation goods from NRW is exported are located in Europe. It is striking that, in addition to China, there

is also a negative trade balance with other countries in Southeast Asia, such as Japan, Taiwan, the Philippines, Vietnam, Thailand, Malaysia and Laos (see map and explanations below).

The largest relative growth in NRW's adaptation sector since 2011 has been in exports to Denmark (+8 % p.a.) and Hungary (+7.5 % p.a.). The largest absolute growth (+ € 110 million) was seen in exports to Poland.

GLOBAL TRADE BALANCE OF GOODS FROM THE ADAPTATION SECTOR WITH NRW

A net positive trade balance shows that exports from NRW into a country are bigger than the imports that NRW receives from the country.



Source: World Trade Model and envigos-Model of the Prognos AG

The ten countries with which NRW had the largest export surplus in trade in 2021

1. Austria:	€ 150 m.
2. Switzerland:	€ 96.6 m.
3. Russia:	€ 74.3 m.
4. France:	€ 71 m.
5. Belgium:	€ 64.8 m.
6. Spain:	€ 54.2 m.
7. Netherlands:	€ 51.4 m.
8. Poland:	€ 50.7 m.
9. USA:	€ 48 m.
10. Denmark:	€ 34.2 m.

The ten countries with which NRW had the largest import surplus in trade in 2021

1. China:	€ 578.6 m.
2. Czech Republic :	€ 129 m.
3. Japan:	€ 97.2 m.
4. Taiwan:	€ 65.8 m.
5. Thailand:	€ 12.6 m.
6. Israel:	€ 12.5 m.
7. Malaysia:	€ 9.5 m.
8. Tunisia:	€ 6 m.
9. Mexico:	€ 5.3 m.
10. Bosnia-Herzegovina:	€ 3.5 m.

CLIMATE ADAPTATION SERVICES CAN BE FOUND IN ALL AREAS OF LIFE

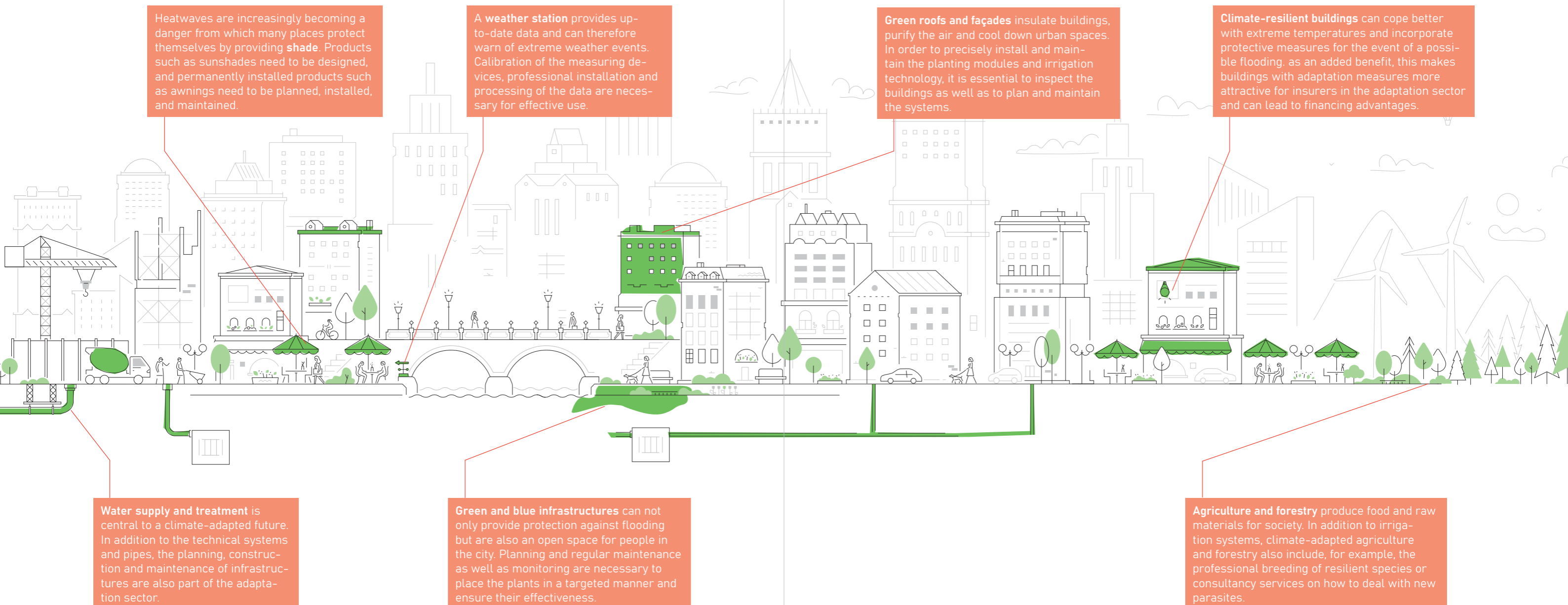
The present analysis of the adaptation sector is the first to offer quantitative insights into global trade within the various subsectors. The international activities of the subsector for planning, consulting and insurance services could not yet be fully quantified. However, the chart presented here illustrates how this subsector is interwoven with the adaptation goods of all other subsectors.

