



Energy Technology

in the Capital Region Berlin-Brandenburg

A Region Full of Energy

The Capital region is full of energy. In Berlin and Brandenburg, some 6,300 companies with over 53,000 employees generate revenue of over 28 billion euros. Numerous research facilities, universities, and institutions of higher education provide first-class research and teaching in all areas of energy technology.

Brandenburg is one of the world's leading regions in the expansion and system integration of renewable energy. As a capital of digitization, Berlin is giving an important boost to the continuation of the energy transition, which is increasingly based on networking, sector coupling, and new business models.



EUREF-Campus in Berlin

Renewable energy

In regard to the number of inhabitants, Brandenburg, with an installed capacity of more than 1.3 kilowatts per capita, is the front-runner in solar power generation in Germany. Germany's three largest solar farms are also here: the Senftenberg solar farm with 168 MW, the Neuhardenberg solar farm with 145 MW, and the Gross Dölln solar farm with 128 MW.

Berlin is an important solar research location. The infrastructure for research and development in the field of solar energy generation (in the form of electricity and hydrogen) is unique in the capital region. It ranges from basic research in the new EMIL laboratory at the Bessy II synchrotron to application-oriented technology development at the Helmholtz Zentrum Berlin.

»Berlin and Brandenburg are among the most exciting economic regions in general. There is a great deal of potential here.«

Dr. Frank Büchner
Head of Energy Management Division, Siemens Germany

In terms of wind energy, Brandenburg is the third largest State in the country with an installed capacity of 6,400 MW. Here, however, not only wind turbines deliver electricity. Systems and components, in particular rotor blades, towers, and their interior fittings are also being developed, produced, and supplied by renowned players. Rotor blades have been manufactured for Vestas wind turbines in the megawatt range at the Lauchhammer site in southern Brandenburg for more than 15 years.

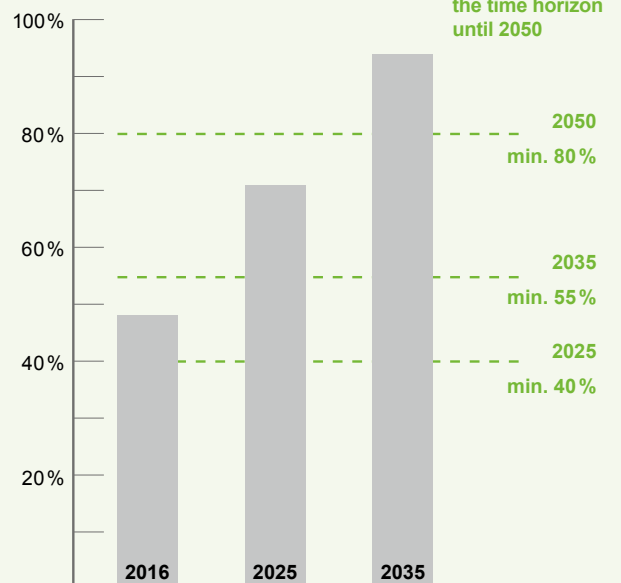
Bioenergy also plays an important role in its application as well as in research and development. A large number of companies and research facilities are working together on solutions in the field of agroforest systems and algae research as well as biogas and biofuels. Brandenburg is also one of the largest biofuel producers in Germany.

Energy grids and storage systems

A critical success factor for the energy transition is the grid integration of renewables with the help of (micro) smart grids, storage solutions, load management, and sector coupling. A lot of innovations are from the region: In September 2014, Europe's first commercial battery power plant, which

Share of feed-in from renewable energy in consumption (50Hertz control zone)

Objective of the Federal Government in relation to all of Germany for the time horizon until 2050



Northeastern Germany is already significantly surpassing national expansion targets and will continue to be a pioneer in the future. Source: GridLab



Micro gas turbine from Aurelia Turbines

was developed by the Berlin company Younicos, went into operation. The fully automatic system with 5 MW of lithium-ion storage stabilizes short-term fluctuations of the power line frequency with control power. Additional battery storage projects are running at the solar farm in Alt Daber and in the energy self-sufficient village of Feldheim in Brandenburg. The world's first hybrid power plant, which produces hydrogen as well as electricity and heat, is operated by ENERTRAG in Prenzlau. Since 2013, E.ON has been testing the power-to-gas technology in a pilot plant in Falkenhagen.

