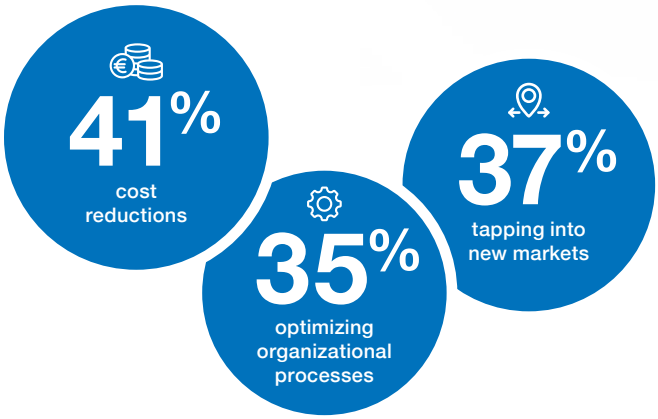
AI offers German companies huge advantages ...



... yet companies are having a much harder time of it compared to the rest of the world

AI-related risks as a challenge

Source: Deloitte, December 2022; survey of 2,620 AI experts worldwide

VDE Policy Brief

Edition 4/2022

VDE Policy Brief online

VDE

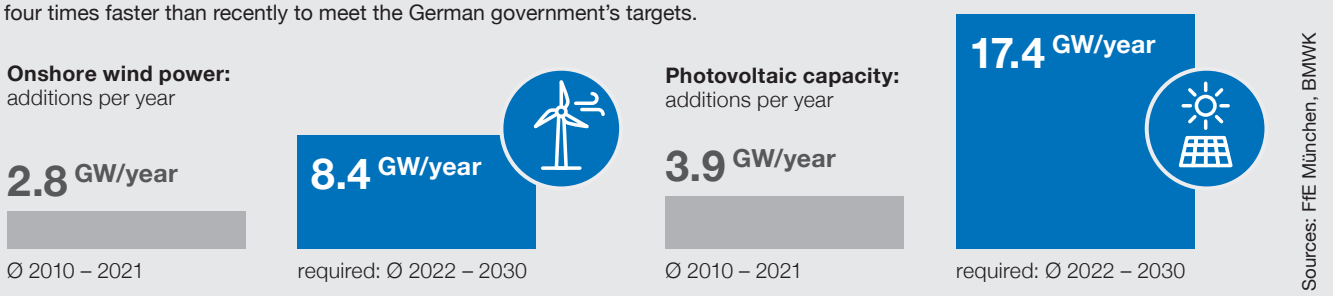
System sustainability roadmap

Upgrading the grid for renewables

Large conventional power plants in Germany are being replaced by hundreds of thousands of wind turbines and photovoltaic systems at lightning pace. This is the right approach for climate and energy policy reasons. However, the power grids have so far been inadequately designed for this many feeders. Grid stability is at risk and the vulnerability of the critical infrastructure to cyberattacks is considerable. The German government wants to develop solutions for this with the participation of the VDE.

Ambitious renewables expansion targets

By 2030, generation capacity for electricity from wind power and photovoltaics must be expanded up to four times faster than recently to meet the German government's targets.



Sources: FfE München, BMWK

First, large conventional power plants produce electricity. Secondly, they secure the supply – something that is often neglected in the public debate – with system services. For example, to keep the power supply system stable, electricity feed-in and consumption must be in balance at all times. This also applies in the event of an unplanned power plant outage or excessive wind power feed-in during high winds.

Today, large power plants stabilize the power supply system by instantly absorbing or releasing active power with their so-called synchronous generators. If, as planned, more and more conventional power plants are taken off the grid, system services will increasingly have to be provided by renewable plants, energy storage systems and flexibly connectable power generators.

VDE: one of the drivers of the system stability roadmap

The German government wants to work out what this might look like in a roadmap for system stability together with key stakeholders by the summer of 2023 and thus define a framework for an electricity grid based solely on renewables. The VDE is a driving force on the advisory board and contributes the unique expertise of its specialist divisions:

- **Technical rules for power grids:** VDE FNN is the technical rule-maker for power grids in Germany. In the Energy System 2030 Roadmap, VDE FNN showed in March 2022 how regulatory framework, market design and technical rule-making can – and must – go hand in hand.
- **Grid control and system management:** VDE ETG pools the expertise of 12,000 experts on all fields of application of electrical energy. Among other things, it provides answers in specialist events and position papers on how grids are to be controlled with a growing share of decentralized generation plants.
- **Secure energy supply:** Increasing interconnectivity and digitalization are increasing the importance of cybersecurity for energy supply. Interfaces must be safe and interoperable. The DKE, which is supported by the VDE, paves the way for cross-company innovations with norms and standards.

