Power
Providing for the future

Turning Ideas into Reality.

Ferrostaal
Combined-cycle power plant: San Pedro de Macoris, Dominican Republic.
The demand for energy is increasing along with the growth of the world’s population and economy. Providing reliable power supplies for up-and-coming megacities and industries is one of the greatest challenges of our time. According to forecasts, the world will need some 40 percent more energy in 2030 than it does today, and in the near and middle future, most of this demand will be met by fossil fuels. Natural gas and coal are essential natural resources for securing reliable power supplies.

Whether for the construction of new power plants or the modernisation of existing plants, Ferrostaal engages the best methods and partners. We develop and realise projects, tailoring them individually to our customer’s requirements, using best available technologies to achieve economic and environmentally friendly solutions. As an experienced Engineering, Procurement and Construction (EPC) contractor, we provide our customers with optimal design solutions, ensuring profitable long-term operation of their power plants.
Secure energy supplies
Reliable long-term power generation

In the decades to come, energy consumption will increase significantly. Demands placed on governments and industry in general continue to increase. The security of our energy supply is crucial to prosperous social and economic development.

Gas and coal will continue to make a major contribution
Even though renewables are growing rapidly, the electricity sector will continue to rely on natural gas and coal. The Energy Information Administration (EIA) has forecast that, by the year 2035, most of the world’s power generation will still be based on fossil fuels. Based on current information, natural gas reserves will last for decades to come (see graphic left).

Large reserves supporting increased production
According to a forecast by the EIA, worldwide natural gas production will be about 50 percent higher in 2030 than in 2005. In the year 2030, gas will be used for a quarter of global power production. The MENA region, the CIS states and non-OECD Asia account for the major share of the world’s gas production. Latin America will become increasingly important: for example, Brazil’s gas production is forecasted to grow at an average annual rate of 5.5 percent in the period from 2005 to 2030. The world’s highest growth rate (see graphic right).
Sustainable power supply
Parallel to ongoing efforts to create a sustainable energy source with renewable energy for example wind and solar, power generation based on fossil fuels remaining a major pillar of power supply. In particular, combined-cycle gas power plants provide a reliable base- and peak-load electricity supply and reserve backup with high thermal efficiency. Combined-cycle plants generating power and thermal heat simultaneously have the highest efficiency. The higher the efficiency, the lower the gas consumption and emissions like carbon dioxide.

The Federal Statistical Office of Germany points out that CO₂ emissions can be reduced by more than one third for each kilowatt of power produced by replacing an aged power plant operating at 30 percent efficiency with a modern one operating at 50 percent. Ferrostaal supports these undertakings through project development and implementation on an economical and technologically sound basis – whether it’s a new greenfield power plant or the modernisation of an existing facility.
Natural gas and coal will continue to be the dominant fuels for electricity generation in the near and middle future. According to the specific requirements of our customers, Ferrostaal develops, designs and constructs gas and steam power plants with installed capacities between 100 and 1,000 megawatts as well as, on a selective basis, diesel engine power plants in the range of 5 to 200 megawatts.

Best value for our customers
We offer our partners tailor-made project development, in which every detail of a power plant project is considered. In cases where financing is required, we provide bankable solutions, making use of our excellent relationships with financing banks, development institutions and export credit agencies. Our in-house insurance specialists arrange comprehensive insurance cover for the construction and operational phases of our projects.

Ferrostaal assumes single-source responsibility for the design, engineering, procurement, construction and commissioning of a wide range of power plant projects. As a successful EPC Contractor, we undertake the construction of turnkey plants with reliable supply chain partners. With our own resources for plant erection, we are flexible and can also act as a member of an EPC consortium.

Ferrostaal as a single-source responsibility for the design, engineering, procurement, construction and commissioning of power plant projects.
Ferrostaal is a solid partner for the turnkey delivery of conventional power plants. The TGU power plant above outlines current process on site.