On the EUREF-Campus in Schöneberg, a Micro Smart Grid (MSG) has been linking different energy sources, consumers, and storage facilities since 2011. In addition to wind and photovoltaic systems, a cogeneration unit and two large storage units, as well as charging stations for electric vehicles are components of the networked system. In Brandenburg, BTU Cottbus-Senftenberg operates a test field for intelligent energy networks. The model systems with network control center, a power-to-heat system and an adsorption refrigeration system, as well as electromobility and grid-friendly charging infrastructure solutions are part of the campus' own Smart Grid and the research network SMART Capital Region of BTU.

All in all, an energy supply system is being set up in Berlin-Brandenburg with increasingly decentralized, fluctuating power feeders as well as smart control of generators and consumers. The safeguarding of this smart grid infrastructure is pursued through the development and deployment of innovative IT technologies and services and will increase the resilience of energy grids. Since 2017, the WindNODE consortium has been developing a digital infrastructure for the next stage of the energy transition.



50Hertz headquarters in Berlin

Turbomachinery and power plant engineering

The capital region offers a globally unique concentration of important players in the field of turbomachinery and power plant technology. It has the highest density of turbomachinery manufacturers in all of Europe with a long tradition. The first steam turbines were already manufactured at the beginning of the second half of the 19th century.

Five major companies – Siemens, GE Power Systems, MAN Diesel & Turbo, MTU Maintenance, and Rolls-Royce – form a complete value added chain from research and development, via production, through to design, planning, installation, as well as MRO (maintenance, repair, and overhaul). The turbines produced are among the world leaders in terms of performance and efficiency.

Smart Energy Showcase – WindNODE

Berlin-Brandenburg is at the center of a large-scale project within the funding program „Smart Energy Showcases – Digital Agenda for the Energy Transition“ (SINTEG) of the German Federal Ministry of Economics and Energy. With a total of more than 50 consortium partners in the six new Federal States, WindNODE shows that the energy transition can be technologically and economically successful. The decisive factor is that if wind and solar supply it, the power can be used wisely or stored efficiently, even if the majority is renewables.

In nine work packages (demonstrators) and 50 individual projects, innovative applications are tested at all levels of the networked energy system and combined to form an overall model. In addition to a powerful ICT platform, important elements include flexible energy users such as cold storage units, heat storage, or electric vehicles and smart home applications. The focus is on power customers and small generators. They are provided with tools and information that help them to actively stabilize the system and thus help to shape the energy transition.



Rotor blade production at Vestas in Lauchhammer

With the increased decentralized production of electricity and heat as well as their consistently high efficiency, the use of micro (up to 250 kW) and small gas turbines (up to 1.5 MW) is increasing, e.g. in local and district heating networks, larger residential complexes, but also industrial processes. Due to the even higher efficiencies, there is great potential for the use of turbo fuel cells (micro gas turbines combined with high-temperature fuel cells) in the industrial sector.

Energy efficiency

The German capital region is home to extensive expertise and experience in the area of energy efficiency as well thanks to its ambitious climate protection goals. Here, efficiency technologies are developed and tested in a variety of projects. Important factors in this respect include lighting technology, visualisation of consumption, lightweight construction, air-conditioning technology, technologies for the efficient distribution and storage of heat and cold as well as building services engineering.

As a growing city, Berlin offers ideal opportunities to develop and apply the latest technologies, energy services, and new business models, especially in the building sector.

The capital region is a particularly suitable location for testing approaches to increasing efficiency at system level. It is about designing the individual critical infrastructures (electricity, gas, heat, transport, IT) to be more robust and efficient, as well as making them increasingly intelligent and interlinked. The use of power and heat storage as well as power-to-heat and power-to-gas technologies plays a

significant role. Berlin and Brandenburg have a very large gas and district heating network ideally suited to receive, transport, and store renewable surplus energy from the power grid.