VDE FNN Roadmap
Towards a "climate protection grid" by 2030

VDE/DKE Whitepaper
AI Energy

Balcony solar plants

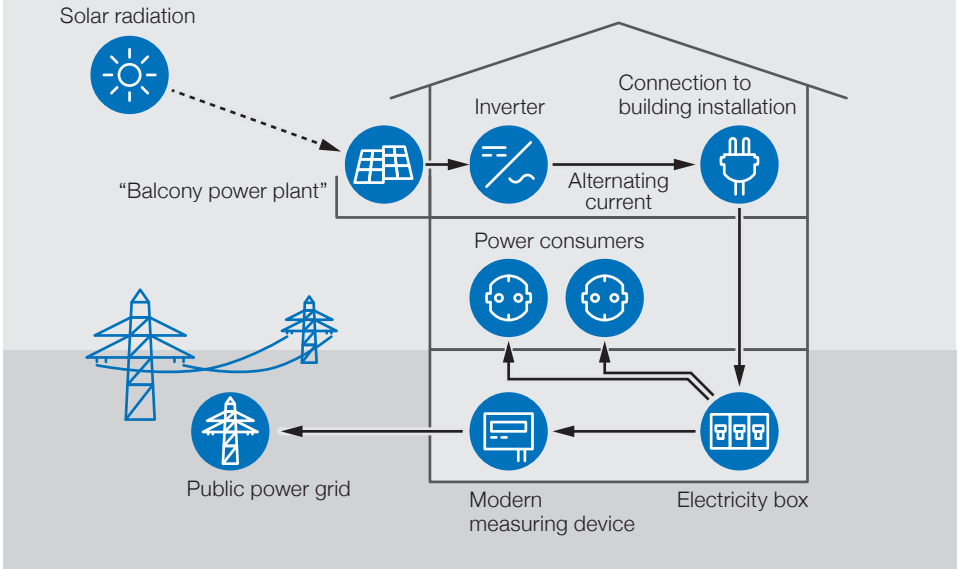
Using innovative energy sources safely

In light of rising energy prices, so-called balcony solar plants are booming. In terms of the shift in energy policy, this is good news. But many photovoltaic systems on the market are unsafe. Among other things, a new VDE product standard is intended to remedy the situation.

The core idea of balcony solar plants: even laymen can set them up and feed the electricity generated into the grid via the socket. To ensure that this succeeds and that power generation can be further decentralized, the VDE is advocating the following three premises:

- **Finally make products safe:** most balcony power plants are not safe! For example, the exposed metal pins of the plug can be live even when not in use – posing a risk of electric shock. The standardization organization DKE, which is supported by the VDE, has recently developed a new product standard to provide the necessary safety for consumers together with manufacturers and trade.
- **Use energy sockets:** building wiring is usually designed to deliver electricity only for use. If, on the other hand, electricity is fed in via 08/15 sockets, the lines can quickly become overloaded and burn out – with potentially life-threatening consequences. The solution: an energy socket set up by electricians and inspection of the household installation.
- **Ensuring grid stability:** In the event of faults, grid operators must know where electricity is being fed into the grid. For this reason, consumers are required to register plug-in solar devices with their grid operator and the Federal Network Agency.

From balcony solar plant to public power grid



Political course must be set

The VDE supports local power generation. Policymakers should also contribute to the shift in energy policy on balconies:

- Enable simplified registration of balcony solar plants by reducing bureaucracy.
- Implement the Europe-wide standardized de minimis limit of up to 800 W for balcony solar plants in Germany.
- Open up the possibility for consumers to connect their balcony solar plants to conventional electricity meters too – instead of solely to modern measuring equipment.

VDE Guide
Generating electricity on your own balcony

DKE Website
Information on balcony solar plants

Artificial intelligence

Germany strives to play a pioneering role

Whether it's for mobility, medicine or industrial production – the use of artificial intelligence (AI) is increasing dramatically. This makes it all the more surprising that firm quality criteria are lacking. The VDE held the first AI Quality Summit on this topic at the beginning of November together with the state of Hesse – and is thus driving Germany forward as a location for innovation.

Domestic companies have always benefited from the fact that the quality of their products and services is recognized and measured. In the future field of AI, of all things, this has so far only been the case to a limited extent: there is a lack of criteria for both the underlying algorithms and the data used. The use of AI thus resembles a game of chance – both for companies and for consumers.

