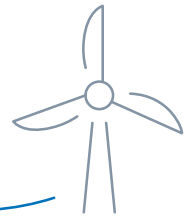
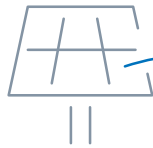




**5,682** GWh



**Thousands of gigawatt hours of renewable electricity wasted every year**

Around 5,700 GWh of electricity from EEG plants had to be cut in 2022 due to grid bottlenecks. This corresponded to about one percent of Germany's gross electricity consumption. The increased utilization of the networks offers a temporary solution.

Source: German government

# VDE Policy Brief

Edition 4/2024

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## A shift in energy policy

# Increasing utilization of power grids

The power grids are the bottleneck of the energy transition. The good news: according to a recent study by VDE, the grid can be utilized at a significantly higher rate than before. In doing so, the technology organization is supporting a key policymaking initiative. Nevertheless, grid expansion and digitalization in the grid must not be neglected under any circumstances..

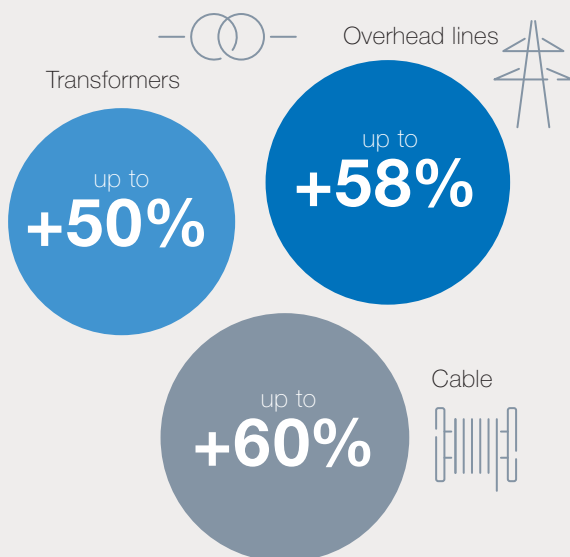
Due to grid bottlenecks, around 5,700 gigawatt hours of electricity from renewable sources had to be cut in 2022 – this corresponds to about one percent of domestic gross electricity consumption. Not using this energy is bad for the climate and costs many millions of euros. In order to provide a short and medium-term remedy, the legislator has paved the way for temporarily increasing the utilization of existing grid operating resources with Section 49b of the Energy Industry Act (EnWG).

The potential is considerable. According to a [study by VDE](#), essential operating resources such as transformers, overhead lines and cables actually offer capacity reserves of up to 60 percent, depending on the technology. With this knowledge, overhead lines, for example, can be used much more flexibly depending on the wind strength or temperature. However, the overall system must always be considered – the weakest link determines the potential load. A higher utilization rate in some places also reduces the cutting of renewable energies: by comparatively

To leverage the enormous reserves, changes are required:

- **Change the mindset:** grid operators and manufacturers must recognize and make greater use of the existing potential. An approach that is too safety-oriented can inhibit innovation.
- **Optimizing monitoring and diagnostics:** however, investments into real-time monitoring and precise diagnostic procedures are required, as well as a standardized “loading guide” for the entire electricity transmission chain. Policymakers should create incentives through funding programs or set clear targets.
- **Further development of the legal framework:** Further adaptation of §49 EnWG could create additional flexibilities, for example to facilitate innovative operational management concepts.

### Additional resilience per resource



### Policymakers value ETG expertise

For 50 years, the Power Engineering Society within VDE (VDE ETG) has been actively shaping the energy system. Today, with around 9,000 members and 300 active experts, it offers a unique platform for the transfer of knowledge between research, industry, policymaking and society. The latest sign of its importance: in October, ETG Chair Dr Britta Buchholz was appointed to the BMWK Expert Advisory Board for the 8<sup>th</sup> Energy Research Program.