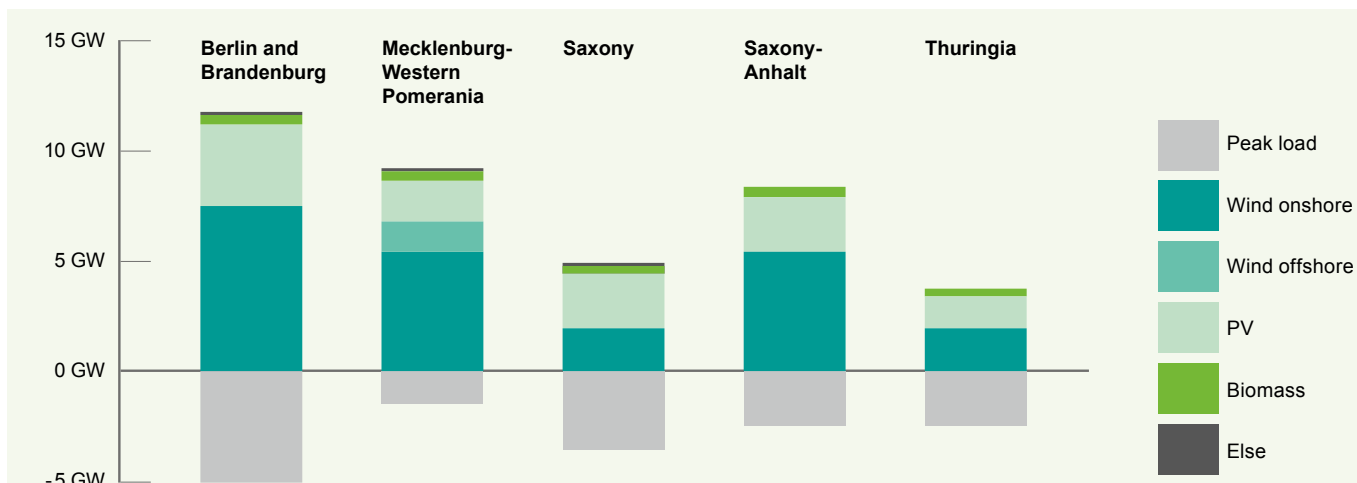
Leading in science and research

In Berlin and Brandenburg, around 30 scientific institutions are working on energy-related topics, in particular the Technische Universität Berlin (including photovoltaics, wind energy, grids, storage), the Brandenburg University of Technology Cottbus–Senftenberg (power plant engineering, biomass, power networks), as well as the universities of applied sciences in Berlin, Wildau, Brandenburg an der Havel, and Eberswalde (awarded as “Germany’s greenest university”).

The most important non-university research institutes include the Helmholtz Zentrum-Berlin, the Leibniz Institute for High Performance Microelectronics (IHP), the Fraunhofer Institute for Production Systems and Design Technology (IPK), as well as the GFZ German Research Centre for Geosciences.

»The German capital region has a unique density of excellent energy research. This benefits companies through technology transfer, well-educated specialists, and the spin-off of innovative startups.«

Prof. Dr. Dr. h. c. Reinhard F. J. Hüttl
 Cluster Spokesman, Chairman of the Board and Scientific Executive Director, Helmholtz Centre Potsdam – GFZ German Research Centre for Geosciences



The installed capacity of renewables in Berlin-Brandenburg in 2025 will be more than double the peak load. Source: GridLab



Solar research at the PVcomB

Research

BAM Federal Institute for Materials Research and Testing
 Berlin School of Economics and Law
 Beuth University of Applied Sciences Berlin
 Borderstep Institute for Innovation and Sustainability
 Brandenburg University of Technology Cottbus-Senftenberg
 Competence Centre Thin-Film- and Nanotechnology for Photovoltaics Berlin (PVcomB)
 Eberswalde University for Sustainable Development
 Fraunhofer Institute for Applied Polymer Research IAP
 Fraunhofer Institute for Open Communication Systems FOKUS
 Fraunhofer Institute for Production Systems and Design Technology IPK
 Fraunhofer Institute for Reliability and Microintegration IZM
 Freie Universität Berlin
 GFZ German Research Centre for Geosciences
 Helmholtz-Zentrum Berlin für Materialien und Energie
 Hochschule für Technik und Wirtschaft Berlin (HTW)
 Humboldt-Universität
 IASS Institute for Advanced Sustainability Studies
 IKEM Institute for Climate Protection, Energy and Mobility
 Institute for Ecological Economy Research (IÖW)
 Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB)
 Leibniz Institute for High Performance Microelectronics
 Max Planck Institute of Colloids and Interfaces
 Potsdam Institute for Climate Impact Research
 Reiner Lemoine Institute
 Technical University of Applied Sciences Wildau
 Technische Hochschule Brandenburg
 Technische Universität Berlin
 Telekom Innovation Laboratories (T-Labs)
 University of Applied Sciences Potsdam
 University of Potsdam
 Weierstrass Institute for Applied Analysis and Stochastics
 Zuse Institute Berlin (ZIB)

