



How to improve boiler operations and emissions



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Challenges coal plants face with boiler operations

01 Efficiency

02 Operator inconsistencies

03 Steam temp alignment as load changes

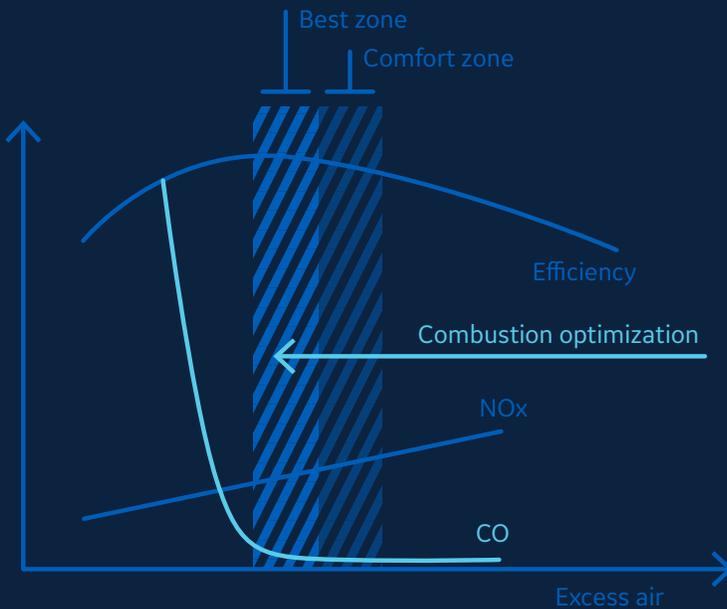
04 Changing coal quality and conditions

05 Soot blowing optimization

06 NOx requirements

Opportunities for process and productivity improvement begin by leveraging machine and sensor data, analytics and optimization technologies across the total plant. Now coal operators can address these challenges with GE Digital's BoilerOpt solution.

Going from the comfort zone to the best zone



Improve heat rate by:

- Leveraging a total plant heat balance analysis and advising operators on gaps in real time.
- Monitoring factors that affect flame stability such as CO and O₂.
- Monitoring cleanliness factors within the boiler to determine which boiler tube surfaces need cleaning and when to clean. This improves steam temperatures.
- Understanding the combustion properties of the fuel and biasing set-points accordingly.

Real results with GE Digital operations

EFFICIENCY

Up to **1%**
reduction in heat rate and CO₂

AVAILABILITY

~ **1%**
improvement*

EMISSIONS

Up to **15%**
reduction in NO_x with CO control

Up to **30%**
reduction in soot blowing

*Together with GE Asset Performance Management

Improve plant availability and reduce the risk of unplanned outages by:

- Cleaning boiler surfaces only when they are dirty and reducing the likelihood of boiler tube failures.
- Monitoring the cleanliness of the boiler tube surfaces in the various zones of the boiler and activating the best soot-cleaning device only in areas that are not optimally clean.
- Adjusting for fuel changes in pulverizers and the boiler in real time to help reduce slagging and improve combustion.
- Avoiding over or under cleaning boiler surfaces to balance the unit's need to reduce boiler tube erosion and thermal stress against improving steam temperatures, minimizing sprays and avoiding fouling, plugging, and slagging events.
- Achieving steam temperature alignment as load changes.

