



Environmental technology from Bavaria

Solutions for global challenges



Chambers of Commerce
and Industry
in Bavaria



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Foreword

Successful environmental protection depends on effective and efficient environ-
 mental technology. Bavarian companies develop innovative products and processes
 that are competitive around the world. Including technology used for CO₂ reduction
 and improving energy efficiency, Bavaria's environmental industry generates annual
 revenue of around 50 billion. On these terms, it is just as important as vehicle ma-
 nufacturing and mechanical engineering.

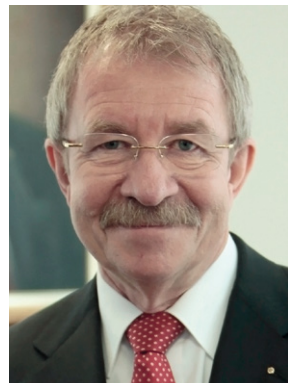
There are good reasons why Bavarian companies are so successful in this sector.
 Bavaria has a long tradition of protecting its natural resources. Bavaria was the first
 federal state in Germany to set up its own ministry for environmental protection, as
 long ago as 1970. It was not until 16 years later that the German Federal Ministry
 for the Environment was founded.

In the intervening years, we in Bavaria have made major advances in environmental
 protection. Despite growing output, companies in Bavaria have steadily reduced
 their environmental footprint. At the same time, efficiency in the use of resources
 continues to grow. The picture from around the globe tells a different story: rapid
 economic growth to meet the needs of an ever-increasing world population has in
 many regions placed an enormous strain on the environment.

Environmental technology from Bavaria has therefore excellent chances in the glo-
 bal marketplace. In order to seize these opportunities, it is vital to keep track of the
 latest developments in markets around the world and to help companies tap this
 sales potential. Equally important is the promotion of research and innovation back
 here in Bavaria. Representatives from the worlds of politics, business and science
 work hand in hand to ensure that environmental technology from Bavaria is able to
 hold its own in international markets and further consolidate its position.



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Bavaria's environmental industry

Facts and figures

The environmental industry is a composite industry, made up of a number of different sectors. For many companies in this field, environmental activities account for only part of their total business operations. This is particularly the case for the mechanical and electrical engineering industries, for example, and also for construction and services.

It is therefore impossible to say exactly how many companies make up Bavaria's environmental industry. On the other hand, companies in the recycling and waste-water disposal sectors can clearly be assigned to this sector. Many studies on the environmental industry also include energy generation from renewable sources and energy storage in this field. In the present publication, however, the emphasis lies firmly on the environmental industry in the narrow sense: recycling, waste-water disposal, environmental protection, and the efficient management of resources and materials. Umweltwirtschaft in Bayern, a recent study of Bavaria's environmental industry by the Bavarian State Ministry of Economic Affairs, lists the following facts and figures:

- 9,400 companies
- 71,000 employees
- Revenue of Euros 18,5 billion in 2014

The industry consists principally of small and medium-sized enterprises; 92 per cent of all companies in this sector have fewer than 10 employees.

In terms of individual market segments, the figures are as follows:

Links & Literature

The study *Umweltwirtschaft in Bayern* by the Bavarian State Ministry of Economic Affairs and Media, Energy and Technology can be accessed at stmwi.bayern.de/service/publikationen/



Recycling

Collection, transportation, processing and recycling of waste; equipment and plant for the waste industry

1,100 companies
30,000 employees
Revenue of Euros 5 billion (2014)
5.6 per cent growth p. a. (2010–2014)



Waste-water disposal

Waste-water treatment, water infrastructure, water conservation

3,300 companies
27,000 employees
Revenue of Euros 4.9 billion (2014)
6.7 per cent growth p. a. (2010–2014)



Environmental protection

Soil protection, air-pollution control, noise control/reduction

1,200 companies
12,000 employees
Revenue of Euros 2.7 billion (2014)
5.6 per cent growth p. a. (2010–2014)



Management of resources and materials

Efficient use of materials in production; renewable resources

4,100 companies
51,000 employees
Revenue of Euros 5.9 billion (2014)
2.7 per cent growth p. a. (2010–2014)

Source: "Umweltwirtschaft in Bayern", Bavarian State Ministry of Economic Affairs and Media, Energy and Technology (2017); BIHK calculations.