Networks, Initiatives, Associations

Agora Energiewende
 Berlin Agency for Electromobility (eMO)
 Berlin-Brandenburg Energy Network (BEN)
 Berliner Energieagentur (BEA)
 Berliner Netzwerke
 bne / Association of Energy Market Innovators
 Brandenburgische Energie Technologie Initiative (ETI)
 Bundesverband Energiespeicher (BVES)
 CEBra – Centrum für Energietechnologie Brandenburg
 Deutsche Energie-Agentur (dena), German Energy Agency
 Deutsche Gesellschaft für Sonnenenergie (DGS) – Landesverband Berlin Brandenburg
 Energiesparagentur bei der Wirtschaftsförderung Land Brandenburg
 Fachverband Biogas
 Fraunhofer Innovation Cluster Life Cycle Engineering (LCE) of Turbomachines
 Fraunhofer Innovation Cluster Maintenance, Repair and Overhaul (MRO)
 German Association of Energy and Water Industries (BDEW)
 German Renewable Energy Federation (BEE)
 German Renewable Energy Research Association (FVEE)
 German Solar Association (BSW)
 German Wind Energy Association (BWE)
 green with IT Berlin-Brandenburg
 HWN 500
 KlimaSchutzPartner Berlin
 Meine Energie für meine Stadt
 MinGenTec – Mining & Generation Technology (Made in Germany)
 Renewable Energies Agency
 WindNODE
 Zwanzig20-Forum Wärmewende

10 Strengths of the Capital Region

- Real life laboratory of the energy transition
- Outstanding research landscape
- Global players in the area of energy engineering
- Numerous incubators, labs, and innovation centers
- Proximity to political decision-makers and associations
- Attractive commercial and industrial sites in all locations
- Proximity to the growth markets in Central and Eastern Europe
- Highly-qualified specialists and executives
- Good funding opportunities
- High quality of life



ENERTRAG hybrid power plant in Prenzlau

Our aim: your success!

Berlin and Brandenburg promote the energy technology industry with an economic policy developed across state borders within the framework of the joint innovation strategy. Cluster management is carried out by the Brandenburg Economic Development Corporation (WFBB) and Berlin Partner for Business and Technology.

Our aim is to provide comprehensive support to companies in setting up or developing their businesses in the region.

- **Location search.** We find the right property for your specific needs.
- **Financing.** We advise you on the use of public funding programs and establish contact with investors.
- **Cooperation in networks.** In our networks, we offer platforms for productive exchange and joint projects.
- **Technology transfer.** We bring business and science partners together to improve products and processes.
- **Joint projects.** We initiate and coordinate joint R&D projects.
- **Recruiting and qualification.** We support you in the search for specialists and executives as well as personnel development.
- **Business development.** We help you to grow with your business and master new challenges.
- **Industry and location information.** In our publications and internet portals, we provide an overview of companies and institutions in the most important regional growth sectors.
- **Protection of intellectual property.** We advise inventors and scientists in patent matters.
- **Authorities service.** We assist with approval and visa issues in connection with your investment.
- **EU service.** We support you in European cooperations within the framework of the Enterprise Europe Network and represent the Berlin economy in Brussels.
- **Foreign trade promotion.** We organize information and joint stands at international trade fairs as well as delegation trips abroad.

www.energietechnik-bb.de

PICTURES: Cover: Berlin Partner. Inside: inno2grid – Vipul Toprani, 50Hertz – Werner Huthmacher, Aurelia Turbines, Berlin Partner – Wüstenhagen, WFBB – Sabeth Stickforth, ENERTRAG

DESIGN: Karen Giesenow. PRINT: LASERLINE, Berlin

© November 2017



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EUROPEAN UNION
European Regional
Development Fund

Publisher: Berlin Partner for Business and Technology in cooperation with Brandenburg Economic Development Corporation (WFBB), commissioned by the Berlin State Senate Department for Economics, Energy and Public Enterprises and the Brandenburg State Ministry for Economic Affairs and Energy. Funded by the State of Berlin and the State of Brandenburg as well as the Investitionsbank Berlin, cofunded by the European Union – European Regional Development Fund.