Competence in Substations
Specialist for Power Networks and Systems

SAG similarly stands for comprehensive know-how and a wide experience in electrical power systems providing specialised full services as well as system knowledge for electrical energy systems. Since the foundation of the company in 1916, SAG was close-knitted with the extension and maintenance of transmission and distribution systems at home and abroad. Traditionally the substation business belongs to the core business activities within SAG.

Your Partner for Energy related Infrastructure

With approximately 8,000 employees, the SAG Group generates an annual turnover of around € 1 thousand million. The core markets are Germany and neighbouring countries in Western and Central Europe as well as project-related business in other European countries and worldwide. SAG has more than 100 locations in Germany to underline its nationwide presence.
Based on decades of experience, SAG as one of the leading European service providers for power network infrastructures develops and implements tailor-made, forward-looking solutions for all added value stages of Asset Management and Asset Service.

The core activities of SAG comprise:
• turnkey construction and maintenance of overhead lines and substations,
• provision of customer-specific automation and geo-information systems, and
• development of IT-supported asset, maintenance and operations management systems.

**Overall projects from one single source**

The full service offered by SAG relies on distinct, manufacturer-independent system know-how, which is based on the detailed knowledge of the implemented equipment and systems and furthermore on the substantiated state of knowledge of network control. Hence, SAG is in the position to fully handle and realise even the most ambitious projects.

In transmission and distribution networks substations are of utmost importance for the reliability of electrical energy supply. In the wide branched electrical supply infrastructure substations bundle and distribute load flows at all network levels from generation via transmission to distribution. Due to their substantial and functional primary and secondary technique substations are high sophisticated and complex systems.

**Solutions for new requirements**

In recent years, new requirements and impulses for the construction, modernisation and operation of high and medium voltage switchgears resulted in two main factors: the ongoing expansion of cross-border networks and structural changes in the transmission and distribution networks due to increased deployment of renewable energy sources.

SAG consistently adapts its product and service portfolio to these market changes with the objective to offer safe, efficient and cost-optimised solutions to the customer considering the entire lifecycle of the equipment.

This applies both to transmission and distribution system operators, utilities, local authorities, municipalities, industrial customers as well as independent power producers.

**The principle of networked competence**

In substation business the guiding principle behind all SAG activities is networked competence. SAG’s substation division collaborates similarly intensively with affiliated divisions or companies of the SAG Group.

The substation division is fit for the market. Via branch offices, regional offices and local cooperation partners SAG is close to the customer. In Germany, the main sales offices are located in Essen, Ergolding, Berlin and Weinheim. The fast-growing international business is managed from the division substation export in Langen near Frankfurt.
Everything the Customer Needs

Electrical power systems – whether national or international – are almost similarly structured. The technical standards, however, often differ significantly in terms of country specific requirements respectively individual requirements of the network operators. In substation business SAG’s wide range portfolio entirely satisfies the customer needs on the highest level of quality.

Our utmost concern is to support our customers with effective and reliable supplies in order to support and to steadily strengthen their market position. For this purpose a high level quality standard of our products and services is an indispensable requisite. Qualified, committed, quality-conscious employees and our comprehensive Quality Management System are the guarantors for the securing of outstanding quality.

In addition, protecting the occupational safety and the health of all employees as well as the protection of the environment are also key parts of the corporate philosophy of SAG. For the successful implementation of these goals, all relevant aspects are integrated in SAG’s Occupational Safety Management System and the Directive on Environmental Protection.
SAG’s supply and service portfolio has developed over many years and is both extensive and flexible. It is oriented to network operation processes and thus covers the entire lifecycle of the equipment, i.e. from design stage via construction, modernisation and maintenance and moreover to dismantling and recycling.

Based on this, SAG develops tailor-made solutions for clients of the energy and industry sector. In this context the idea of giving the best service to the customer is of vital importance. At the same time, the selected product from the different manufacturers are combined to form an optimized system fulfilling all requirements.

**Turnkey with standard technology**

Turnkey competence, distinctive orientation to service, manufacturer independence and professional interface management thus particularly characterise SAG’s product portfolio in substation construction. Core elements of the service and supply spectrum is engineering, procurement, erection, testing and commissioning as well as maintenance of all:

- HV switchgears > 60 kV (outdoor and indoor technology)
- MV switchgears > 6 kV (AIS and GIS)
- Auxiliary systems
- Protection systems
- Control, Metering, Communication

The range of products and services offered is supplemented by:

- Damage analyses and rehabilitation concepts, developed by SAG’s Research and Technology Centre (SAG VTZ)
- Grid connection and operation of decentralised power producers, like wind farms or photovoltaic systems
- Earthing calculations and analyses
- Studies on electrical interference

**Streamlining increases profitability**

With this orientation SAG is exactly following present market requirements. Due to increasing regulatory and competitive pressure, cost considerations increasingly become the decisive factor in substation business. Increasing requirements on profitability are forcing the network operators to permanently improve and optimise their return on system investments and to organise and configure the network service as efficient as possible. Rehabilitation of existing switchgear systems is thus becoming more and more significant. At the same time, network and system operators are permanently attempting to exploit additional efficiency and quality potentials by combining primary and secondary technologies from different manufacturers and delegating the realization to the specialist staff of the contractor.