Bavarian solutions for global challenges

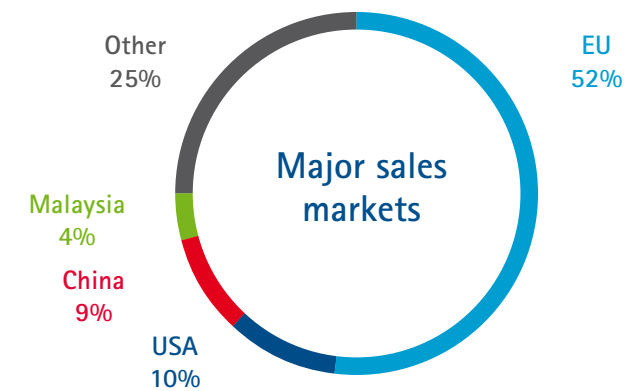
International markets are an increasingly attractive target for Bavaria's environmental technology companies, offering substantial growth opportunities for new sales of products and services beyond the domestic market. Bavarian companies have a wealth of know-how and expertise in dealing with global challenges such as climate change and urbanisation. The consequences of these global developments are manifold: according to the United Nations, 80 per cent of the world's waste-water currently remains untreated; at the same time, two-thirds of the world's population live in regions that are threatened at least once a year by water scarcity. Forecasts for 2025 indicate that the world's cities alone will produce 2.2 billion metric tons of waste. Meanwhile, 6.76 billion people worldwide suffer from the effects of excessive air pollution. Environmental technology from Bavaria can help bring about a lasting improvement in living conditions in both urban and rural environments.

fig. 1: Export volume of the Bavarian environmental industry, 2015



Source: "Umweltwirtschaft in Bayern", Bavarian State Ministry of Economic Affairs and Media, Energy and Technology (2017); BIHK graphic

fig. 2: Major sales markets for the Bavarian environmental industry, 2015; Percentage of total environmental industry exports



Source: "Umweltwirtschaft in Bayern", Bavarian State Ministry of Economic Affairs and Media, Energy and Technology (2017); BIHK graphic



1 Sources: unesdoc.unesco.org/images/0024/002475/247552e.pdf unenvironment.org/explore-topics/chemicals-waste/why-do-chemicals-and-waste-matter un.org/sustainabledevelopment/blog/2016/09/vast-majority-of-world-6-76-billion-people-living-with-excessive-air-pollution-un-report/

Best Practices

Information on all flagship projects is available at
www.umweltcluster.net/de/projekte/leuchtturmprojekt.html

The following technological developments have been selected as flagship projects by Umweltcluster Bayern. This award was created in 2008. It is presented to flagship projects that have pioneered new developments, have been successfully implemented and are now operating profitably.



The BENCHMARK TOOL for the identification of untapped potential for waste elimination and waste recycling in manufacturing companies around the world

This project received the award in 2016. The BENCHMARK TOOL helps companies to factor in their waste-processing requirements when planning new production sites and enables effective detection of potential for improving the disposal of solid and liquid waste at manufacturing locations worldwide. The award demonstrates that a family-run Bavarian company can lead the world in the planning and development of industrial waste-disposal solutions and thereby make a significant contribution to conserving resources in manufacturing.

Developer: ELOGplan GmbH
elogplan.com



The FIBALON polymer fibre filter for crystal-clear water

The patented polymer fibre filter FIBALON is a fully fledged substitute for sand, glass or cartridge filters, with a large number of applications (swimming pools, aquariums, ponds, waste-water filtration in sewage treatment plants etc.). It is significantly lighter than filter sand (1 kg of FIBALON is the equivalent of 75 kg of filter sand) and therefore much easier to transport and handle. There are no restrictions with regard to filter system, manufacturer, size, or year of manufacture: FIBALON offers a truly universal solution. This young company received the flagship award from Umweltcluster Bayern in 2015. The honour was in recognition of an innovative product that has been developed together with partners from all over Bavaria and is now marketed worldwide.

