



Flexible Solar Cell | © HZB

Photovoltaic

Solar energy plays a key role in Germany's sustainable energy future and is already one of the most important renewable energy sources for both the supply of electricity and heating.

Within the framework of the Energy Transition (*Energiewende*), Germany provides significant business potential in the fields of photovoltaic and energy storage thanks to unique market conditions, excellent industry infrastructure, and numerous partnering opportunities. **Contact our industry specialists now** to explore the individual investment opportunities available to your business.

PV Industry

Germany is one of the most developed PV markets with around 43 GWp of cumulated installations at the end of 2017. New capacity of 1.75 GWp was installed in 2017. According to SolarPower Europe, Germany is expected to continue amongst the global top 5 solar markets over the next four years. The own-consumption segments are the driving force of the future PV market in Germany.

- 1.7 billion Euros were invested in new PV installations in Germany in 2017. (BmWi 2018)
- The German PV Industry employed around 36000 people in 2016 (BSW 2018).

- Being one of the world leaders in high quality PV modules, inverters and production equipment, the German PV equipment industry has had an export quota of around 92% in 2017 (VDMA 2018).

Contact our industry experts today! We offer you free-of-charge consulting on what the German market has to offer for your solutions. Find out how GTAI can make your market entry a success.

Testimonial - Sun + Lite & Power GmbH



Logo Sun + Light Power GmbH | © Logo Sun + Light Power GmbH

"Germany's pioneering role in the solar energy sector provides significant opportunities for international companies. Highly connected research and business communities combined with a pool of highly trained professionals and modern infrastructure provide the ideal basis."

Nik Hanif Kadir, CEO, Sun + Lite & Power GmbH

We provide you with all of the information you need - covering everything from key PV industry information to relevant background information on the German incentives, tax, legal and employment systems. All of our investor-related services are treated with the utmost confidentiality and provided entirely free of charge.

Market Potential

Over the last two decades, the German PV market has developed to become one of the most sophisticated PV markets worldwide. With more than 1.7 million PV systems, total electricity consumption share of around six percent (39.8 billion kWh) was produced in 2017. The majority (over 80 percent in terms of number; 21 percent in terms of capacity) of new systems installed in 2017 were smaller than 10 kWp in size – making Germany by far the largest residential customer market in Europe. The potential rooftop area in Germany alone allows for an installed capacity of around 200 GWp. Germany, together with other European markets, is expected to con-

tinue leading the global rooftop PV market in the next years. The German government is aiming at new annual PV installations in Germany of between 2 and 2.5 GWp in the coming years.

New business models are being used and developed to build the base for the economic operation of PV systems beyond the feed-in tariff scheme. This opens up a vista for new markets and technological innovations. The large pool of installed PV systems is a pillar for the development of the energy storage systems market. According to GTAI's research, PV-battery systems could reach an annual installation volume of around 50,000 systems by 2020. Retrofit storage installations will also be a major driver for improving energy self-sufficiency in private households and commercial operations.

The inverter market continues to profit from the large base of existing PV installations in Germany as well as new inverter systems, such as hybrid and micro inverters for new PV systems. Innovative data management systems and new tools for optimizing PV systems efficiency and operations are further promising fields within the German PV market.

Market Access

As the pioneering market in this grid-parity environment, Germany now provides the opportunity for companies to test, define and introduce new industry standards for this new PV market. Innovative PV sales strategies, system configurations, and integration processes, such as storage or demand management, are intrinsic components of the specialist expertise currently being developed in Germany. The country is actively welcoming foreign enterprises to participate in his development and to shape the global PV market of the future.

International companies wishing to sell photovoltaic products in the European Union must fulfill the established quality and safety requirements. In Germany, solar photovoltaic modules are certified according to European Norm (EN) standards. Manufacturers must comply with the "safety class II" norms which certify the electrical safety of photovoltaic modules. The certifications for design qualification and type approval (EN 61215 and EN 61464) have become an industry essential, even though they are not required by law. (See our "Module certification" fact sheet for more information.)

Quality marks remain optional for PV-storage systems (excluding the CE certificate). However, battery customers value products that comply with certain safety guidelines, such as the "Safety Guideline for Li-Ion Home Storage Systems developed by the German Energy Storage Association and its partners.

Testimonial - Innotech Solar



Tommy Strömberg CEO, ITS | INNOTECH SOLAR | © ITS | INNOTECH SOLAR

"Germany provides the ideal conditions to strengthen our business activities. A thriving photovoltaic cluster and outstanding infrastructure are essential for us. Halle give us a unique competitive advantage, enabling us to continue our exceptional growth."

Tommy Strömberg, CEO, Innotech Solar

PV Infrastructure

The complementary SME landscape in all PV technologies offers broad partnership opportunities with established German PV manufacturers. Ongoing optimization of production technologies and processes is made possible through close cooperation with world-class R&D institutions, universities, and leading material and equipment suppliers. The German federal and regional ministries and the EU support R&D projects in several renewable energies sectors through a number of institutional funding programs.

Downstream companies and service providers - such as system integrators, project developers, plant management, and energy trading companies - can source know-how from a large pool of specialists. They also benefit from a unique PV infrastructure in terms of experienced installers, banks that offer attractive international financing models, and local authorities guaranteeing fast and easy access to the grid.

State-of-the-art infrastructure - partly supplied by a well-developed chemicals industry - provides production sites that offer not only industry-specific utilities and services, but also a holistic, closed loop "materials to recycling" approach - especially for innovative PV (e.g. OPV) and storage technologies (e.g. batteries and fuel cells).

A vast experience in PV manufacturing and close synergies between the PV, the semiconductor, and microelectronics sectors create a ready-made workforce; particularly in the energy, battery and plant management technology sectors. There are also more than 300 university degree courses with a strong PV and other renewable energies focus. Quick and easy access to a flexible labor pool with a solid PV-related education

and training, competitive labor costs, and high productivity rates combine to guarantee new businesses optimal levels of professionalization and competitiveness from the outset.

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