One power plant – three world records

Environmentally friendly, flexible and innovative

www.siemens.com/powerplants
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

<table>
<thead>
<tr>
<th>Parameter</th>
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<tbody>
<tr>
<td>MW th</td>
<td>&gt;300</td>
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<tr>
<td>MW el</td>
<td>&gt;595</td>
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Architectural Highlight
City Window to the Center of Duesseldorf
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 environ- mental 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 takes 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 addi- tional environmental pollution.

Particularly powerful: the gas turbine

The SGT-800 is the most powerful gas turbine in the world. It weighs 440 tonnes and is designed to generate 400 MW when operating just in gas turbine mode and 600 MW when operating in combined cycle mode. It can produce as much power as 1200 Porsche 911 cars or nearly as much as a wind power plant with an output of 3.6 MW.

Individually adjustable: the steam turbine

The Siemens steam turbine has a combined high and intermediate pressure section and a dual flow low pressure section. Each flow has a flow surface area of 12.5 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 pro- tecting the electricity grid and anchoring it for flexible applications in renewable energy markets.

Optimized cooling concept: the generator

The generator has a unique design. The process parameters for the water-steam circuit are increased to implement higher steam parameters. As considerable emphasis is placed on increased efficiency and flexibility, the heat exchangers in the power plant are thus able to utilize the exhaust heat arising in the power generation process can thus be utilized efficiently as well, to produce the necessary steam. The combined cycle power plant can be run up from 5% to 100% in less than 40 minutes and shut down equally quickly. It is thus able to respond flexibly to meet all heat generation process can thus be utilized efficiently as well, to produce the necessary steam. The combined cycle power plant can be run up from 5% to 100% in less than 40 minutes and shut down equally quickly. It is thus able to respond flexibly to meet all heat opportunities. The heat arising in the power generation process can thus be utilized efficiently as well, to produce the necessary steam. 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