Developer: FIBALON e. K.
fibalon.com

Project partners: Technische Hochschule Nürnberg Georg Simon Ohm
 MSP-Poolservice und Schwimmbadbau Reiner & Dirschka GmbH

Conversion to an anaerobic sludge treatment process so as to improve the energy efficiency of the Bad Abbach sewage plant

The Bad Abbach sewage plant originally used simultaneous aerobic stabilisation to deal with sludge. This was a relatively energy-intensive process. When an increase in the number of inhabitants from 10,000 to 16,000 necessitated an expansion in capacity, the sewage plant was converted to operate with an anaerobic stabilisation process. Using cost-effective methods to build digesters for the biogas industry – which require only minor, project-specific adaptation – even small sewage treatment plants operating with anaerobic stabilisation can now be run on an economic basis. The sewage gas produced in this process is used to generate electricity, which largely covers the plant's energy needs. Numerous delegations from both Germany and abroad have since been persuaded of the benefits of this technology.

Developer: Markt Bad Abbach

Project partners: Bayerisches Ministerium für Umwelt und Verbraucherschutz,
 Bayerisches Landesamt für Umwelt, BBI Bauer Beratende Ingenieure GmbH,
 Hochschule Weihenstephan-Triesdorf, ATM Abwassertechnik, ELO-consult
 Elektrofachplanungs-GmbH



Exploiting waste heat from a commercial mangle in order to enhance the energy efficiency of the washing process

Energy efficiency is a key consideration in energy-intensive sectors, not least on grounds of cost. Laundries and dry-cleaners, for example, have relatively high energy requirements on account of the temperatures used in washing and cleaning. The company Coburger Handtuch + Matten Service has developed – in addition to an innovative solid-filter system – a heat-exchanger in order to exploit the waste heat from commercial mangles. The energy recuperated from the hot air emitted by the mangle is reused in the form of heated water at three different stages of the remaining process.

Developer: Coburger Handtuch- und Mattenservice CHMS

Project partners: August Hofmann & Söhne
 Technische Hochschule Nürnberg Georg Simon Ohm





Energy-efficient utilisation of waste heat for Tropenhaus Klein Eden in Upper Franconia

A company in Upper Franconia – a region not known for its hot climate – is farming exotic fruit and edible tropical fish with organic methods. Known as Klein Eden, the glasshouse complex covers an area of 3,500 square meters and is heated with previously unused process heat from the neighbouring glass company, Heinz-Glas GmbH. By utilising this low-temperature waste heat, it is possible to grow – here for commercial and research purposes – tropical plants and fish under economically viable conditions, even in Bavaria. The project was presented with the Umweltcluster flagship award in 2013.

Developer: Klein Eden Tropenhaus am Rennsteig GmbH

Project partners: HEINZ-GLAS Group Kleintettau, Ecological-Botanic Garden of the University of Bayreuth and other companies and municipalities in the region



Heating with waste water

A renovation project to improve the energy efficiency of a housing complex belonging to the housing association Städtische Wohnungsbau GmbH took a two-pronged approach: extra insulation to achieve passive energy savings together with measures to improve the efficiency of heat generation. Following the installation of façade insulation and modern insulated glazing in order to reduce the heating requirements of the housing complex, the entire heating system was converted to a heat-pump system operating at low flow temperatures. The energy source for the heat pump is waste water from nearby sewers, which is significantly warmer than the other two energy sources conventionally used for heat-pump systems: air and groundwater. As a result, the heat pump can be operated with greater efficiency.