However, by definition, the adaptation sector does not only include product-based activities, but all services that serve to prevent or mitigate potential damage by increasing resilience to actual and expected climate impacts. In practice, this means that for the vast majority of products traded in the adaptation sector services in the areas of planning, consulting and/or insurance are needed to properly function.

The envigos-Model (see next page) is capable of quantitatively mapping aspects of the 'planning, consulting and insurance services' subsector. In 2021,

around 13,000 people were employed in this area in NRW, making it the smallest of all subsectors, but no less important for the preparation and implementation of adaptation measures.

Quantifying the international interdependencies in this subsector is very complex and not yet possible on the basis of currently available data. However, the following figure uses specific examples from all subsectors to illustrate how closely the services of the adaptation sector are linked to product-based trade flows.



MEASURING A CROSS-SECTORAL INDUSTRY: METHODOLOGICAL BASIS

The adaptation sector and its global export and import activities cannot be extracted directly from official statistics. However, with the *envigos*-Model exists an approach based on the estimation of shares within conventional sectors that can be determined as adaptation-related. A global trade model can then be used to visualize the global import and export flows of the most important trading nations.

The adaptation sector, which is the focus of the information in this brochure, is a cross-sector industry. Data on it cannot be clearly extracted from official statistics (in contrast to the chemical or automotive industries, for example), but must be determined using a complex statistical procedure.

For example, roof construction and roofing work can include both conventional roof installations and form the basis for green roofs.

The *envigos*-Model (model for the environmental goods and services sector) from Prognos AG allows statements to be made on the shares of those economic activities in each economic sector up to the 5-digit level that can be assigned to the field of climate adaptation.

To this end, the model systematically examines the 1,834 economic sectors in the current WZ-2008 clas-

sification and the 7,690 goods in the current GP-2009 classification.

While the model was originally developed to define the environmental economy sector, it can also be used to define the adaptation sector, which is per definition a subsector of the environmental economy. According to the model definition, the adaptation sector includes all **products and services for the preventive avoidance or mitigation of potential damage by increasing resilience to actual and expected climate impacts.**

As this is a theoretical, statistical approach based on comprehensive research of secondary literature, the share estimates are associated with a certain degree of uncertainty and are therefore only rounded in order to avoid fictitious accuracies. Furthermore, in addition to the sectors themselves, the shares of relevant activities for climate change adaptation in the sectors can also change dynamically, meaning that comparisons with previously published figures cannot always be made exactly.

The basic data for this analysis are the foreign trade statistics by goods and goods groups from the German Federal Statistical Office and IT.NRW. These include the export and import volume of goods from all countries in the world to and from Germany and NRW. To illustrate global trade links, the data is based on information from the COMTRADE database and was supplemented by the **Prognos world trade model**. This model maps global trade between over 60 countries in the world (with >90 % of the total volume of goods traded globally) and is compatible with the demarcation method from *envigos* in order to provide this information specifically for the adaptation sector.



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