**Innovations in SAG’s own products**

SAG offers not only the necessary system, engineering and project management know-how. Further to this, SAG manufactures control, protection and annunciator panels, customer specific AIS MV switchgears and – the recently developed – field adaptation cabinet, which optimize the interface to the primary equipment. This cabinet provides the complete secondary technique for HV switchgears in one single unit, is factory pre-tested and ready for connection.
The network operation increasingly faces growing economical and technical requirements leading to an increasing demand for tailor-made concepts for the construction, expansion and modernisation of high and medium voltage substations. Utility and industry costumers are therefore turning more and more to the proven manufacturer-independent solution competence of SAG, as demonstrated by some selected recent reference projects below.

References

- **Germany:** Implementation of the Superior Power Infrastructure for Lignite Mining in Garzweiler for RWE Power AG, Construction of S/S “Kriffel” for RWE Transportnetz Strom
- **Austria:** Construction of a 110 kV substation for EVN
- **France:** Extension of a 400 kV substation for RTE (Réseau de Transport d'Électricité)
- **Luxembourg:** Construction of substation Berchem, Kayl for Cegedel S.A., Construction of 220/25 kV substation Oxylux for Cegedel S.A.
- **Netherlands:** Construction of 380/150 kV transformer substation for TenneT
- **Ireland:** Construction of S/S “Athy” for ESB, Construction of S/S “Stephenstown” for ESB
- **UK:** Rehabilitation of S/S “Aldershot” for Scottish & Southern Electric
- **Sweden:** Extension of S/S Linköping for State Utility Kraftnät AB, Turnkey construction of 400 kV S/S “Stenkullen” for Svenska Kraftnät
- **Mexico:** Refurbishment and Improvement of the 115 kV – grid connection S/S for VW-Facility in Puebla
- **Algeria:** Extension of S/S El Affroun, Cherchell, Kherba and Oued Sly for SONELGAZ, Extension of 220 kV substations El Ksuer and Bouira for SONELGAZ
- **Rwanda:** Turnkey construction of S/S “Mont Kigali” for Electrogaz, Turnkey construction of 110/70/30 kV/ 10 MVA S/S Kabarondo
- **Thailand:** Construction of a Solar Power Plant for EGAT
Wind Farm Grid Connection/Ireland: Bally Water

Bally Water Wind Farm Ltd., as IPP, ordered SAG to realize the grid connection of their wind farm in County Killmuckridge in Ireland. The 110/20-kV substation connects a 42 MW wind farm to the electrical grid of the Irish Utility ESB. In the final stage the wind farm will have an aggregate capacity of 72 MW. SAG’s scope comprises the grid study for the connection of the wind farm, primary and secondary engineering, supply and erection of HV and MV components, laying of 21 km 110 kV power and communication cables.

Electrogaz/Rwanda: Grid Extension/Rehabilitation

In Eastern Rwanda SAG is significantly involved in the extension and rehabilitation of the electricity supply system. In the western part of the country SAG is currently realizing a new 110 kV transmission link for the national utility Electrogaz. The scope within this project comprises the turn-key construction of a 15 km OHTL and a new 110/30 kV 40 MVA substation. In a second project SAG is rehabilitating the 110/30 kV substation Gikondo, located in the suburbia of Kigali. Within this turn-key project SAG, as principle contractor, provides the complete spectrum from engineering, civil works, procurement of a 30 kV MV GIS double busbar switchgear, installation, erection to commissioning and new control and protection systems for the 110 kV feeders.

RWE Power/Germany: Turnkey infrastructure for Lignite coal mine Garzweiler

Since the beginning of 2006 RWE Power AG has been stepwise expanding the brown coal surface mining facility in Garzweiler in the Rhineland. SAG – as consortium leader – together with a manufacturer implemented the superior power supply infrastructure. The key elements of this turnkey project with a total value of 12.6 Million Euros was the construction of a 110/25/6 kV transformer substation for the material handling facilities and a 6 kV auxiliary system for the drainage facilities. SAG was responsible for the project management, primary engineering, civil works as well as all erection works. The consortium partner provided high voltage and secondary equipment.

Svenska Kraftnät/Sweden: Reconstruction of a 400 kV substation

The Swedish Svenska Kraftnät AB is currently systematically expanding its high voltage grid. In this context SAG received the order to reconstruct the 400/130 kV substation Stenkullen, east of Gothenburg. The turn-key contract comprises engineering, procurement, erection testing and commissioning of the new primary and secondary technique. The core element of the future switchgear will be a central portal with two tubular busbars. The digital control system IDS LISA 850 will be functionally adapted and will meet the stringent Scandinavian requirements on electromagnetic compatibility.