Focus on quality leadership

The technology organization VDE is stepping up to close this gap. The VDE will help companies increase the quality and performance of their AI products and prove them on the market. To do this, research gaps must be closed, common standards developed, test tools provided and simulation environments created.

Shaping AI regulation

The effort is a worthwhile investment. Whoever is the first to overcome the challenges of AI quality testing will influence market development and shape global AI regulation. This view is also shared by the EU Commission, which is currently developing a general legal framework for Europe in the form of the AI Act. The AI Quality Summit – which attracted around 150 scientists, top politicians and business leaders – provided important impetus and, in particular, allowed international frameworks to be discussed. Like no other organization, the VDE brings together knowledge from experts and passes it on:

- **European association:** The CEN-CENELEC JTC21 standardization body, which will be established in June 2021, is chaired by VDE expert Dr Sebastian Hallensleben. The results underpin AI regulation and show companies, for example, how to demonstrate the transparency requirement.

VDE: An expert partner with international influence

Policymakers are particularly dependent on neutral, external support when it comes to dynamically developing topics such as AI. The VDE is on hand. At the end of November, for example, the technology organization hosted a high-level panel on digital identities as part of the G7 presidency. Second example OECD ministerial meeting on the digital economy in mid-December: Dr Sebastian Hallensleben, VDE Head of New Technologies and Services, is invited to the hearing as an expert and Markus B. Jaeger, VDE Head of Policy, will contribute as Chairman of the European umbrella organization EUREL.

G7 GERMANY | OECD

- **Global network:** In a comprehensive guide, the OECD defines how companies must comply with the requirement of responsible corporate governance. In 2023, it will be supplemented by a chapter on AI risk management. This OECD expert group is also led by Dr Hallensleben.

The VDE is driving the topic of AI as a neutral technology organization. In doing so, we aim to build bridges between technical possibilities and societal and business needs – and are always available to members of parliament, federal ministries and EU institutions with our expertise.

VDE Topic Webpage
Artificial Intelligence

Article from the Policy Brief 2/2022
How can we demonstrate quality in the digital world?

Hydrogen in rail transport

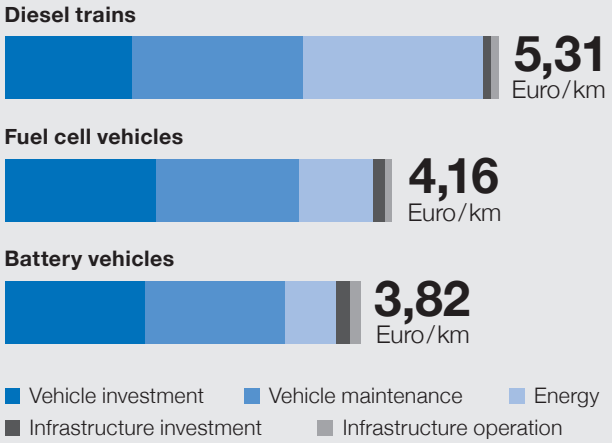
Driving forward options with precision

The aim is to make the mobility sector CO_2-neutral by 2045. The focus will be on challenges in air and road transport. However, there is also a need for action in rail transport: diesel locomotives require around 328,000 tons of fuel per year, emitting a well over a million tons of CO_2. In a current impulse paper, the VDE explores alternative drive concepts – and calls for political support.

Where possible, trains should be supplied with energy via overhead lines. If economic or technical reasons prevent the construction of new overhead lines, battery and fuel cell vehicles are needed. The general conditions for each route must be examined. One important aspect is that battery vehicles currently have a range of up to 120 kilometers. On longer stretches that are completely without overhead lines, fuel cell vehicles score with ranges of up to 1,000 kilometers. The VDE analyzes usage requirements and general conditions in order to select the best long-term option.

Example: Düren – Diesel trains are the most expensive option

In 2020, the VDE analyzed the Düren local transport network in NRW. The key finding of the study: over 30 years, battery and hydrogen trains are significantly more profitable.