Developer: Town of Straubing

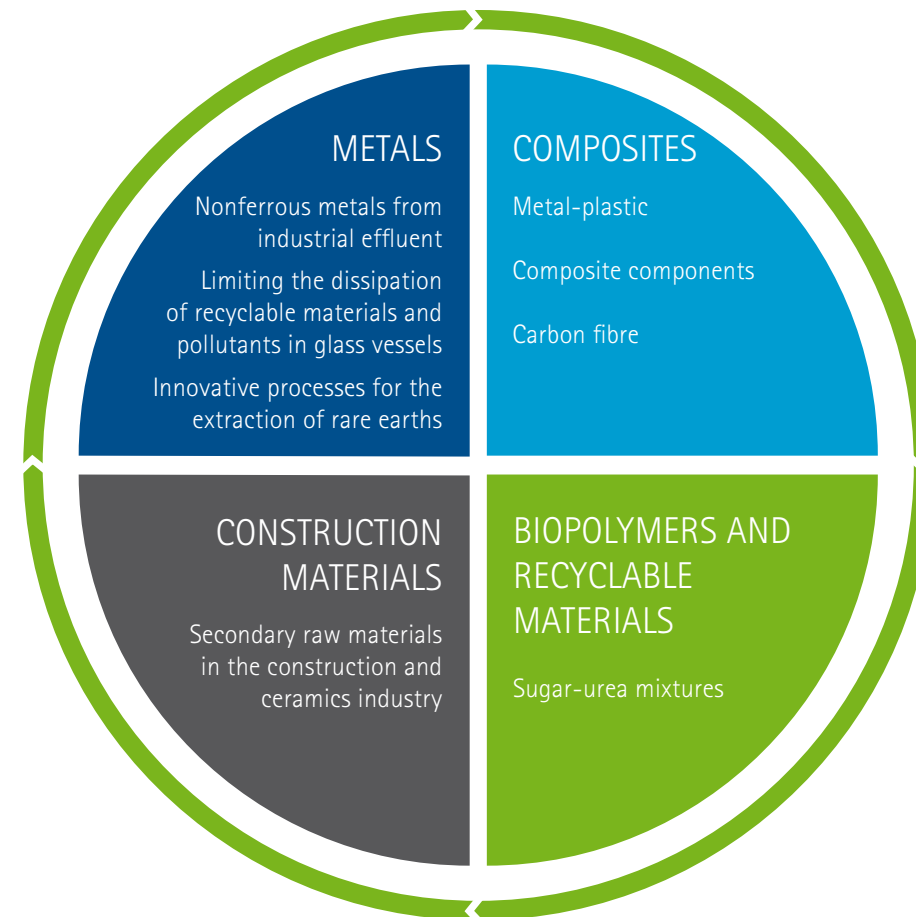
Project partners: GFM Beratende Ingenieure GmbH, HUBER SE, Technical University of Munich, Chair of Regenerative Energy Systems, Städtische Wohnungsbau GmbH

Cutting-edge environmental research from Bavaria

Research is currently carried out at some 75 universities and non-university institutions in Bavaria. A key focus of such work is the search for solutions to the global and regional challenges in the area of environmental, energy and climate research. Research alliances, whereby scientists from different disciplines work together on a complex issue, are a key aspect of the Bavarian research sector. In the field of environmental research, the "ForCYCLE – Rohstoffwende Bayern" alliance, funded by the Bavarian State Ministry of the Environment and Consumer Protection, plays a leading role. In ForCYCLE I, which ran from 2013 to 2017, nine project groups conducted research into Bavaria's future resource strategy, with a particular emphasis on secondary raw materials. ForCYCLE II, which is due to start in 2019, will focus on the topic of resource efficiency in the Bavarian economy, particularly with reference to the SME sector and the skilled trades.

