

Bavaria - top location for power electronics

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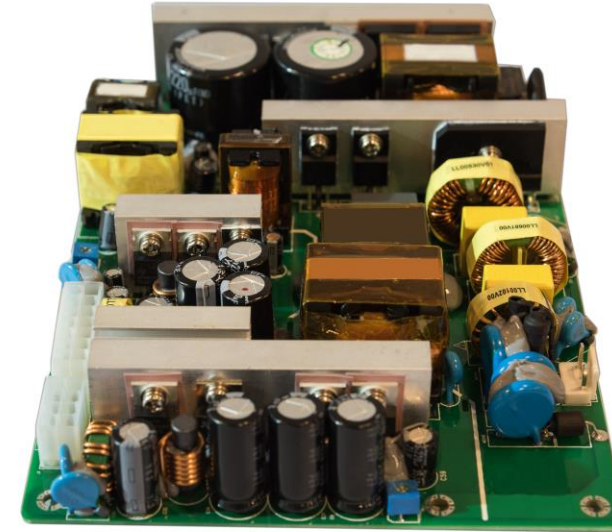
Bayerischen Staatsregierung



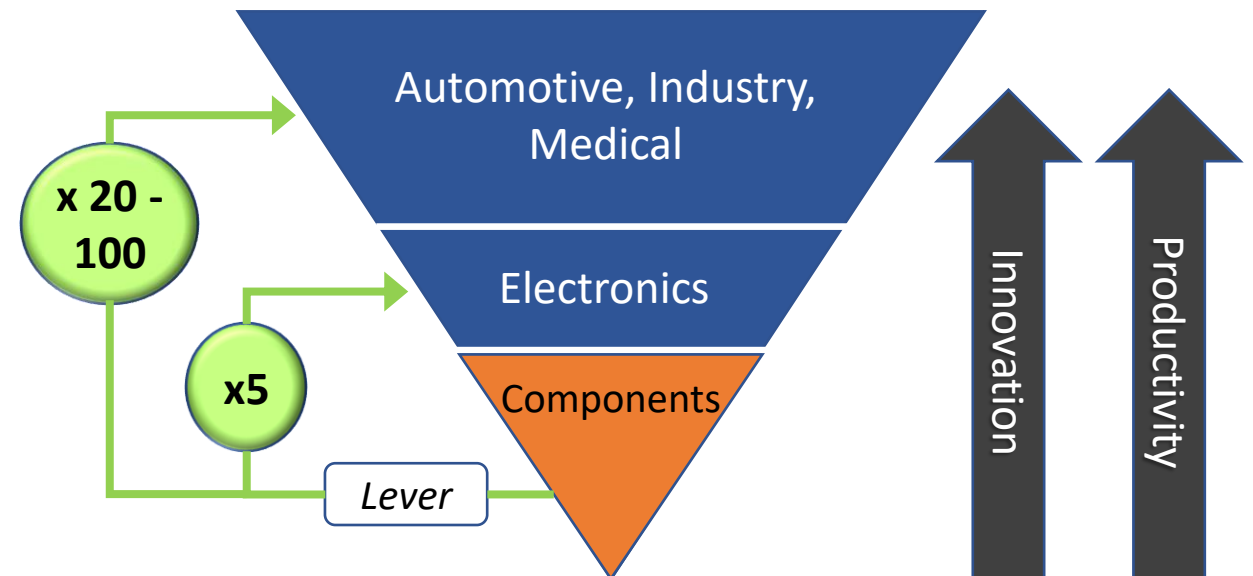
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Significance of power electronics

The function of power electronics is to convert electrical energy as efficiently as possible into the form required by various applications and to control the power flow. This makes it a key technology for growth industries in the fields of mechanical engineering, electrical engineering and automotive as well as for industrial drive technology, renewable energies and power grids. Around 550 companies and institutes with around 110,000 jobs in Bavaria are directly involved in research and development, production, sales and services in the field of power electronics.



Source: istock



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Key industries

Power electronics are needed in almost all electrically powered applications: From LED lamps and smartphone chargers to electric cars, data center power supplies and high-voltage power grids. Efficient power electronics stand for CO₂ reduction and resource conservation. Power electronics is a key technology especially in the areas of electric mobility (from e-bikes to electric cars to e-airplanes and regardless of whether the energy comes from a battery or fuel cell), industrial drive technology and traction, renewable energies and power grids as well as building and lighting technology.