- 📄 **VDE ETG Study**  
Increasing the utilization of operating resources
- 📄 **Article from VDE Policy Brief 2/2024**  
Decentralizing the electric market
- 📄 **Article from VDE Policy Brief 4/2023**  
Digitalizing electricity grids

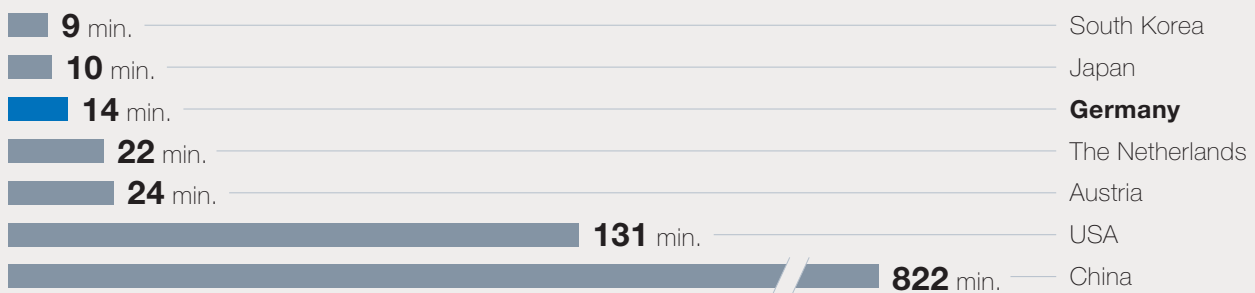
## Security of supply

# Securing the peak value permanently

In 2023, 99.997 percent of households in Germany had a power supply. An all-time high. At the same time, renewables reached a 55 percent share of total feed-in – more than ever before. The downside: grid and system operators had to make a considerable effort to ensure grid stability. A remedy is urgently required.

### A global comparison of power supplies

Average annual power interruption duration in selected countries, latest available data in each case



Source:  
VDE FNN analysis based on country-specific information

Conventional power plants have the advantage of producing electricity extremely reliably. In addition, gas-fired power plants in particular can adjust their output as required. Renewable energies are much more volatile. Nevertheless, supply and consumption must always be in balance. The grid and system operators respond by redirecting electricity flows if necessary, for example, or instructing contractual partners to produce or consume more electricity.

However, these measures cannot be exploited to an unlimited extent. To ensure that security of supply can remain at the accustomed high level, the following measures are indispensable:

- **Grid expansion:** more speed is required here. It is at least as important to optimize planning: where could wind farms be built? Where are server farms being built? To this end, the more than 800 distribution system operators throughout Germany must provide reliable data to the four transmission system operators. In addition, the Federal Network Agency is called upon to take sufficient account of economic and sustainability aspects in the grid expansion scenarios.
- **Promoting flexibility:** Grid operators and plant owners must invest in better measuring and controlling electricity production and consumption at the local level. In addition, legislators should develop financial support instruments so that households – for example,

those with a photovoltaic system with storage options – can exploit their flexibility potential as required.

- **Thinking across sectors:** In mid-November 2024, the Federal Ministry for Economic Affairs and Energy published a [strategy](#) for developing the electricity, gas and hydrogen networks across sectors. A good approach to planning the network of the future and utilizing synergies! Two aspects will be critical to its success. Firstly, all stakeholders must work together constructively. Secondly, it is imperative to avoid further bureaucracy. VDE is ready to drive the issue forward.

### Basis for secure grid operation

VDE's FNN statistics provide grid operators and policy-makers with a reliable basis for deriving measures to ensure continued secure grid operation. The statistics are available free of charge upon request to [politik@vde.com](mailto:politik@vde.com).



#### VDE FNN topic page

Reliability of supply



#### Article from VDE Policy Brief 1/2024

System Stability Roadmap



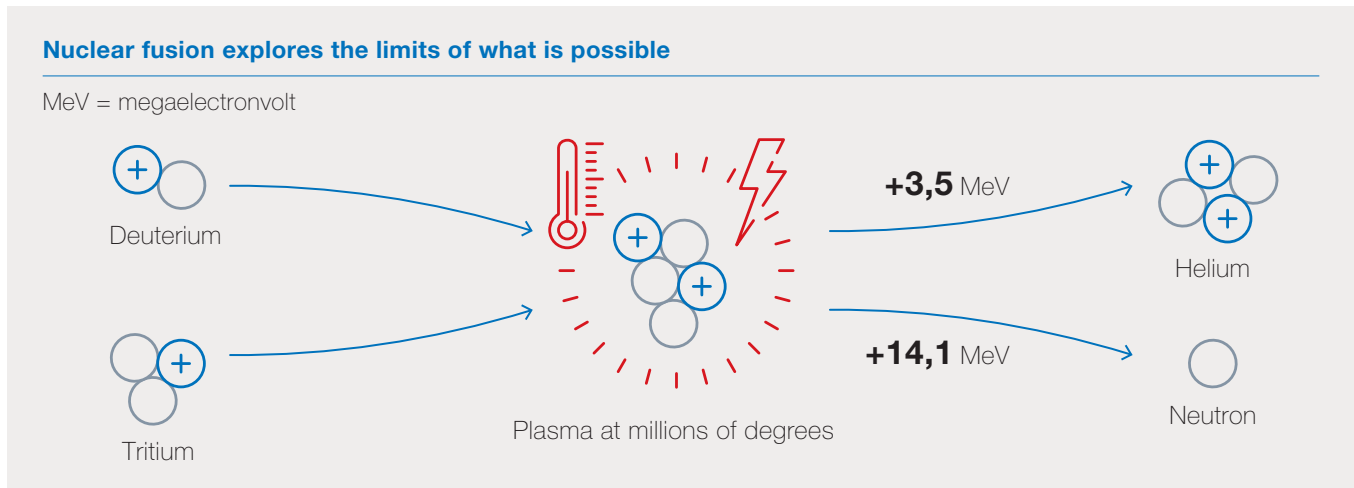
#### Article from VDE Policy Brief 1/2023