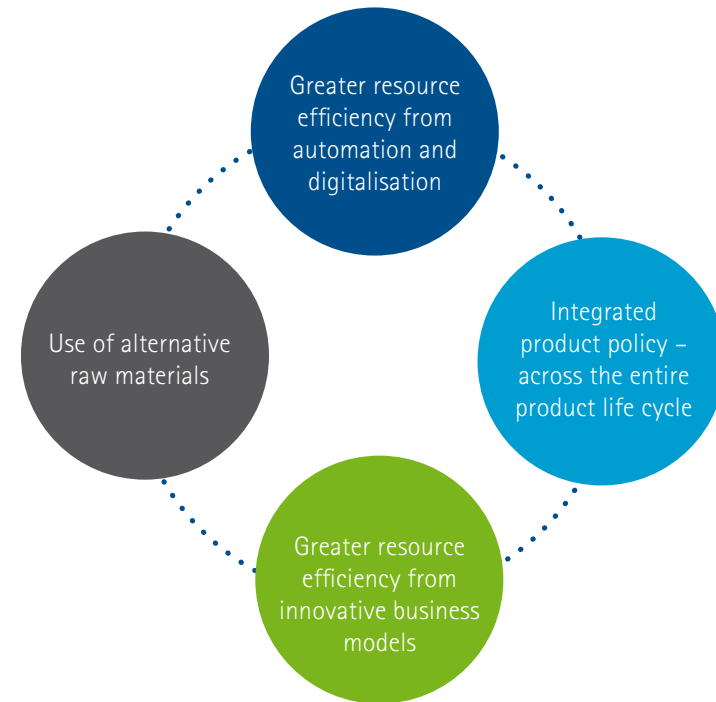
Key topics of ForCYCLE I and II:

fig. 3: ForCYCLE I



Source: forcycle.de, BIHK graphic

fig. 4: ForCYCLE II



Source: stmuv.bayern.de/themen/ressourcenschutz/forschung_entwicklung/forcycle.htm, BIHK graphic

Support with application for European funding

The Bavarian Research Alliance (BayFOR) is a publicly funded company that promotes Bavaria as a centre for science and innovation within the European Research Area. Its Environment, Energy & Bioeconomy unit advises and supports scientists from Bavarian universities and stakeholders from industry in the process to secure European funding for environmental research.

BayFOR is active in four core areas:

- EU funding programmes
- Bavarian research alliances
- International scientific collaboration
- EU liaison office in Brussels

In 2016, Umweltcluster Bayern and BayFOR launched a collaborative project. Its purpose is to strengthen Bavaria's position as a location for research and innovation in the field of environmental technology and to promote and consolidate Bavarian universities and SMEs as key players on the European level.

bayfor.org

Umweltcluster Bayern: the network for Bavaria's environmental industry

A success story: the founding of Umweltcluster Bayern

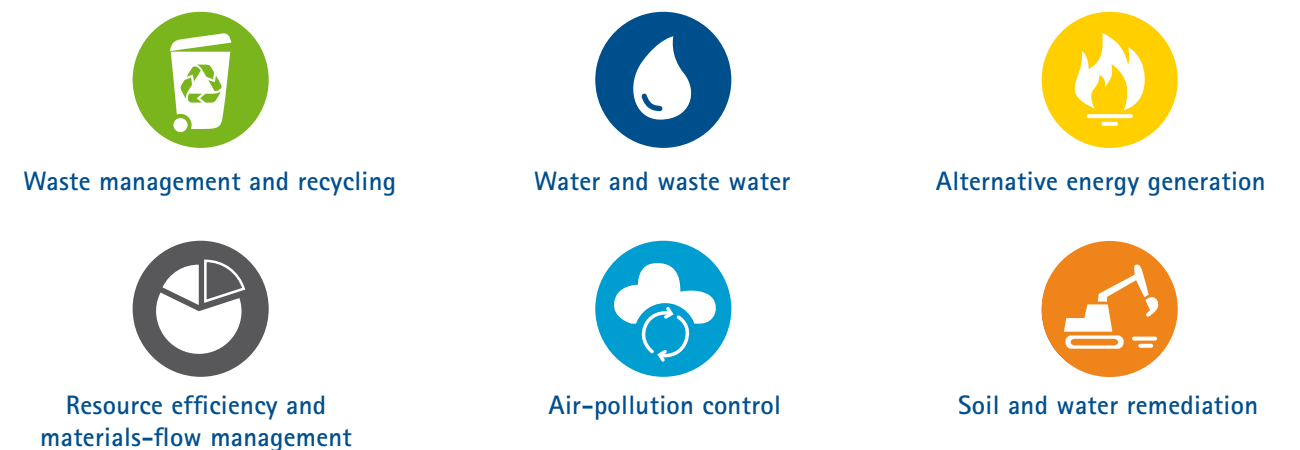
The Bavarian Cluster Initiative is an instrument devised by the Bavarian state government to promote greater networking between industry and science, with the aim of strengthening Bavaria as a business location. In line with this initiative, the Bavarian chambers of industry and commerce have actively promoted a process of clustering in the Bavarian environmental industry, which is made up predominantly of small and medium-sized enterprises. The Bavarian chambers of industry and commerce assumed the trusteeship of Umweltcluster Bayern in 2006 and have provided funding ever since, together with the Free State of Bavaria. Moreover, they decisively shaped the strategy and organisation of cluster management in the initial phase. This early cooperation has given rise to a strong partnership, including a joint programme of work.