BoilerOpt

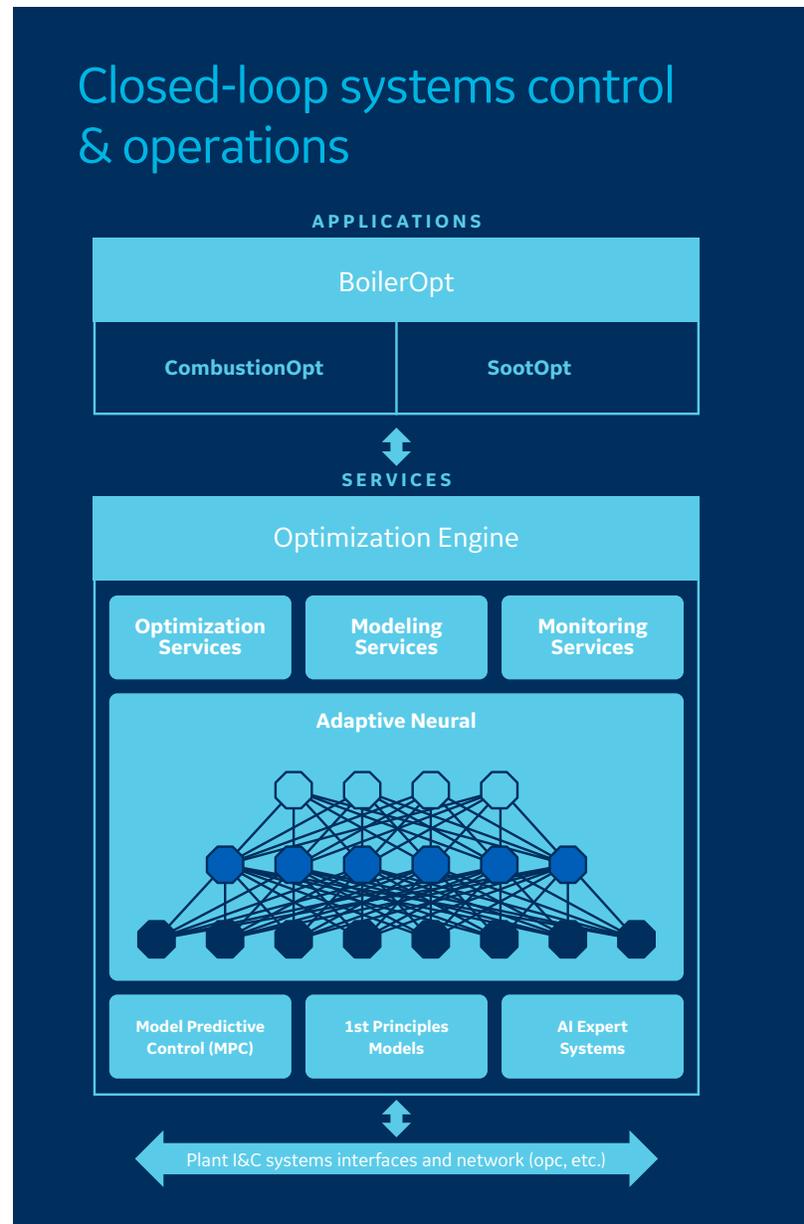
- A closed-loop optimizer layered on top of your control system to maximize benefits in heat rate, CO₂, NO_x, and other emissions. Uses CombustionOpt and SootOpt simultaneously to achieve these outcomes.
- Builds custom AI/ML models for your boiler using live sensor data, and leverages these models to optimize boiler operations by fine-tuning key control loops in real time.
- Full visibility to these subtle fine-tune changes is available to control operators and management staff through BoilerOpt Dashboards.
- The combination of CombustionOpt and SootOpt together improve boiler efficiencies and steam temperatures while also reducing NO_x.