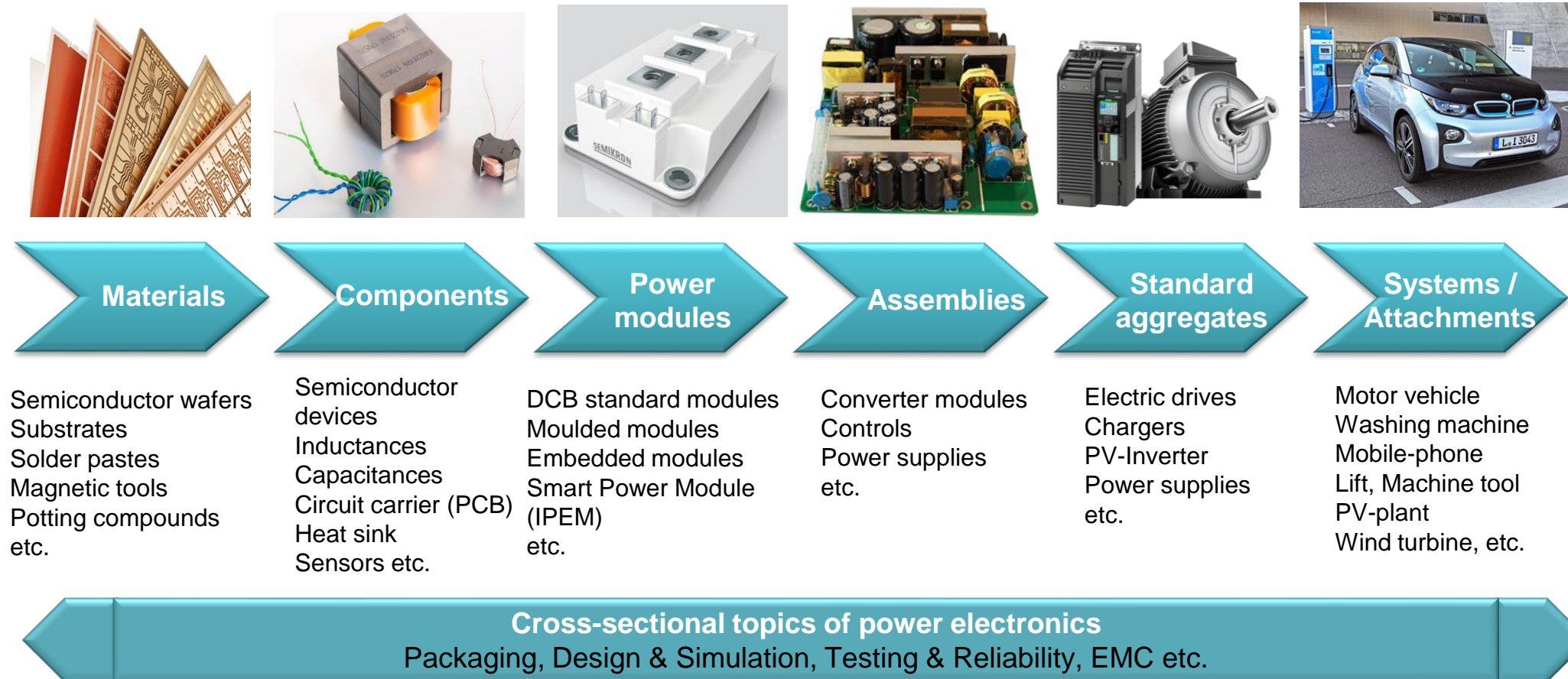
Bild: ECPE

Prof. Dr. Leo Lorenz,
President ECPE e.V.

„Power electronics is a strong enabler for many applications. At the same time, many innovations are also taking place here, for example to further increase reliability despite ever higher power densities and new semiconductor materials.“

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The value chain of power electronics



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Future topics in power electronics

Power electronics continues to undergo rapid development.

Modern power electronics are faster, lighter, smaller, more energy-efficient and more intelligent.

Modern power electronics thus play a key role in the efficient use of electrical energy.

Modern Power Electronics:

Better semiconductor materials, faster switching, higher power density, higher operating temperatures, programmable



CO₂ reduction

Energy efficiency (for drives, power supplies, green IT, ...), renewable energies: efficient feed-in and transmission, decarbonization, green hydrogen, power-to-X, CO₂ capture



Mobility & Transport

Electrification of car, bike, bus, truck, train, plane and autonomous driving



Medical Technology

Diagnostics, robotics, wireless power for applications in the body



Industry 4.0

Condition monitoring of electronics, predictive maintenance, flexibility & efficiency of electric drives



Digitalization / A.I.