International players with strong roots in Bavaria

Umweltcluster Bayern has developed into a key network for Bavaria's environmental industry. It connects companies and service providers, science and research, municipalities and associations, and representatives from the worlds of politics, trade and industry in Bavaria, Germany and throughout the world. It has over 200 members and serves as a forum for the latest industry trends, an innovation platform for the initiation of joint projects and a springboard for doing business abroad. The aim is to make its members more competitive, more innovative and more international. Together, its members cover the entire value chain of the environmental industry.

Umweltcluster Bayern pools expertise in the following areas:



In order to encourage information sharing and innovation among its members, Umweltcluster Bayern organises events, working groups and projects in areas such as the circular economy, energy from waste and biomass, recycling of building materials, recycling of waste containing carbon fibre-reinforced plastics, landfill engineering, recovery of waste-water heat, decentralised waste-water treatment and start-ups as an innovation driver for SMEs.

Environmental technology from throughout Bavaria

Innovative companies operating in environmental technology are located throughout the regions of Bavaria. Knowing these potential business partners is crucial for promoting competitiveness and innovation. Equally important, however, is to encourage regional cooperation and to engineer solutions to the environmental challenges facing all the regions, such as in the area of resource efficiency. The Bavarian chambers of industry and commerce work closely together with Umweltcluster Bayern to promote regional strengths and develop the industry's potential.

Regional networks

Umweltkompetenz Nordbayern

The environmental initiative "Umweltkompetenz Nordbayern" is an alliance of companies and institutions from northern Bavaria that are working in the environmental industry. The initiative is coordinated by the chambers of industry and commerce in Bayreuth, Coburg, Nuremberg, Regensburg and Würzburg-Schweinfurt.

umweltkompetenz.net

Kompetenzzentrum Umwelt (KUMAS) e. V.

KUMAS is a platform for cooperation and the sharing of knowledge, information and experience between environmental companies and institutions based in or around the administrative region of Swabia.

kumas.de

Ressourceneffizienz-Zentrum Bayern REZ

In the field of resource efficiency and recycling, a further partner to the Bavarian chambers of industry and commerce and to Umweltcluster Bayern is Ressourceneffizienz-Zentrum Bayern (REZ).

The services provided by REZ are directed at all Bavarian companies and, in particular, at small and medium-sized enterprises in the manufacturing sector. REZ aims to facilitate a comprehensive sharing of experience and know-how among companies, industry and other stakeholders and to help decision-makers at Bavarian companies implement measures in the area of resource efficiency. Its priorities are in the following areas: the efficient management of resources and materials, ecological product development and the use of alternative and secondary raw materials.

REZ was set up by the Bavarian State Ministry of the Environment and Consumer Protection. It is run by the Bavarian Environment Agency (LfU) together with BIHK, the umbrella organisation of the Bavarian chambers of industry and commerce. REZ is located at LfU in Augsburg and has branches at the chambers of industry and commerce in Nuremberg and Munich.

REZ provides companies in Bavaria with information on all the stages of the product life cycle where resource-conserving measures can be applied. In particular, REZ stages a variety of events, ranging from information forums at individual companies to an international resource conference. Its website publishes examples of best practice from Bavarian companies, information on the practical implementation of measures to increase resource efficiency and an overview of funding programmes.



Finding an environmental technology partner in Bavaria

Environmental technology made in Bavaria

Umweltcluster Bayern provides the springboard for its members to do business abroad. It is also the first point of contact for foreign partners looking to source environmental technology made in Bavaria. Thanks to its powerful international network, Umweltcluster Bayern has numerous contacts in key markets abroad.

