One power plant – three world records

Environmentally friendly, flexible and innovative
Designing solutions for tomorrow’s challenges

We have been building integrated, turnkey power plants throughout the world for over 130 years. This exceptional wealth of experience, combined with the quality of our pioneering work, helps you to avoid risk and safeguard your investment. Cost and resource efficiency combined with largest occupational safety and optimal plant availability is important to us as your partner. Ultimately this is the only way to build an environmentally friendly combined cycle power plant that sets new standards and achieves three world records: Lausward, “Block Fortuna”.

Hand in hand with climate protection
Fossil-fired power plants still have an important role to play in the energy mix of the future. Our highly efficient combined cycle power plants and combined heat and power plants demonstrate that climate protection and conventional power generation can go hand in hand. They are used when there is not enough wind or the sun's rays are not strong enough. Finally, we all rely on a continuous power supply and need power plants that can be started or shut down as required.

Our power plants are already extremely cost-effective when simply used to generate electricity. Additionally, they recover process heat to make operation even more economical. Combined production of heat and power plays a substantial part in increasing energy productivity and protecting the climate worldwide.
We bring out the best: with combined heat and power (CHP)

CHP concepts guarantee a particularly high efficiency level. They use fuel extremely efficiently and reduce CO₂ emissions. They thus not only provide a guaranteed energy and power supply, but also protect the environment. In fact, at the Lausward site, our CHP concepts have helped to achieve the highest efficiency levels worldwide.

The simple principle behind CHP
In CHP, a single fuel is used not only to generate electricity, but also to recover heat. The exhaust gas from the gas turbine contains plenty of thermal energy. A heat recovery steam generator makes use of this energy to heat and evaporate water and the resulting steam is passed into a steam turbine to create even more power. Steam can be taken off at three extraction points in the steam turbine and the heat content of the steam is used for district heating.

Maximum district heating supply by a single power plant unit with >85% fuel efficiency

>61% net efficiency

595 MWel maximum electricity output generated by a single combined cycle unit

300 MWth maximum district heating supply generated by a single combined cycle unit

>85% fuel efficiency

net efficiency
When heat and power are combined

Combined heat and power concepts based on gas and steam turbines guarantee considerably higher efficiency levels than conventional power plants. They thus lead to reduced CO₂ emissions as well as lower energy costs. They guarantee an energy supply, and play a crucial role in protecting the environment by reducing the environmental pollution caused by power generation. The German Federal Government has set a target to increase the amount of power generated by CHP plants. This should reach 25% by 2020.

Our combined cycle plant at the Lausward site makes a significant contribution towards this target. It makes full use of the opportunities offered by combined heat and power technology and supplies the city of Duesseldorf directly with district heating, without creating any additional environmental pollution.

Particularly powerful: the gas turbine

The SST5-8000H is the most powerful gas turbine in the world. It weights 442 tonnes and is designed to generate 400 MW when operating in gas turbine mode and up to 600 MW when operating in combined cycle mode. It can produce as much power as 1,200 Porsche 911 Turbo cars. A single blade of the SST5-8000H gas turbine also produces nearly as much power as a wind power plant with an output of 3.6 MW.

Individually adjustable: the steam turbine

The SST5-9000 series steam turbines can be used in combined cycle power plants and steam-cycle power plants with outputs ranging from 120 to 750 MW.

They have a combined high and intermediate pressure section and a heat flow low-pressure section. Each flow has a flow surface area of 1.25 square meters. Steam can be taken off at several points on the low pressure turbine as required. Optimized operation of the steam turbine ensures high flexibility with regard to output, thus protecting the electricity grid and adjusting to fluctuations in renewable energies.

Optimized cooling concept: the generator

The SGen-3000W generator has a unique design. The process parameters are tailored to maximum efficiency and flexibility, the heat optimization rate, reducing specific costs and increasing the annual mileage of approximately 20,000 km per year.

In order to play an essential part in the energy mix of the future, we need a power plant that combines a number of features: it must be highly efficient, flexible, environmentally friendly and cost-effective. We have worked alongside the Stadtwerke Duesseldorf AG to bring about this flagship project, one that is set to make a crucial contribution to the changing face of energy generation.

Efficient

The outstanding engineering achievements that go to make our power plant have earned three world records.

- The Lausward combined cycle power plant is an environmentally friendly and economical means of generating heat and power in a future with lower CO₂ levels – as such, it has won us three world records.
- The “Block Fortuna” on the Lausward site in Duesseldorf Harbour is a new combined cycle power plant that exceeds the customary efficiency levels. Alongside maximum output, maximum efficiency and minimal use of waste heat, it also boasts as overall natural gas efficiency of up to 85% and offers exceptional combined heat and power application. Performance in power generation is thus possible at a rate of 35 MW per minute – not only is this the absolute peak value for such load ramps, but also the power plant itself, due to the specific stability requirements for grids.

- The SST5-8000H gas turbine, transported from the manufacturing site in Aachen to Duesseldorf, is to be the world’s most powerful gas turbine. When operating in gas turbine mode, it can generate 600 MW. The total weight of the gas turbine, including the generator, is 442 tonnes. The gas turbine’s rotor – supporting the turbine’s high output – is made from closed steel frames and intermediate joints to convey the power it generates.

- The Aachen-based architects kadawittfeldarchitektur have used closed steel frames and intermediate joints to convey the power it generates. The stack is enclosed with a special sense of rhythm. In addition, the stack is enclosed behind glass. The resulting stack forms a pinnacle near the city where the city’s energy comes from.

Maximum flexibility with maximum power

In May 2014, the gas turbine was transported from the manufacturing site in Aachen to Duesseldorf Harbour. Its prominent position on the harbor front.

The world’s most efficient combined cycle power plant

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The SST5-8000H gas turbine and its associated generator have a combined output of 600 MW. The resulting steam generator is a technological milestone across all key parameters.