Strengthening resilience

## Inexhaustible energy from nuclear fusion?

# Further research is required

In times of the energy transition, the potential of nuclear fusion is repeatedly discussed. VDE has summarized the state of affairs. Key message: If the technology is ever to be used commercially on a larger scale, then it will not be until the 2050s at the earliest. Nevertheless, research should continue – also because of so-called spill-over effects.



Nuclear fusion occurs when two light atomic nuclei are merged to create a heavier one. If we can solve the major technological challenges of controlling nuclear fusion, the technology could open up an additional and extensive climate-neutral energy source. In contrast to conventional nuclear power plants – in which very heavy atomic nuclei are split – nuclear fusion only produces intermediate-level radioactive waste with comparatively short half-lives. An uncontrolled chain reaction is also impossible per se. However, nuclear fusion is technically extremely demanding. The fundamental problem is that the fuel has to be heated to millions of degrees Celsius and the resulting plasma must be stabilized, for example, by highly complex magnetic fields.

### On the way to a power plant

In Cadarache in the south of France, an international consortium – including Germany – is building the International Thermonuclear Experimental Reactor (ITER). The project is considered the most ambitious research project in the world, but it has faced significant delays: completion was originally planned for 2018, but is now not expected until 2034 at the earliest. If the research reactor achieves promising results, a demonstration power plant is to be built in the 2050s. Only then will it be possible to estimate when the first commercial fusion power plants can be

expected. Laser-assisted fusion follows a different technological approach. But here too, no commercial power plants will be launched in the foreseeable future.

### Further research

From VDE's point of view, nuclear fusion cannot contribute towards achieving climate neutrality by 2045. Nevertheless, research into nuclear fusion should be continued, as it also opens up technological innovations beyond energy production. For example, significant spillover effects are to be expected for future topics such as supercomputing and superconductivity, as well as for the development of completely new material properties. Germany is one of the leading research nations in this area – the next federal government should underpin this status with an appropriate funding strategy.



#### VDE background

Nuclear fusion: no contribution towards climate protection until 2045



#### VDE ETG Expert group

Generation, consumption and storage in the electrical energy system

# Faster market maturity

Germany is familiar with the scenario: innovations were developed here, but brought to market maturity elsewhere with the necessary investment capital. This pattern must not be repeated with a new computer technology. Innovations must be consistently driven forward – VDE makes a decisive contribution with its standards.

We are talking about so-called neuromorphic computing, which is modeled on biological nerve cells. These can both process and store information. The advantage is that while conventional computers have to work with separate processors and storage devices, with the new approach, data processing and storage merge. This architecture can process large amounts of data much faster and requires considerably less energy. Given the XXL computing capacities required by AI applications, this is a ground-breaking advance – also from an energy and climate policy perspective.

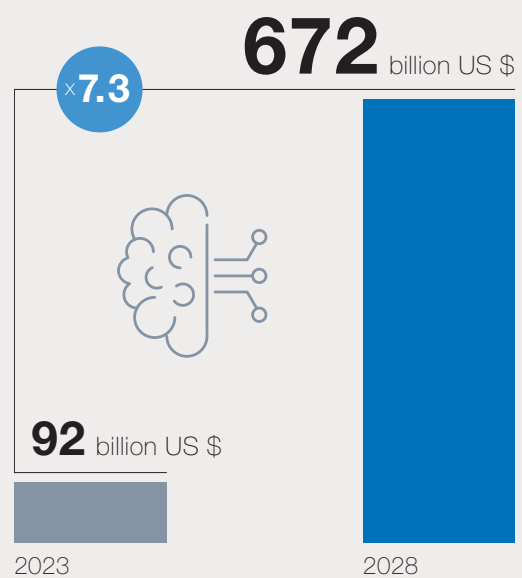
Germany is one of the leading nations in research: for example, neuromorphic concepts are being developed here that can be used in autonomous systems such as self-driving cars. Furthermore, there are prototypes of neuromorphic hardware platforms that are particularly relevant for applications in robotics, industrial automation and the Internet of Things – and thus for the core areas of the German industrial landscape. However, countries such as the USA and China are investing heavily into the commercialization of this technology. To exploit the potential here at home, the path from the laboratory to practical application must be significantly accelerated.