Services in this area include:

- Individual advice and contacts
- Country-specific information and specialist events on accessing foreign markets
- Project development and acquisition of funding
- Organisation of delegations abroad and reception of foreign delegations
- Joint development of solutions for environmental challenges worldwide
- Sharing between members of information on individual target markets

From UMFIS to IHK ecoFinder: the new database of environmental companies

For more than 20 years, UMFIS – the environmental company database of the Bavarian chambers of industry and commerce – has provided a comprehensive overview of the service companies, consultants, manufacturers and distributors in the environmental and energy sector. UMFIS has now undergone a technical and visual makeover, bringing it into line with the requirements of a modern, user-friendly, barrier-free and secure web application. And it also has a new name: IHK ecoFinder.

ecofinder.ihk.de

umfis.de

Tipp



Do you offer products and services in this sector? Then simply register at the following link:
ecofinder.ihk.de.



Tapping international markets: the Bavarian chambers of industry and commerce

The Bavarian chambers of industry and commerce work hand in hand with Umweltcluster Bayern

When entering and developing foreign markets, it is vital to have the right strategy. Companies must ensure not only that their products and services are tailored to the precise needs of the market but also that they properly understand the administrative, legal and economic requirements of the country or region in question. Bavarian companies looking to access foreign markets can turn to the Bavarian chambers of industry and commerce and to Umweltcluster Bayern for information. Together, they organise events on specific countries, business delegations and visits to trade fairs abroad. The in-depth experience of the chambers of industry and commerce provides the perfect complement to the special industry knowledge of Umweltcluster Bayern.

The chambers of industry and commerce are the first point of contact for export-oriented companies

Any company exporting goods abroad or importing to Germany has to deal with customs. There are numerous regulations, many of them complicated. The chambers of industry and commerce help companies with questions such as: Which goods can be exported to which countries? Which regulations have to be observed in specific countries? Are there any precautionary measures that should be observed in a particular country?

Go international

"Go international" is a sponsorship programme run by the Bavarian chambers of industry and commerce and the Bavarian chambers of trade and crafts. It provides financial support and advice for small and medium-sized enterprises that are looking to tap new foreign markets. Companies receive support for up to two target countries. The project receives support from the European Regional Development Fund of the EU and from the Free State of Bavaria. To date, some 1,500 companies have received funding of over Euro 6.5 million.

Dienstleistungskompass.eu

The website <www.dienstleistungskompass.eu> offers a clear and digestible overview of information for companies looking to offer their services abroad. It provides explanations, practical tips and examples for all the major EU countries as well as Switzerland and Norway. In particular, it features information on any legal requirements abroad that must be observed in order to avoid penalties in the cross-border provision of services. The website provides answers to questions such as: Where and how do I register my employees? What documentation is required? What do I need to bear in mind when dealing with employment contracts and social security?

dienstleistungskompass.eu

The German Chambers of Commerce Abroad: Chambers for GreenTech

With their networks and their expertise, the German Chambers of Commerce Abroad are the first point of contact for German companies looking to tap and develop foreign markets. This applies particularly to the fast-growing market in environmental technology. In line with the Federal government's export initiative for environmental technology, the Bavarian chambers of industry and commerce continue to expand their expertise in the relevant fields. Key topics here are recycling, water management and sustainable mobility.

ahk.de/foerderprogramme/umwelttechnologien/chambers-for-greentech/

Contact details for the Bavarian chambers of industry and commerce (CCIs) and for Umweltcluster Bayern