The individual characteristics of a rail line must always be taken into account in economic feasibility analyses for climate-neutral drive concepts. The VDE offers support in this regard. Contact: politik@vde.com

Source: VDI/VDE 2021

The alternative forms of propulsion offer the potential to replace diesel trains on German lines. However, this requires political support:

- **Offsetting investment costs:** Compared with conventional trains, alternative drives are currently still significantly more expensive to purchase. There is also a lack of infrastructure for hydrogen trains in particular. Financial support approaches are necessary to achieve cost parity.
- **Drive forward harmonization:** To accelerate the market introduction of new technologies, essential guidelines must be harmonized internationally. As a first step, a Europe-wide initiative is required.
- **Enable own hydrogen production:** Green hydrogen is in high demand. To ensure that adequate quantities are available to rail transport in the long term, the transport mode should establish its own production units.
- **Open up sector coupling:** Rail transport can be an important driver for an H_2 refueling infrastructure that is also available to heavy-duty transport. Synergy effects must be used.

Hydrogen: Impart knowledge now!

Hydrogen is considered a key technology for transforming energy systems in many ways. Numerous occupational groups – from electrical engineering to plant construction to installers – will in some cases have to build up new knowledge in the coming years, courses of study should integrate relevant focal points, and vocational training courses need to be updated. The VDE is driving the issue forward by producing an initial overview of the upcoming changes. Click here for the discussion paper on imparting hydrogen knowledge.

VDI VDE Impulse Paper
Hydrogen for rail transport

Website
Press materials

VDE Whitepaper
The hydrogen economy

Fast internet

Bringing fiber optics to the area

With its gigabit strategy, the German government wants to massively promote fiber optic connections, especially in structurally weaker regions. This is the right approach. However, structural issues, in particular the shortage of skilled workers and compliance with binding standards, are not being adequately addressed.

Germany lags far behind the rest of the world when it comes to fiber optic expansion. It is true that the government has invested many billions of euros in fast internet connections over the past seven years. However, telecommunications companies have so far mainly laid classic copper and coaxial cables, which can only transport 1 gigabit of data per second in exceptional situations. Fiber optic connections, on the other hand, are virtually unlimited in bandwidth if they are installed in compliance with norms and standards and by skilled workers.

Broadband Committee Network: VDE initiative delivers

In 2020, the Informationstechnische Gesellschaft im VDE ITG (Information Technology Society within the VDE) and partners founded the Broadband Committee Network. The aim: to standardize training in fiber optic construction, promote quality and counter the shortage of skilled workers – which is one of the main obstacles to fiber optic expansion. Guidelines for specialist qualification will be published shortly, and more and more training institutions are taking part.

Addressing the need for action

To ensure that Germany finally catches up in terms of fiber optics, the following issues need to be on the agenda:

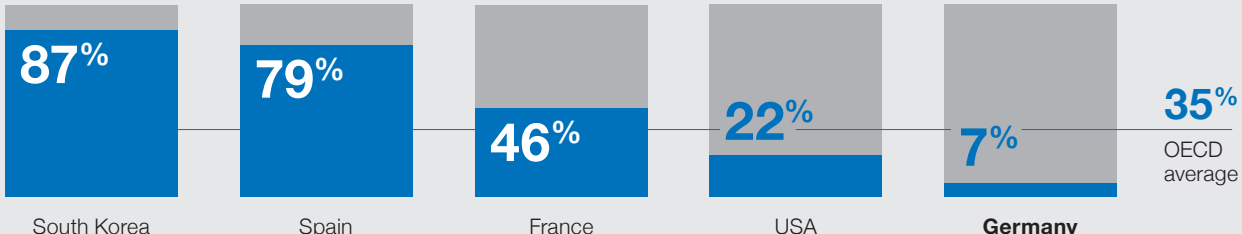
- **Launching a skilled labor offensive:** Laying, processing and connecting fiber optic lines is a demanding task and only suitable for qualified specialists. Nevertheless, many unskilled workers are working on the digital backbone of the gigabit society. Policymakers are urgently called upon to promote training measures and to harmonize the qualification of skilled workers across Germany via the Broadband Committee Network.
- **Defining rules and regulations:** Comprehensive technical regulations apply to the installation and operation of gas, water and electricity networks – for everyone, everywhere. This is different for digital networks. The result is that neighboring municipal networks are sometimes constructed in a way that they are incompatible with each other. The public damage is in the hundreds of millions. A groundbreaking set of rules is being developed by the VDE and can already be applied. Compliance with norms and standards must be made mandatory in the funding guidelines.
- **Promoting innovation:** With innovative methods such as trenching, fiber optic cables can be laid faster than with conventional construction measures. Local authorities should pursue such approaches more strongly than in the past. Following an impulse from the VDE, laying procedures are described for the first time in the DIN 18220 standard. This has been developed jointly by all market players and these methods can therefore be applied as general rules of technology.

