

# Kn3 Optimization Software

Kn3 is a software system that uses measured data-along with customer experience-to accurately model processes.

Kn3 uses these predictive models to:

- » Optimize and control operation
- » Identify anomalous behavior before it occurs

Kn3 can be used to reduce boiler emissions, as well as identify emission sensor faults to prevent exceedances.



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## The Environmental Challenge

Power plant operators are continuously constrained by multiple and sometimes competing operational objectives. A solution was needed to optimize multiple objectives simultaneously such as emissions, efficiency, and availability. By synchronizing multiple tasks plant operators will be able to run their operations smoothly, reducing cost to both themselves and their customers.

## GE's innovative solution

GE's innovative new Kn3 optimization software can help improve boiler efficiency and reduce combustion-related emissions simultaneously, while keeping availability high. Kn3 optimization software can also be used for anomaly detection, which further helps improve availability.

Kn3 optimization software has the flexibility to be applied in different ways to improve overall plant operation. Several examples of different applications include:

- » The Birchwood, gas- and oil-fired plant uses Kn3 to monitor the Continuous Emissions Monitor. At one point an anomaly in the NOx emissions measurement was found, caused by a leaking calibration gas. Because Kn3 was able to highlight the anomaly early, the CEMs could be repaired and the inaccurate readings replaced before being reported to the EPA, avoiding costly fines.
- » Kn3 optimization software is used at FirstEnergy's Sammis coal plant where it optimizes boiler operation while simultaneously decreasing heat at a rate of 1.2 percent and NOx emissions by 18 percent would produce annual benefits of over US\$ 1M for this 300-MW unit.

## Environmental Impact

Kn3 optimization software models the operation of any fossil-fired boiler and then provides settings to improve efficiency while reducing NOx, CO2, and CO. Kn3 optimization software reduces unforced outages and lost generation. By employing GE's Kn3 optimization software, a 300-MW coal-fired power plant operating 8,000 hours per year and emitting 0.45 lb NOx/MBtu could reduce NOx emissions by as much as 20 percent, or an amount equal to removing approximately 241,000 cars from US roads for a year.

## Cutting costs

To operate a boiler at its maximum efficiency while minimizing emissions requires balancing operation. Kn3 optimization software provides the tools to model and predict boiler operation and then optimize settings in a closed or open loop environment. An 800-MW gas-fired plant operating 8,000 hours per year can improve energy efficiency and reduce fuel costs by approximately 1 percent, or more than \$4.5 million, with GE's Kn3 optimization software.

