



Elpro

Power distribution and infrastructure

Power system
manufacturing

COMPETENT

Elpro is a leading supplier for control center, automation, and power engineering. Based on the experience of our large team of installers, supervisors, and engineers, we implement a wide range of customer needs related to power system manufacturing.

Embedded in an end-to-end project management approach, Elpro plans, delivers, and installs turnkey power systems for high, medium, and low-voltage applications.

In addition to new construction, our portfolio also includes overhauls, upgrades, expansions of existing systems, even including complete renewals of primary, secondary, control center, and safety equipment.

As a manufacturer-independent partner, we employ state-of-the-art technology and the latest equipment generations to meet the specific needs of our customers. Quality and on-time delivery are a top priority for us.



... for the future

Regenerative power sources are a principal component of the power mix. Important reasons for this not only include the limited availability of fossil energy sources and environmental and climate protection, but also supply reliability.

Elpro is ideally positioned to confront the challenges presented by these developments.

Based on innovative technologies and intelligent systems, our engineers help to maximize grid quality.

Elpro ensures that regenerative power sources are fed into the distribution grids of electrical utilities based on demand and with a high degree of efficiency. As a result, power is reliably routed to the end user independent of the time the power sources are available.

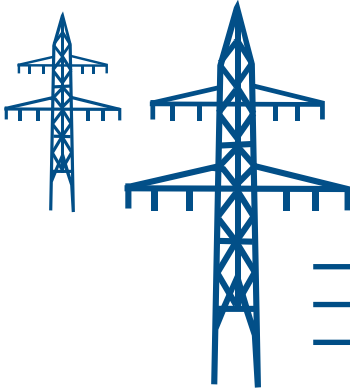
**FORWARD-
LOOKING**



Electrical power - from the maximum voltage grid ...

Extra-high voltage grid

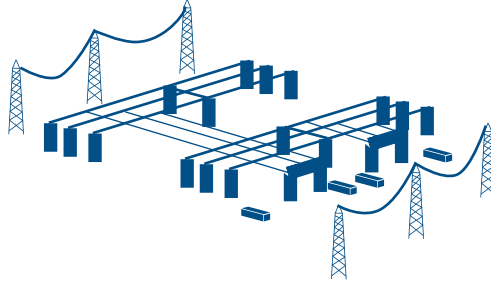
380 kV or 220 kV, pan-regional



380(220) / 110 kV overhead Substation

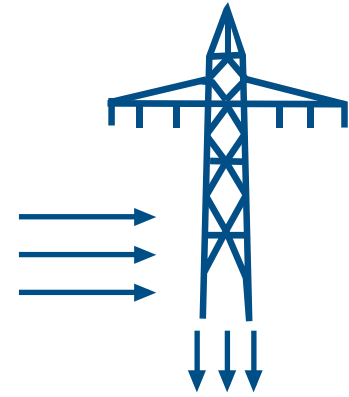
Elpro services:

- Conversion of cable busbars to double duct busbars
- New construction/expansion / 110 kV feeder panels
- Secondary technical connections



high-voltage distribution grid

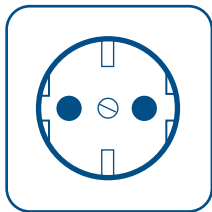
110 kV, regional



400 / 230 V Low-voltage grid

Elpro services:

- Cable systems (mid and low-voltage)
- Customer-owned transformer stations
- Lighting systems



10(20) / 0.4 kV transformer station



Mid-voltage distribution grid

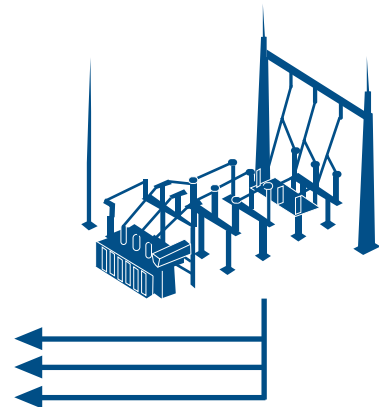
10(20) kV, local



110 / 10(20) kV substation

Elpro services:

- New construction / 110 kV substation
- In-house requirements systems
- Safety and control center equipment (ASR, SSN, RUA, FES and RIS)



The electrical power generated by large-scale power plants and offshore windparks is predominantly fed into the integrated grid of the European Union.