Website
Broadband Committee Network

Website
VDE ITG

VDE Tec Impulse
Gigabit Networks

Proportion of fiber optic connections in all fixed broadband connections — As of December 2021



Source: OECD

50 years of EUREL

Continuing the success story

Pandemics, war, climate and energy crises: Europe is facing major challenges that require joint responses. With their innovative strength, European engineers in electrical engineering, electronics and information technology are playing a key role. For half a century, the European umbrella organization EUREL has been advising Brussels policymakers on technological issues – competently and independently.

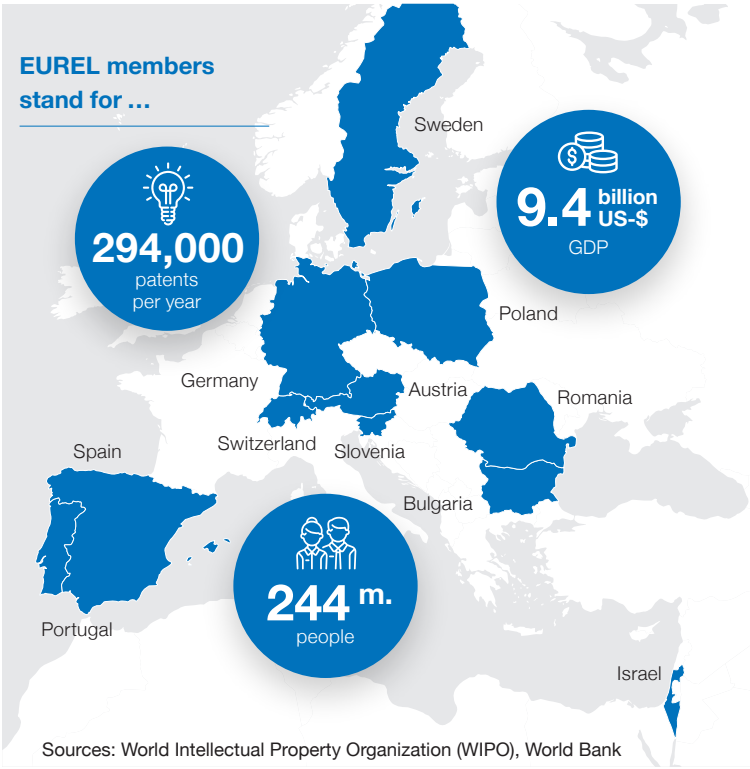
Since its foundation in Zurich in 1972, the Brussels-based organization EUREL has been bringing together Europe's leading technical and scientific minds and offering them a platform for dialog. EUREL is paying particular attention to the increasingly urgent need to train skilled workers: In the Young Engineers' Panel (YEP), students and young professionals come together, exchange views on technical issues and coordinate their positions vis-à-vis politicians and the public.

Founding member VDE is a driving force in EUREL and, in addition to its office space in Brussels, has provided the Chairman of the Board of Directors for many years; since 2019, this has been Markus B. Jaeger. The VDE has also provided the EUREL Secretary General for almost 20 years.

Electrical engineers make a strong case for Europe's future

More than ever, Europe must provide answers to essential questions about the future. With its expertise, EUREL is a close partner of policymakers:

- **Training skilled workers:** From electrical engineering, through electronics, to information technology – there is a shortage of engineers everywhere. Therefore, it is important to use cross-national synergies and to push education and training.
- **Ensuring technological sovereignty:** Digital technologies play a special role in the globally networked economy. They permeate all key future fields – be they AI, medical technology or microelectronics. Only those who build up capacities and expertise will remain competitive.
- **Protecting the climate:** Innovations are essential for effective climate protection. Europeans can learn from each other and contribute specific competencies.
- **Strengthening cybersecurity:** Administration and business are increasingly falling victim to cyber-criminals. Cross-border alert systems and security strategies are essential, as well as joint projects, see Cloud Gaia-X.
- **Introducing trusted identities:** Opinion formation is massively manipulated by bots on the internet. This threatens democratic decision-making processes. EUREL advocates for Europe-wide pseudonyms that verify users.
- **Taking social responsibility:** EUREL made an appeal to engineers – especially in Russia – at the start of the Russian attack on Ukraine.



Sources: World Intellectual Property Organization (WIPO), World Bank

Website EUREL

50 years of EUREL Anniversary brochure

EUREL Ukraine statement

Website Young Engineers' Panel – YEP

VDE – the technology organization

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Facts and figures

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