**Individual solutions**

A compelling advantage for our customers is our independence from technology providers and manufacturers of plant and equipment. This allows us to use the most suitable technology and components, sourced through our global procurement centres. At the same time, we ensure the highest possible value-added in the project host country, and promote the engagement and training of local employees. In selected markets, we also build plants with our own local plant erection personnel. With this model, we make a valuable contribution to socio-economic development in many countries of the world.

Moreover, Ferrostaal offers solutions beyond the boundaries of power plant project realisation. For example, the growing demand for water in some regions of the world is a pressing topic. In the long term, seawater desalination will make an important contribution here. Ferrostaal therefore also offers power plant solutions with integrated seawater desalination.

**Types of power plants offered by Ferrostaal:**

- Gas Turbine Power Plants configured as simple- or combined-cycle
- Steam Power Plants
- Diesel Engine Power Plants
- Co-Generation Plants
- Hybrid Power Plants (solar and combined-cycle)
In terms of efficiency and environmental impact, the combined-cycle power plant is considered the ideal conventional power plant. Its operational flexibility allows rapid start-up, minimal shut-down times and fast and efficient adjustment to varying load demands.

Ferrostaal is particularly qualified and experienced in converting simple-cycle gas turbine power plants to combined-cycle power plants that produce additional power from the turbine exhaust gas. After conversion, these plants have a higher thermal efficiency with lower emissions per unit of power produced.

We also design combined-cycle plants as co-generation plants, for the simultaneous production of process steam along with power. Process steam can be used for seawater desalination, industrial applications, district or factory heating. Co-generation plants can have an even higher overall efficiency.

For regions that experience intense sunshine, Ferrostaal offers as an alternative hybrid power plants, integrating a solar power unit into a combined-cycle power plant to achieve greater power output.

Whilst less efficient, an alternative to combined-cycle power plants are conventional steam power plants. In this kind of plant a boiler produces steam at high pressure and temperature that drives a steam turbine coupled with a generator. By applying the appropriate combustion technology, various fuels can be used.

For customers requiring an individual, independent power supply, diesel power plants are a fast-track solution. Diesel engine power plants, based on 2 or 4-stroke diesel engines, can also run on biodiesel or gas. Reduced erection time for diesel engine plants also provides advantages.

Power for the future
Proven technologies, bankable solutions

Our power plants combine best performance and highest operational flexibility with maximum reliability. We are fully committed to the concept of sustainable development, designing power plants to the highest international standards.
Steam power plant: Steam power plants can be operated with various fossil fuels (natural gas, oil, coal etc.). Here, in a water-steam-cycle, demineralised water is heated in a boiler under high pressure and converted into water vapour which then expands in a steam turbine with a generator for power production. The efficiency of such plants is highly dependent on the turbine entry temperature of the steam and the cooling performance of the condenser. Air, seawater, river or well water may be used for cooling, according to local conditions.

Combined-cycle power plant: As in a gas turbine power plant, hot exhaust gas from fuel combustion in the gas turbine expands and drives the turbine's generator for power production. Instead of being vented into the atmosphere as in the gas turbine power plant, the turbine exhaust is diverted to a heat recovery steam generator. Here, steam is raised for driving a steam turbine with its own generator for additional power production. Through this principle of maximum energy utilisation, the highest efficiencies in power generation can be achieved (up to 59 percent).
As project developer, we support our customers in all aspects of a power plant project, from technology selection to financing and identification of strategic investors and plant operators. Through the provision of project-specific financing arrangements, we contribute to the sustainable success of our customers’ undertakings. In our projects we seek a well balanced cooperation between the customer, our supply chain and the financial institutions involved, providing attractive returns to all partners.

As a turnkey EPC Contractor, we take the overall responsibility for achieving project completion on time and in budget. The customer has a single point of contact and contract partner: Ferrostaal. We deliver power plants on a turnkey basis or partial turnkey basis, depending on the requirements of our clients.

