GE Introduces Digital Power Plant for Steam to Enhance Efficiency and Reduce Emissions of Coal-Fired Plants
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- *With coal set to remain the world's second largest energy source through 2030, GE's leading steam technology and digital capabilities will be critical to achieving global greenhouse gas reduction targets set out at COP21*
- *Digital Power Plant software interprets data from more than 10,000 sensors to improve coal-fired steam power plant performance and increases efficiency up to 1.5 percentage points, allows for 5% less unplanned downtime and 3% lower CO2 emissions*
- *Every point of efficiency lowers CO2 emissions by two percentage points and can reduce fuel consumption by 67,000 tons of coal per year with the same MW of output*
- *GE combines physical strengths of legacy Alstom steam technology with GE's industry-leading digital capabilities to deliver better performance, greater efficiencies and improved reliability*

Today at GE's Minds + Machines event in Paris, GE Power (NYSE: GE) unveiled the Digital Power Plant for Steam, a suite of technologies that can dramatically reduce greenhouse gas emissions by improving the performance and efficiency of coal-fired steam power plants.

Improving the efficiency of coal-fired plants is one of the toughest challenges in the electricity industry today. Plant technology is typically more mature (50% of active plants in Europe are more than 25 years old), systems are highly complex and average efficiency rates are low.

"The world is going to need 50% more power in the next 20 years and it will need to be affordable, accessible, reliable and sustainable," said Steve Bolze, GE Power president & CEO. "In order to meet these needs and achieve the Paris COP21 goals, companies must embrace digital technologies that can enable and accelerate transformation to help decarbonize the world. Together, with our customers, we're on a journey to realize the true power of leveraging software and analytics to provide comprehensive digital solutions that drive greater efficiencies that are environmentally compatible."

By monitoring and analyzing data from more than 10,000 sensor inputs across the plant, GE's Digital Power Plant for Steam helps plant operators make smarter decisions about how to optimally run their power plants, achieving better performance, greater efficiency and improved reliability while lowering environmental impact. This solution helps eliminate 0.58 Gigatonnes of greenhouse gas emissions—equivalent of removing 120 million cars from the road and adding 550 million square miles of forest absorbing CO2 from the atmosphere and switching 20 billion incandescent bulbs to LED.

Coal is forecasted to remain the world's second largest energy source through 2030, and an even more critical source of electricity in developing economies such as India, China, the Middle East and Africa. The ability of nations to meet emissions goals set out in the Paris COP21 agreement, while meeting growing demand for electricity, will depend on the ability of fossil fuel-powered plants such as coal to deliver power more flexibly, responsively and cleanly.

"In a post COP21 world, we believe the best results will come from balancing a mix of fuel sources and creating maximum efficiency through the power of digital," said Andreas Lusch, president and CEO of GE's Steam Power Systems. "By combining the physical strengths of our legacy Alstom steam technologies with GE's industry-leading digital capabilities, we can help our customers enhance the operating performance of their power plants to increase efficiency, lower emissions and reduce cost."

Today, GE Power released new Digital Power Plant software designed to play a significant role in helping nations meet COP21 greenhouse gas emissions goals. The software will help European power customers such as Yildirim Energy improve the efficiency and reduce emissions from coal-powered steam plants. Coal plants generate 40% of the world's electricity. GE Power's new software can reduce CO2 emissions from those plants by 3%. With GE's advanced controls and cyber security software, the Digital Power Plant for Steam interprets data drawn from sensors across the power plant, highlights key factors that may affect performance (such as fuel quality, plant aging and ambient conditions) and takes appropriate action through

a closed loop control system. GE Power's new software can reduce CO2 emissions from those plants by 3% and reduce fuel consumption by 67,000 tons of coal per year with the same MW of output based on a 1,000 MW power plant.

Real-time monitoring of these factors is especially important when steam plants are operating in grid demand mode, requiring them to ramp-up generation faster and more often than they were originally designed to do. Without effective monitoring and control of key plant processes, fuel consumption is inefficient, emissions increase, and equipment life may be impacted.

"The only way we can do both is by applying data science and intelligent software-defined automation to every aspect of the electricity value chain, from generation to delivery and consumption," said Ganesh Bell, Chief Digital Officer, GE Power. "Today's announcement marks another big step on that journey."

For example, Digital Power Plant software monitors and seeks to optimize the mix of fuel and air in the combustion process, which is critical to both output and emissions. Too much fuel in the mix may lead to higher emissions. Too little air may lead to ineffective combustion and output.

GE's Digital Power Plant software can enhance the performance and reduce emissions of almost all steam plants – including non-GE and legacy Alstom plants - commissioned in the past 25 years.

News in Detail

Today, GE announced the following new Digital Power Plant software applications and capabilities, operating on Predix:

- **Asset Performance Management for the Digital Steam Plant -** An application which continuously monitors steam plant equipment health, enabling operations teams to make decisions that enhance plant performance, reduce unplanned downtime and extend plant life with minimal capital investment.
- **Operations Optimization for the Digital Steam Plant -** An application which provides customers with plant and fleet-wide visibility of the impact of operational decisions on efficiency, emissions, capacity and production costs. Specific capabilities include:
    - **Boiler Optimization –** Boiler efficiency has the greatest impact on overall plant efficiency. GE's software improves boiler reliability and efficiency, and can reduce CO2 by 1-2% and NOx by 10-15% through integrated enhancement of the combustion and soot cleaning processes.
    - **Coal Analyser** – Enhances plant performance by tuning combustion and exhaust management processes based on coal properties such as moisture content. This can reduce fuel consumption by 4,400 tons of coal per year with the same MW of output in a single steam power plant.
    - **Plant Optimization**– A "digital twin" of the physical steam plant that is continuously monitored to identify gaps between actual and ideal performance relative to key performance indicators such as output or emissions. For example, tuning a plant to run one percent more efficiently can add $20 million in value over 10 years.
    - **Smart Start** – Reduces inefficiencies that occur on load change by helping the operator improve key parameters including speed to grid, impact to asset life and fuel consumption.
- **Business Optimization for the Digital Steam Plant** – An application which aggregates information such as fuel and power price, demand, and plant capacity – now including steam plants - to enable energy traders to make better buying and selling decisions.

Additional Resources:

- Press Release: GE Introduces Digital Power Plant for Gas Powered Plants
- Press Release: GE introduces Digital Wind Farm
- White Paper: Powering the Future - Leading the Digital Transformation of the Power Industry
- Web Site: GE Power's digital solutions

About GE:

GE (NYSE:GE) is the world's Digital Industrial Company, transforming industry with software-defined machines and solutions that are connected, responsive and predictive. GE is organized around a global exchange of knowledge, the "GE Store," through which each business shares and accesses the same technology, markets, structure and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry. www.ge.com

About GE Power:
GE Power is a world leader in power generation with deep domain expertise to help customers deliver electricity from a wide spectrum of fuel sources. We are transforming the electricity industry with the digital power plant, the world's largest and most efficient gas turbine, full balance of plant, upgrade and service solutions as well as our data-leveraging software. Our innovative technologies and digital offerings help make power more affordable, reliable, accessible and sustainable.

For more information, visit the company's website at www.gepower.com. Follow GE Power on Twitter @GE_Power and on LinkedIn at GE Power.

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