Offshore installations powered from shore
Safe, reliable, economic and environmentally friendly
Just about every process on an offshore installation requires power. To guarantee a reliable supply, operators install a gas turbine of the appropriate rating to cater to their platform’s maximum power demand. This approach makes for a rather expensive solution, because maximum power is hardly ever required – yet it has to be paid for by installing a gas turbine that is oversized for the majority of applications. Add to this the higher energy efficiency of an all-electric compression train, and you’ll end up with significant savings in energy costs, year after year. Can you afford not to? Safety is another factor in firing a combustion engine on an oil and gas platform – not to mention the burden on the operating personnel of noise and vibration. Operation, service, and maintenance are additional liabilities of today’s gas turbine-based solutions. Local power generation requires special expertise that is not typically a part of your core competencies – and it also requires a lot of staff.

Even worse: In the long run, depleting wells will require more technology and power generation capacity to keep up production. Depending on the distance from shore, a well-founded decision for or against an on-site power solution will always need to consider the initial investment and the operating costs over the entire lifecycle.

»Siemens can help oil and gas offshore production sites to reduce their emissions significantly. Our AC or DC links connect the electrical grid on land with the oil and gas production sites at sea, making on-site power supply safer and cleaner than ever.«

Dr. Jan Mrosik
Energy Management

<table>
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<th>Offshore power</th>
<th>Simple cycle</th>
<th>Power from shore</th>
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<td>Gas turbine</td>
<td>Generator</td>
<td>Gas turbine, generator, steam turbine</td>
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<tr>
<td>Simple cycle efficiency</td>
<td>25–30%</td>
<td>Combined cycle efficiency</td>
<td>&gt; 60%</td>
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The all-electric solution ensures higher efficiencies and less pollution

**Offshore oil and gas installations need reliable power**

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Integrated power supply solutions from shore

Substantial savings, reliable power, and eco-friendly performance – that’s behind Siemens’ integrated onshore power solutions for offshore applications.

Minimized costs
With power from shore, you’ll profit from extra-efficient power generation and optimized fuel use without compromising reliability, service quality, or costs. What’s more, you’ll need fewer personnel on board, less space, and fewer reinforcement structures by eliminating the gas turbine.

Reliable power
Onshore power can be generated more efficiently, and any problems can be resolved very quickly. Because the land connection is part of the national power grid, you’ll benefit from its high security of supply.

Eco-friendly performance
When it comes to environmental issues, powering your offshore assets from shore has enormous advantages. First of all, the significantly higher energy efficiency of onshore power generation results in a minimized carbon footprint. Secondly, you can make use of renewable energy sources when you supply power from shore.

Reliable operation 24/7
With Siemens, you can also rely on a well-prepared turnkey partner for the operation and maintenance of your power-from-shore link. Our experienced and well-trained service team will cover all system-related services that are necessary to keep up the plant’s specified functionality, reliability, and availability over the entire lifecycle. The Neptune and Hudson HVDC systems (both in New Jersey, U.S.) are operated and maintained by Siemens personnel in order to provide reliable power to the city of New York.

Furthermore the Siemens offshore HVDC systems HelWin1+2, BorWin2, and SylWin1 are covered by Operation & Maintenance contracts with our client TenneT.
Siemens’ HVAC and HVDC grid access and power supply solutions have proven their superior reliability and availability in numerous projects all over the world – in the harshest climates. We have also acquired substantial experience with various offshore grid access projects over the last several years, with proven technology at the core of our solutions.

**Specification and distance**
Which option will best suit your requirements? There are three alternatives available depending on your project’s specifications, the transmitted power, and the length of the transmission cable:
- AC transmission
- DC transmission
- Gas turbine solution

Obviously, if there is no associated gas available, a gas turbine will need to run on liquid fuel, or else a “power-from-shore” solution may be chosen, depending on the specific combination of transmission length and rated power. Within approximately 170 kilometers from shore and with less than a 60-MW capacity, an AC connection may be possible, but this requires, dynamic-reactive power control. For power capacities above 100 MW and distances of more than 200 kilometers from shore, an HVDC solution will be the most economical.

**High-voltage sea cable**
While we concentrate on efficient transmission and switching technologies, we also collaborate with a variety of sea cable manufacturers and rely on their specialist expertise. This allows us to offer our customers the highest possible flexibility in terms of cable designs, individual features, and delivery schedules.
Marinizing a reliable onshore solution is no small thing. Siemens has successfully proven in several offshore projects that our power transmission solutions are as durable and reliable both onshore and offshore. In addition to AC and DC grid connection for offshore windfarms in the North Sea and the Baltic Sea, we also designed and constructed offshore connections to Norwegian oil production platforms, such as Goliat and Martin Linge.

The Martin Linge oil production platform

The challenge for Total’s Martin Linge oil production platform was to comply with Norway’s efforts to fulfill CO₂ emission reduction obligations in accordance with the Kyoto Protocol. To this end, the operator decided to use power from shore, despite the long distance. To increase AC grid reliability and reduce power delivery costs, we used our FACTS (Flexible AC Transmission System) SVC PLUS® technology (2x SVC PLUS container solutions, each ± 50 MVAr) to handle the above-average demand for reactive power compensation. Our customized turnkey solution also consists of nine bays of 100-kV GIS and two 80-MVA transformers. This connection is the world’s longest AC connection of an offshore production platform.

Total will profit from numerous advantages and benefits:
- Maximum space savings on the platform thanks to a customized solution package
- Significant reduction of the platform’s CO₂ footprint
- Reliable 24/7 power supply, even under the most adverse environmental conditions
- Automatic fault detection and response within fractions of a second at the onshore SVC station
- Fewer personnel required at the platform for service and maintenance

Goliat project

The Goliat floating offshore platform for the production, storage, and offloading of oil and gas (FPSO) operates in the Norwegian Barent Sea. It is supplied with power from shore with a 106-kilometer-long cable and not, as usual, by on-board gas turbines and generators. The result: a 50 percent reduction in CO₂ emissions. At the core of this solution: the SVC PLUS reactive power compensation system and voltage-sourced converter technology (VSC) by Siemens.

HelWin1+2/BorWin2/SylWin1

HVDC PLUS is the perfect access technology for bi-directional power transmission with black-start capability. Based on voltage-sourced converter technology (VSC) and specially designed for transmission in the range up to 1,000 MW and above, it is ideally suited for the connection of offshore applications to the grid. For SylWin 1, Siemens supplied the world’s largest VSC offshore system with a rating of 864 MW. The platform accommodates all electrical equipment required for the HVDC converter station. The energy is transmitted via subsea and land cable to an onshore converter station that reconverts the DC to AC and feeds it into the 380-kV AC grid.
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