## VDE's SPEC leads the way

A decisive step towards accelerating market readiness is the introduction of technical standards. An important milestone was reached in November 2024 with [VDE SPEC Neuromorphic Computing](#). This standard offers companies a structured framework for product development in the field of neuromorphic computing – from material selection to specific application. This makes it easier for German companies to quickly and efficiently develop marketable products. At the same time, the standard builds trust and ensures the compatibility of different applications.

### Great marketing potential

Global market development of neuromorphic computing



Source: Fortune Business Insights

For policymakers, this means strengthening standardization. Standards such as VDE's SPEC Neuromorphic Computing create reliable structures that will consolidate Germany's position as a leading location for AI and digital products in the long term.



#### VDE press release

Inspired by biological neurons



#### VDE SPEC

Neuromorphic Computing

# Digitalizing the operating theater

Digitalization is affecting a large part of medical technology. For example, medical devices – which are highly regulated in terms of safety – are connected by routers that are often subject to significantly lower safety requirements. VDE is now showing a way to connect medical and non-medical devices. This is good for patients. In addition, the approach presented by VDE offers domestic companies a competitive advantage. Policymakers should promote this approach.

[VDE's MD Comp](#) concept offers manufacturers the opportunity to take regulatory requirements from the medical technology sector into account when developing IT equipment, for example. **Advantage one:** The new products then meet the strict quality requirements of the European Medical Device Regulation (MDR) and can be integrated without any problems. **Advantage two:** The products do not have to go through the extremely bureaucratic MDR approval processes. **Advantage three:** MD Comp offers important assistance to start-ups in particular, which are often overwhelmed by the complex research required to meet the relevant requirements.

It is to be expected that medical institutions will prefer MD Comp products in the future due to their simplified integration. In doing so, VDE is giving companies a real competitive advantage in a booming market. According to forecasts, medical technology will achieve a global turnover of more than 510 billion US dollars by 2024, with growth rates expected to exceed 5 percent in the coming years.

German manufacturers are among the market leaders in many areas, and the industry provides 250,000 well-paid jobs.

From a health and economic policy perspective, it is important to exploit the potential of MD Comp. The key steps to achieve this are:

- **Adapt the legal framework:** The EU Parliament is pushing for the MDR to be revised in the coming months. The aim here is to integrate the MD Comp approach and to explain its implementation in the so-called MDCG guidelines.
- **Tap into the potential:** In order for important stakeholders such as the authorities, notified bodies and industry to deal with MD Comp appropriately, policymakers should create incentives as part of funding programs for the digitalization of healthcare.
- **Expand existing medical technology standards:** Standardization bodies at national and international level are called upon to expand the specifications for medical devices in line with MD Comp. The DKE standardization organization, which is supported by VDE, will play a leading role in this.

## MD Comp creates added value

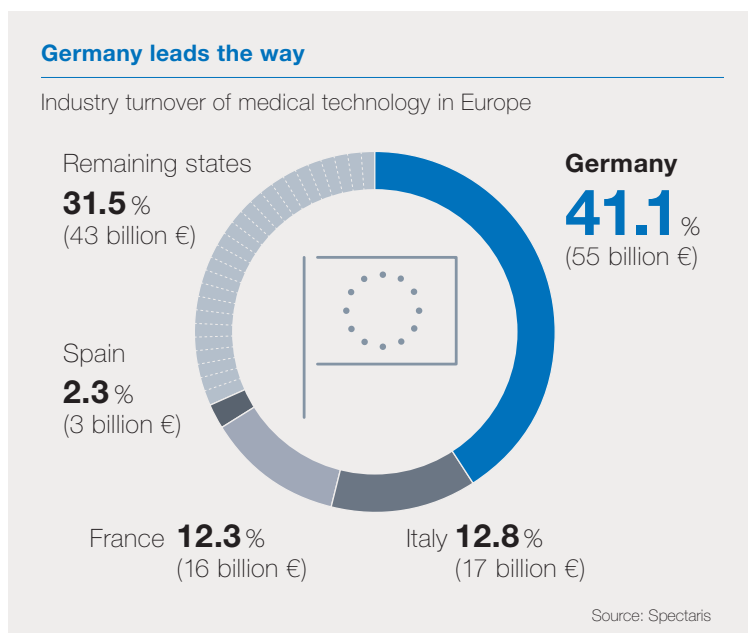
MD Comp is a structured concept that enables the compliant integration of non-medical devices with medical devices, guarantees the safety of patients and also offers domestic companies a competitive advantage.