Edge & Cloud Computing, Data Center, IoT, Mobile Communications, 5G (6G), Energy Grid Stabilization, Smart Grid

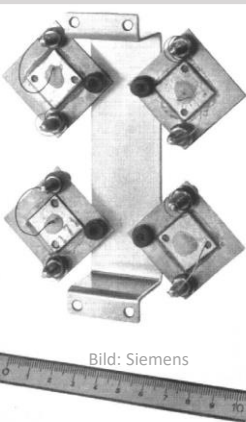
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Source: Watercolour Feldkeller

History of power electronics

From 1946 to 2002, a series of pioneering technical and scientific achievements in the field of semiconductor materials and power components were made in the Franconian town of Pretzfeld, such as the development of the manufacturing process for ultra-pure silicon and silicon crystal production, using the crucible-free zone process (floating zone). This research and development work has achieved world-class significance and laid the technical foundations for the key components of microelectronics and power electronics, on which modern information technology and the electrical power supply of the future are based.



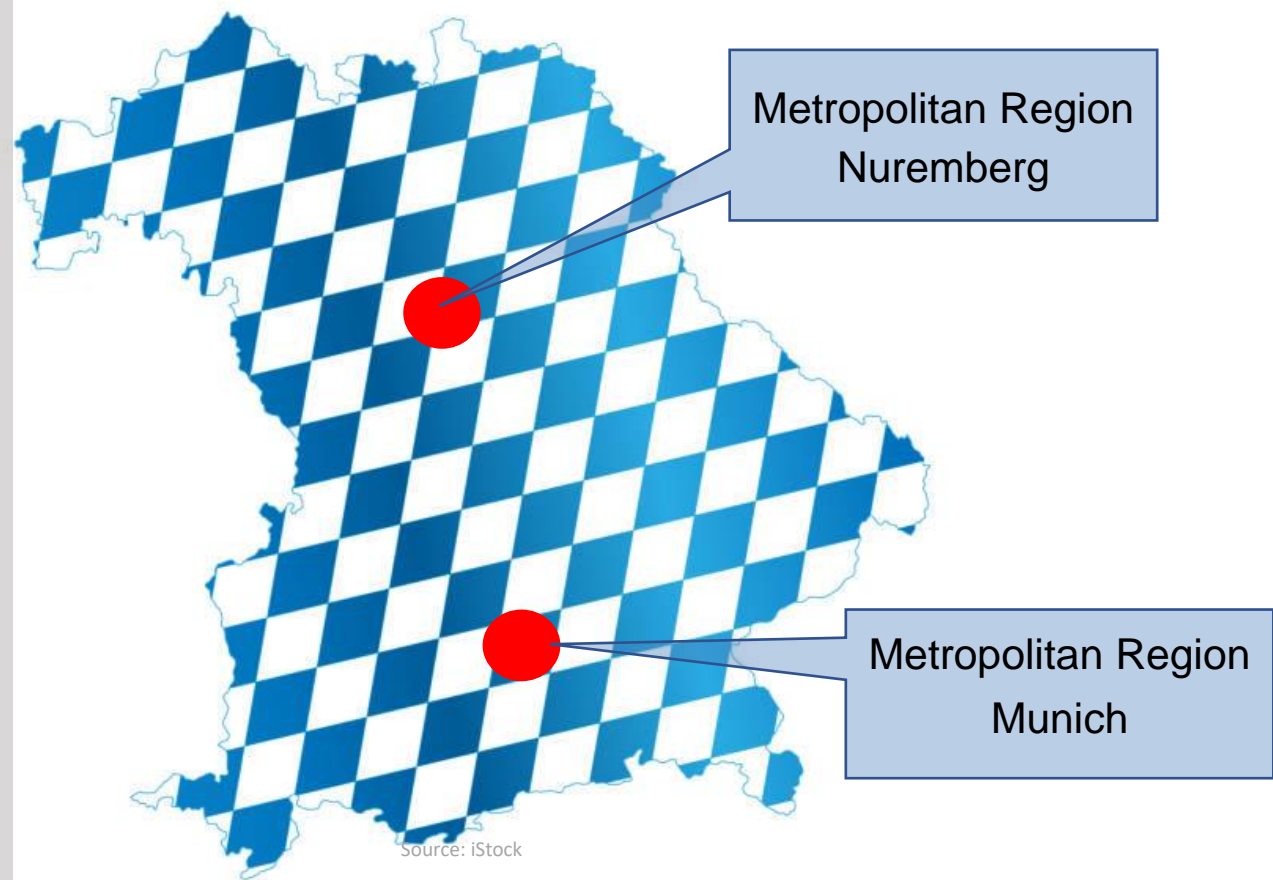
First silicon rectifier

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Competent companies and research institutions active in the field of power electronics can be found in all Bavarian regions. There are two centers where a particularly large number of players are concentrated:

