Siemens announces technology push for higher power plant efficiency

- Testing and validation of advanced HL-class technology under real conditions at customer site
- New efficient technologies to be rolled out subsequently to existing gas turbine portfolio
- Designed to plug in to Siemens suite of digital products – running on MindSphere

Siemens is paving the way for the next level of efficiency with the development of its HL-class. In June 2017, Siemens announced the company will validate the technologies of its HL-class at Duke Energy’s Lincoln County site in North Carolina. Siemens is developing this class in an evolutionary development step derived from its proven SGT-8000H technology. The advanced Siemens HL-class gas turbines combine a series of new but already tested technologies and design features with the best of past experience – resulting in a technology carrier to the next level of efficiency and performance. The HL-class is clearing the way to efficiency levels beyond 63 percent with a mid-term goal to reach 65 percent.

Furthermore, Siemens is gaining speed to drive technological upgrades and competitiveness by transferring newly developed key technologies to its entire gas turbine portfolio. In the near future, all customers will benefit from further efficiency and performance increases. This approach is part of a series of activities to help Siemens’ customers compete in a rapidly changing market – working to significantly reduce lead and construction times through standardization and modularization.
The new Siemens HL-class consists of three engines: SGT5-9000HL, SGT6-9000HL and SGT5-8000HL. In simple-cycle operation the air-cooled SGT-9000HL gas turbine will provide a capacity of 545 megawatts (MW) for the 50-Hertz market and 374 MW in the 60-Hertz version. SGT5-8000HL will provide 453 MW in simple-cycle operation. All engines reach more than 63 percent combined cycle efficiency.

To achieve top performance, the turbines operate at high combustion temperatures. For this purpose, Siemens’ specialists have developed advanced combustion technologies, innovative multi-layer coatings, super-efficient internal cooling features as well as an optimized water-steam cycle. Furthermore, optimized sealings minimize cooling and air leakage. At the same time, evolutionary 3D-blading is enabling higher aero-efficiency for the compressor. Predefined and prefabricated solution elements as well as pre-selected vendors and products allow a significantly reduced construction time and a fast start for projects. The turbines are designed to plug in to Siemens’ digital offering for plant operators and utilities alike, incorporating connectivity to MindSphere, the cloud-based Siemens operating system for the Internet of Things. MindSphere offers access to powerful analytics from Siemens and its partners – using intuitive insights in engine operation and decision support to deliver benefits to customers.

“Driven by digitalization, speed in technology development is rapidly gaining momentum in the power generation arena," said Willi Meixner, CEO of the Siemens Power and Gas Division. “It took us 10 years from 2000 to 2010 to increase the efficiency of our combined cycle power plants from 58 to 60 percent, a further six years to reach 61.5 percent in 2016 and now we are taking the next step to 63 percent and beyond. That’s amazing. But we know that speed and efficiency alone are not sufficient – reliability and cost effectiveness of our solutions as well as partnership, support in financing and insurability are also key to our customers,” said Meixner.

To minimize customer risk, Siemens is following an extensive and thorough validation and testing approach. After component testing and prototype testing in Siemens-owned facilities, the company is now pursuing validation under real field conditions. “With the new HL-class our customers will be prepared for whatever digitalization brings in the future,” Meixner added.
“Worldwide we see renewables are growing rapidly, but gas-fired power plants will still play a vital role in the energy mix for the next decades,” said Meixner. “With the growing share of fluctuation power from renewables, flexibility will be a key feature of gas turbines. Our HL-class offers a simple-cycle ramp-up of 85 MW per minute. Therefore, highly efficient and flexible gas turbines like our HL-class are the perfect fit to energy systems with a rapidly increasing share of fluctuating renewables,” said Meixner.

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