 **VDE website**  
Press release

 **VDE topic page**  
Connected Health

 **VDE recommendation**  
MD Comp

 **Article from VDE Policy Brief 3/2022**  
EU Regulation threatens supply



70 years of ITG

# We are building the future

Information and communication technologies are of significant importance, whether for digitalization, the applications of generative AI or for transatlantic data connections. VDE's Information Technology Society (ITG) – an association of industry and science – has been driving the range of topics for decades.

On 26 November 2024, the ceremony marking the 70<sup>th</sup> anniversary of the ITG took place at the Berlin-Brandenburg Academy of Sciences and Humanities as part of VDE's Capital City Forum. Prof. Gerhard Fettweis from the TU Dresden covered the period from the development of the first mobile communications standard to the development and standardization of the next generation, 6G. The key buzzwords are higher energy efficiency, higher data transfer rates and trustworthiness. These are topics that are also being addressed in various ITG working groups. Dr Heike Riel from IBM Zurich introduced the development of quantum computing and provided an outlook on the scaling of integrated qubits in different generations of integrated circuits. The promise: quantum computers could calculate very specialized application scenarios and mathematically complex problems more efficiently – for climate models or new medications, for instance.

Anyone who talks about the future should involve young people. That is why VDE ITG anniversary event was also used to celebrate this year's winners of the [INVENT a CHIP competition](#) – which is organized by VDE together with the BMBF: Around 2,000 students from 169 schools across Germany took part in the competition and developed integrated circuits with AI voice control themselves – an extremely challenging task. In addition to the young people, VDE ITG also honored experts, for example for outstanding publications or dissertations.

“INVENT a CHIP is a great way to spark enthusiasm for technology. Here, young people can get involved in production, get their hands dirty and learn how important chips are for the further development of society and the economy.”

**Dr Tina Klüwer**

Head of Department  
at the Federal  
Ministry of Education  
and Research



“Microchips are the building blocks of the future. That is why it is so important to get people excited about entering the chip design business at an early stage – see the INVENT a CHIP competition. The high number of participants shows how well the concept has been received.”

**Alf Henryk Wulf**

VDE President

“The winners' achievement cannot be overstated: they had to learn to map neural networks onto a hardware structure, to optimize them and then to work together in a group and help each other.”

**Prof. Dr.-Ing. Holger Blume**

Scientific Director of INVENT a CHIP, Leibniz University  
Hannover

## 70 years of ITG



**9** departments

Services and applications,  
media technology, audio  
technology, communication  
technology, computer  
engineering, high-frequency  
technology, micro- and  
nanoelectronics



**80** expert committees



**1,000** volunteers



**10,000** ITG members



**Website**

VDE ITG



**Website**

70 years of VDE ITG Future ahead!



**Article from VDE Policy Brief 3/2024**

VDE inspires young talent



**Article from VDE Policy Brief 4/2023**

Satellite infrastructure

# VDE – the technology organization



## Your contact

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### Publisher

VDE Verband der Elektrotechnik  
Elektronik Informationstechnik e.V.  
Merianstraße 28  
63069 Offenbach am Main

### Legal notice

[www.vde.com/en/legal-notice](http://www.vde.com/en/legal-notice)





### Editorial deadline

December 13, 2024

### Agency partner

Köster Kommunikation  
GDE | Designing communication

## Facts and figures

	Founded:	<b>1893</b>
	Employees:	worldwide <b>2,000</b>
	Members:	almost <b>30,000</b>
	Volunteer experts:	over <b>100,000</b>
	Locations:	worldwide over <b>60</b>
	Research and funding projects:	<b>175</b>
	Events per year:	over <b>1,600</b>
	Product inspections per year:	<b>25,000</b>
	Electrical products bearing VDE's certification mark:	<b>billions</b>
	Norms and standards:	over <b>3,500</b>