EPC Contractor with long track record
Competence is the key to success

We design, engineer, construct and commission a wide range of power plants for utility, public works and heavy industrial applications. As an experienced turnkey contractor, we undertake power and industrial plant projects with selected, renowned partners. The advantage for our customers: we provide tailor-made solutions involving the best available process technology and equipment.
Our services as an EPC Contractor include the following:

- Project development and financing support
- Power plant design and engineering
- Global procurement and expediting
- Turnkey plant construction
- Project management
- Plant commissioning
- After-sales services, maintenance

Quality and safety first

Our goal in every project is to achieve completion with zero defects and zero accidents. Across all interfaces and disciplines of the EPC project execution, we seamlessly manage quality assurance/control (QA/QC), health, safety and the environment (HSE). Expert construction planning and construct reviews are carried out by us early on in the project. Our experienced staff manage and supervise the turnkey construction of the power plant. Ferrostaal’s erection companies around the globe employ and train local plant construction workers.

For Ferrostaal, quality, safety and employee training carry the highest value in our corporate culture: one reason why so many customers choose us repeatedly as their preferred partner.

Ferrostaal’s Quality and HSE management systems are certified:

- Quality management is in accordance with DIN EN ISO 9001
- Environmental management is in line with ISO 14001
- Safety and health standards are in accordance with OHSAS 18001

We are committed to continuously raising our quality and safety levels. This is how we ensure that plants “made by Ferrostaal” will continue to stand for the highest international quality and will fully meet our customers’ requirements.
Active in over 40 countries, we possess extensive knowledge and access to local markets. We are at home anywhere in the world and have realised numerous successful power and large-scale industrial projects for our customers globally.

From the initial project vision to final project completion, we stand with our customers as a partner:

Power for Trinidad and Tobago
Ferrostaal has a history in Trinidad dating back 20 years when our first contract was completed in the Petrochemical sector. Ferrostaal has since acted as general contractor and co-investor in seven major chemical plants in Trinidad.

Ferrostaal recently entered the power market in Trinidad with the award of a major contract for the engineering, procurement and construction of a combined-cycle power plant (6+2), generating 765 megawatts. The power plant (TGU), located in La Brea, will increase Trinidad’s generating capacity by some 50%. With all our projects, we endeavour to achieve the highest possible local content, thus adding value to the local community.
Termozulia project in Venezuela. Conversion from simple- to combined-cycle.

The Ribatejo power plant supplies electricity for Lisbon.

**Power for Venezuela**
After project completion, the Termozulia power plant in Venezuela now produces over 50 percent more power than before. This plant, belonging to the utility group ENELVEN, has been converted by Ferrostaal from a simple-cycle gas turbine power plant into a modern combined-cycle power plant, increasing its installed capacity from 320 to 475 megawatts. Ferrostaal is currently executing its second major contract for ENELVEN as turnkey EPC Contractor. Under this contract, two new combined-cycle power plants will be built to supply over 1,000 megawatts to the power grid in the region of Zulia, the centre of Venezuela’s oil and gas production.

**Power for Portugal**
The state-of-the-art power plant in Ribatejo supplies power to Portugal’s largest city, Lisbon, 30 kilometres away. Since 2006, the Portuguese power group Termoeléctrica do Ribatejo S.A. has operated the natural gas-fired combined-cycle plant, which has an installed capacity of 1,200 megawatts. The turnkey project was executed by Ferrostaal, through its Portuguese subsidiary Ferrostaal Lda., in consortium with Siemens. We were commended with a safety award for completing two million man-hours of project work without an accident.

**Power for Germany**
We applied efficient, economical technology in the modernisation of an existing power plant for the public works department of Wuppertal city in Germany. With the new 90 megawatts co-generation facility, emissions have been reduced significantly: carbon dioxide has been decreased by 200,000 tons per year and nitrous oxides by 50 percent.

**Power for Syria**
We have also been at home in the Middle East and North Africa for a long time. In Syria, we converted two gas turbine power plants to combined-cycle power plants. Installed capacity was expanded and efficiency substantially improved.
As an EPC contractor for industrial projects, we have conducted business in over 40 countries for several decades. Our experience and local presence make us an ideal partner for the development, design, supply and construction of power plants. Ferrostaal offers a comprehensive package of turnkey services around the world: we take overall responsibility for the project, providing professional project development, competitive financing and EPC project implementation to the full satisfaction of our customers.
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