- The **Nuremberg metropolitan region** covers a wide range of industries such as semiconductors, energy, electric drives and automotive suppliers. Various research institutions such as Fraunhofer IIS and IISB, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), TH Nürnberg are important partners for research and development.
- The **Munich metropolitan region** bundles competencies, especially in the areas of energy, automotive (OEM and suppliers) and aerospace. The renowned Technical University of Munich, the University of the Federal Armed Forces, the Fraunhofer EMFT and others provide a rich research landscape.



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The Power Electronics Cluster coordinates the Bavarian cooperation network of companies and research institutes.

The network contains around 135 core players from industry and research, as well as around 240 other players. Close cooperation with the European ECPE network enables a wide range of synergies - be it in the organization of specialist events or in the search for suitable cooperation partners.

Goals and focus

- Initiating innovations in the Bavarian economy.
- Further development of the research landscape in Bavaria according to the requirements of the economy.
- Strategic market development for Bavarian companies, especially for small and medium-sized enterprises.
- Contribution to increasing energy efficiency and ensuring a sustainable energy supply based on energy from renewable sources.
- Education and training of qualified specialists in the field of power electronics.
- Promotion of young talent to ensure future qualified specialists (shortage of engineers, engineer training).

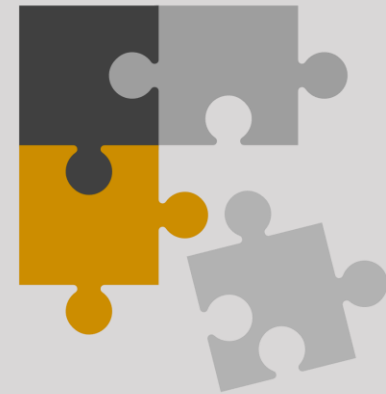
Another goal of the cluster is to increase the perception of power electronics as a cross-sectional and key technology for energy efficiency and sustainability with impact in many application areas.

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The Power Electronics Cluster is the contact for all questions concerning power electronics

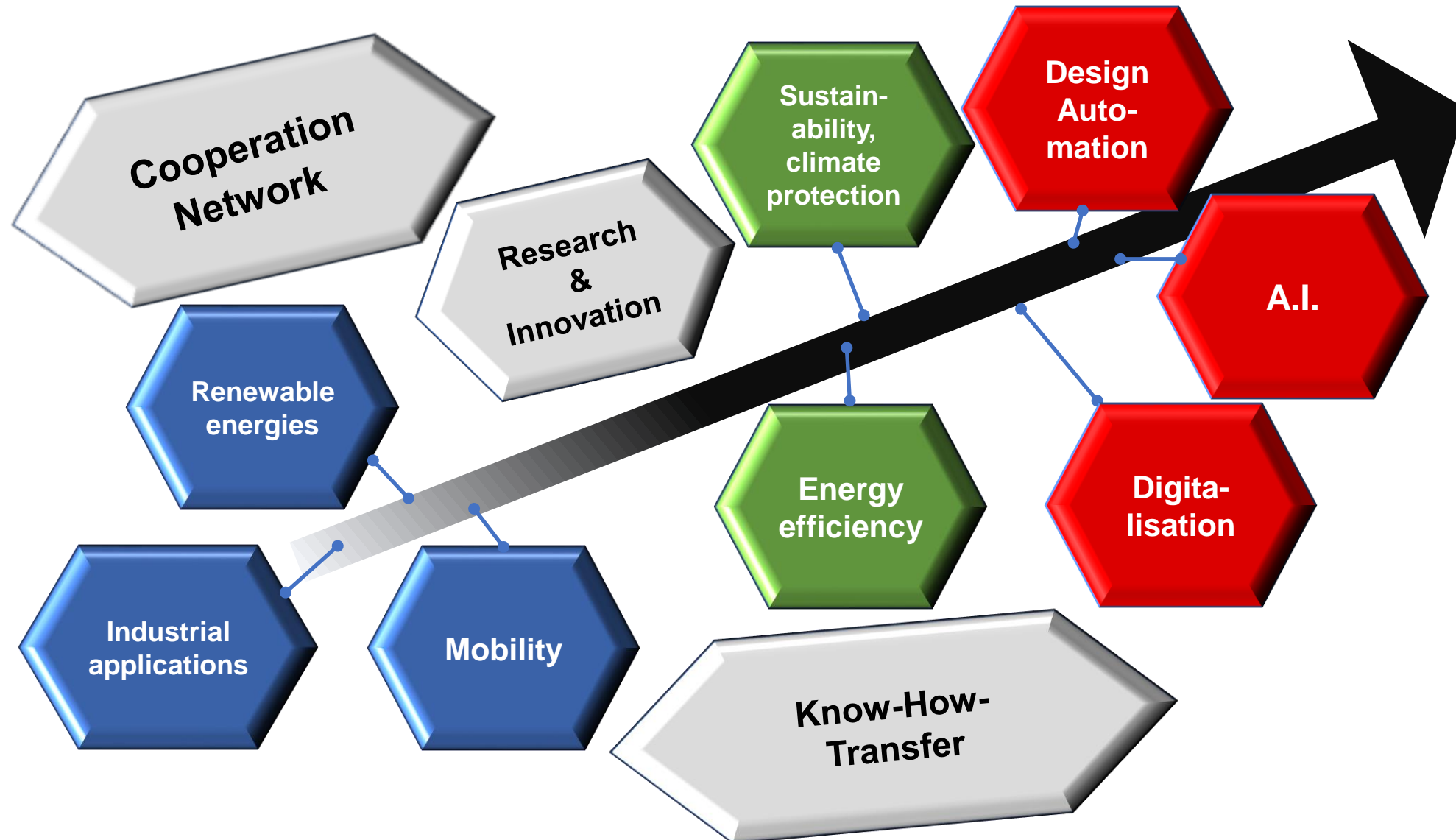
The cluster offers support :