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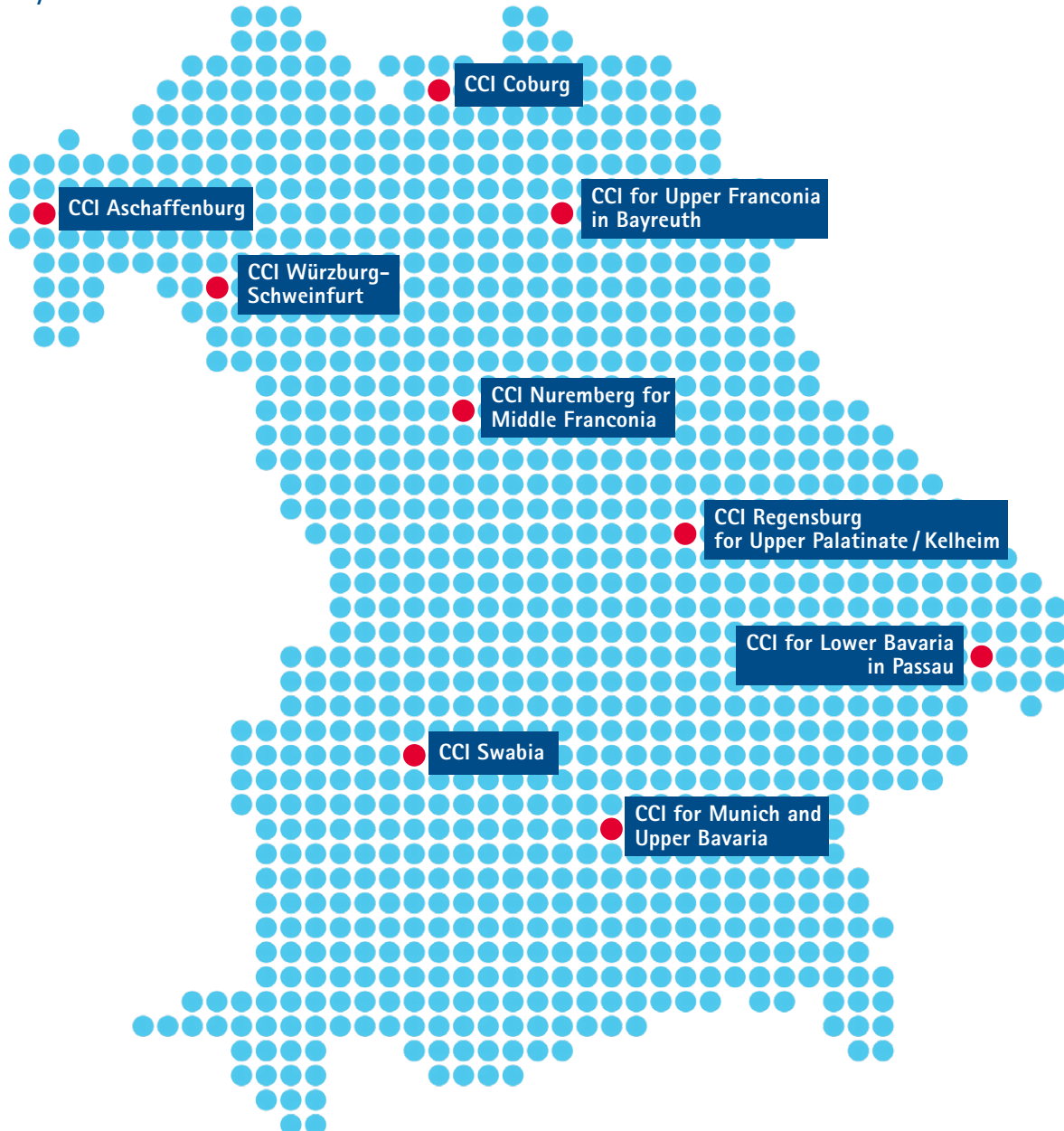
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Chambers of Commerce
and Industry
in Bavaria

We're at your service



The CCIs in Bavaria

The Association of the Bavarian Chambers of Commerce and Industry is the umbrella organisation for the nine Bavarian Chambers of Commerce and Industry (CCIs). All Bavarian firms – excepting those in the craft trades, the liberal professions and agriculture – are compulsory members of a chamber of commerce and industry. The Association of Bavarian Chambers of Commerce and Industry therefore represents over 973,000 enterprises of all sizes and across all industries, from global corporate groups to owner-operated SMEs. The Association is therefore not beholden to a specific group of businesses, instead acting on behalf of the overall interests of the commercial sector in Bavaria. Since its inception in 1909, the Association has been the largest business organization in the Free State of Bavaria.