The pan-regional 380(220) kV long-distance grid is the top grid level.

The higher voltage allows power to be transmitted with the lowest possible losses.

Transformers at substations connect the extra-high voltage

transmission grid to the regional 110 kV distribution grids. Industrial power plants and onshore windparks are additionally fed into the 110 kV distribution grids. Industrial consumers and Deutsche Bahn are also supplied with 110 kV. Additional substations supply voltages of 10,000 V or 20,000 V to local distribution grids. These mid-voltage distribution grids support consumers (industry, regional commuter railways, and

residential areas) in addition to municipal works, solar parks, and windparks - which feed in power. The mid-voltage is stepped down by on-site transformers to 400 V low-voltage in the final meters before the end-user's residence. The star voltage of the 400 V three-phase grid is 230 V, which is then available to end users at their electrical outlets.



Distribution substations

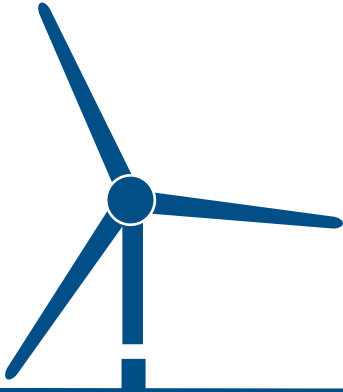
In the course of the electrical power flow, substations and transformer stations that convert high-voltage into mid and low-voltage are needed in the proximity of end users. Erecting 110 kV distribution

substations for municipal works, power utilities, and grid operators is a core competency of Elpro.

Windpower - from the point of generation ...

Windturbines (WT)

Generated between 0.4 to 1kV low-voltage



MV infeed cable to the transfer station

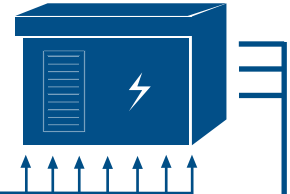
Windpark

Stepped up to 20kV (30 kV) mid-voltage within the windpark



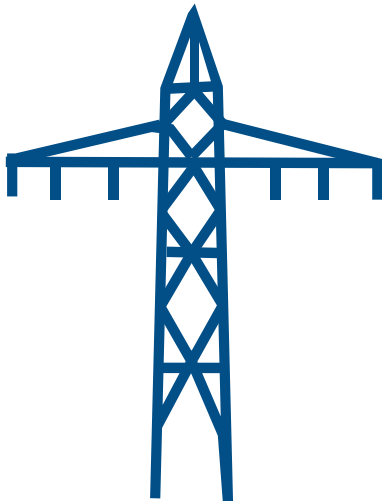
transfer station 20kV (30 kV)