- In the search for suitable cooperation partners in the fields of R&D, production or application.
- In the application for funding projects: from the identification of ideas and assistance in the preparation of the project outline to exploitation and technology transfer.
- In professional training and further education through an extensive regular training program as well as individually designable training topics.
- In the exchange of knowledge between different actors in the network e.g. by means of specialist seminars on current topics or expert discussions.
- In the search for experts for specific technical questions.
- In the search for technical solutions to specific problems.
- In the promotion of young talent and public relations work.
- And for other individual topics.

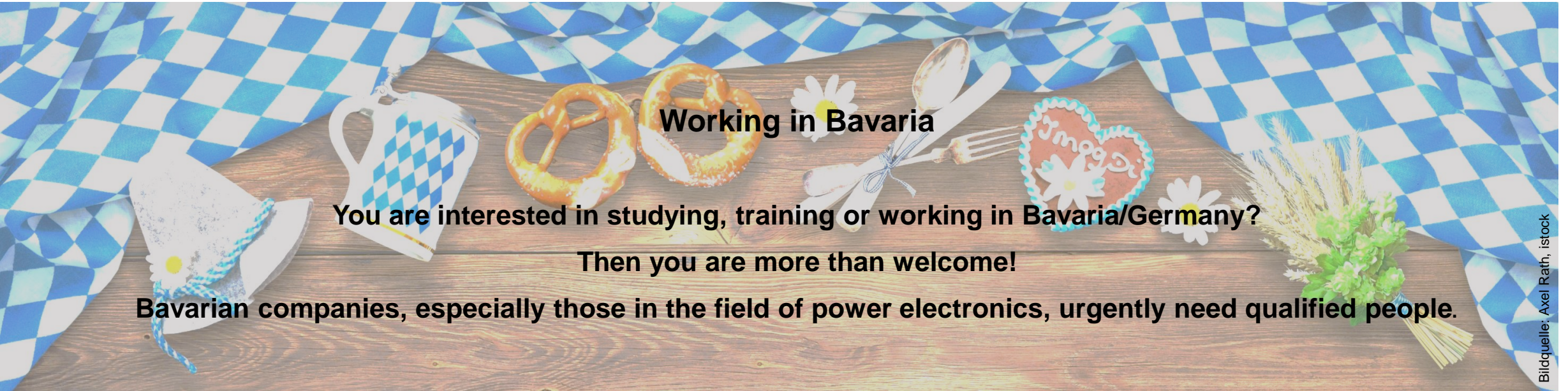


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The Power Electronics Cluster links proven technology fields with new ones :



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There are plenty of attractive places to study in Bavaria. A good overview can be found at:
<https://www.study-in-bavaria.de>



Many universities in Bavaria offer special services to help foreign students to secure accommodation before you arrive.

For skilled professionals the official website of the Federal Government provides a lot of relevant information: <https://www.make-it-in-germany.com/en/>



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