The power is then bundled by the MV switchgear



Distribution grid / 110 kV

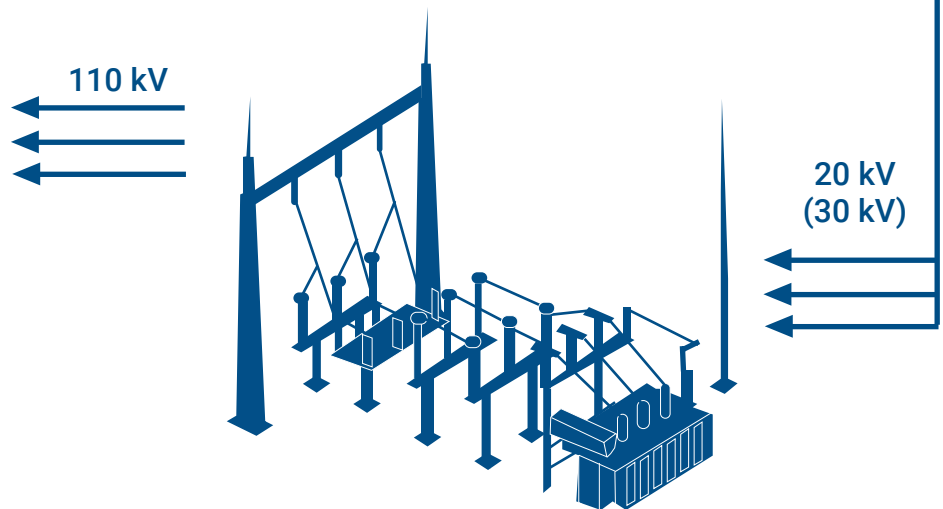
Infeed point into the 110 kV overhead line grid of the grid operator



Substation 20(30) / 110 kV

Elpro services:

Turnkey new construction of infeed substations for regenerative power sources



Windparks are the backbone of regenerative power conversion and consist of at least three wind turbines. The turbines used to convert wind energy into electrical power typically generate voltages of less than 1,000 VAC. Transformers that are usually arranged in the turbine towers convert the low-voltage into mid-voltage of 20,000 V or 30,000 V.

The power from several turbines is routed by mid-voltage cables to the transfer station, where it is consolidated by mid-voltage switchgear and fed into substations with primary cables. The power supplied by several windparks is then converted to the transmission level of the regional distribution grids.

The most common voltage level used for this purpose in Germany is 110 kVAC.

... to the grid infeed point

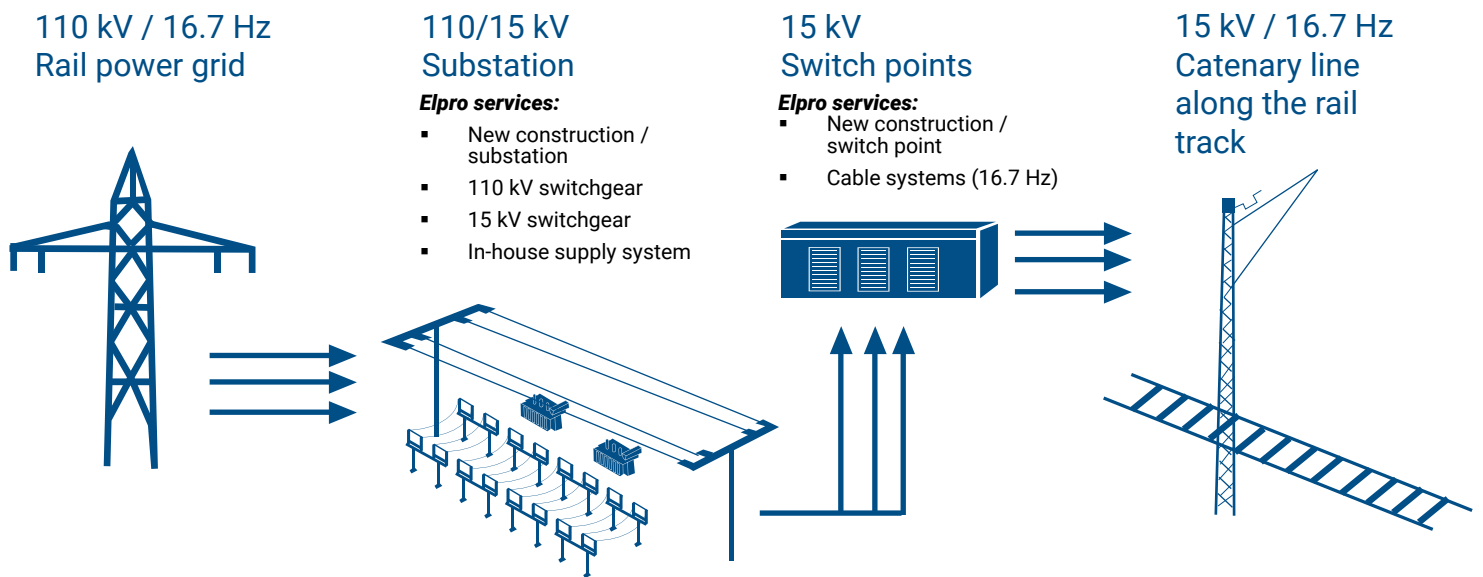


Infeed stations and substations

Elpro builds, expands, and modernizes infeed substations in the chain from the power generation point to the grid infeed point. Our expertise shows that you can reliably feed your regenerative energy sources into the high-voltage grid of the electrical utilities.

Simply give us the primary performance parameters of your windpark, and we will plan and erect your turnkey substation, including commissioning.

Traction power - from the provisioning point ...



Elpro services:

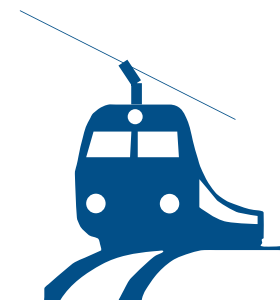
- Transformer station 10(20)/0.4 kV
- MV and LV switchgear
- Cable systems (50 Hz)



Track switch heaters

Elpro services:

- Electrical track switch heating systems
- Emergency power supplies



The rail power supply grid is operated with 16.7 Hz and 110 kV. This voltage is either sourced from power plants owned by the rail system operator or is supplied from the general 50 Hz utility grid via inverter stations. Substations then step down the voltage to 15 kV to connect to the catenary line.

Switch points then supply the various track sections with traction power. In order to use traction power to electrically heat the track switches, this voltage is again stepped down by transformers. Alternatively, the voltage for heating the track switch can also be sourced from the 50 Hz grid.

Pantographs, transformers, and electro-motors are then used to convert the electrical power back into kinetic energy that allows the trains to roll.

... to the rolling wheel



Substations Switch
Points Electrical
Power Systems

Elpro implements 110/15 kV substations and switch points 16.7 Hz, electrical power systems 50 Hz and electrical track switch heating systems for Deutsche Bahn.

Professionalism and ...

Depending on the system and the specific customer requirements, our engineers project plan based on database-supported CAE systems, such as:

- Rupan + EVU-Modul for technical support systems
- AutoCAD for primary technical systems.

This ensures consistency and plausibility for customer-specific implementation and final documentation.

The services for our areas of specialization include:

- Project management
- E-planning and design engineering
- Construction site management
- Assembly by professional electricians
- Functionality checks and commissioning
- System documentation



The quality management system (QMS) is a key ingredient for quality assurance and customer satisfaction.

It is recertified regularly. Our QMS is implemented in three levels on the basis of the DIN EN ISO 9001:2015 standard:

- The quality management manual (QMM) defines the framework conditions for managing the company
- The process management manual (PMM) defines the business and operational processes
- Operational procedures are supported by operating instructions and forms.

We can also provide proof of the following qualifications:

- Registration in the Business and Supplier Directory for Public Contracts [Unternehmer- und Lieferantenverzeichnis für öffentliche Aufträge (ULV)]
- Pre-qualification from EnBW Regional AG for planning and erecting substations
- Pre-qualification from E.ON Netz for E-assemblies in 110 kV substations
- Pre-qualification from Deutsche Bahn for delivering, erecting, and assembling 110/15 kV switchgear 16.7 Hz
- Pre-qualifications from S-Bahn services in Berlin and Hamburg for erecting DC rail power cable systems
- Pre-qualification from Deutsche Bahn for erecting electrical track heating systems





Stand August 2017

Elpro GmbH

Marzahner Straße 34
D-13053 Berlin

Tel .: +49 30 9861 0
Fax: +49 30 9861 2276

E-Mail: info@elpro.de
Internet: www.elpro.de