CombustionOpt

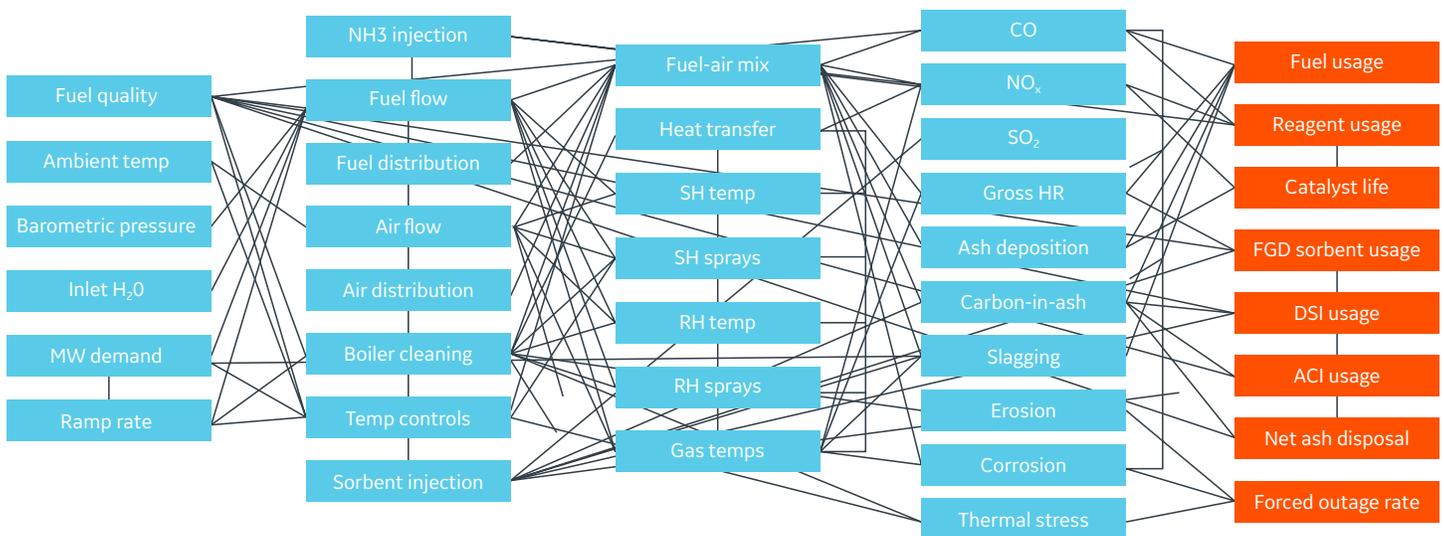
- Focuses on control loops that affect fuel/air distribution and steam temperature performance, such as fuel and airflow loops, overfire air, and burner tilts. Complex objectives that optimize the tradeoffs between boiler efficiency, NO_x reductions, Steam Temperature targets, and other competing goals are optimized in real time to provide outcomes faster and more consistently than is possible by control room operators.

SootOpt

- Focuses on activating individual soot blowers only when needed. This is done by responding to key process variables – such as Main Steam Temperature – in real time, while simultaneously leveraging cleanliness calculations to ensure that already clean surfaces are not subject to overblowing. This helps reduce boiler tube erosion and unanticipated outages. SootOpt can also help maintain steam temperatures as load changes occur.



Multiple variables impacting boiler optimization



By making improvements from the fuel supply, within the boiler, and across the balance of plant, there is potential to incrementally impact efficiency, flexibility, availability, and emissions.

Given the number of variables at play in a typical coal-fired steam plant, it would take a team of data scientists and skilled operators to handle the complexity. With advanced analytics, machine learning and the experience of multiple installations across various coal environments, you gain the benefit of BoilerOpt digital solution immediately. Every decision made in the plant comes with a trade-off. Improving efficiency impacts emissions, flexibility and outage plans. By leveraging BoilerOpt to understand the many variables and their dependencies, process states, performance impacts and costs, plant operators can reduce the intricacies required to optimize the coal burning process in real time, saving precious staff time, operations costs, and overall profit margins.

Meet NOx reduction requirements

Reduce emissions by:

- Biasing Digital Control Systems set-points to adjust dampers, burner tilts, pulverizer settings, over-fire air and other controllable parameters to lower NOx emissions.
- Analyzing and improving the operation of the Environmental Control System under variable loads to reduce emissions.

Real world successes

Operations Optimization is a proven technology, deployed at over 50 sites across the globe. To achieve desired outcomes, the solution models process behavior using mathematical relationships to accurately predict boiler processes and the impact across the balance of plant with the ability to make adjustments quickly in a closed-loop to improve production, reduce heat rate and increase operating margin.

Real results from multi-unit plant

Challenge: With the rise in renewables, CENAL's Karabiga is essential to provide stable power to prevent shortages with as little emissions as possible.

Solution: Adopting a technology that improves operational inconsistencies to help improve plant performance and efficiencies.

"General Electric (GE) provided both the technology and expertise required to meet strict emissions guidelines while remaining profitable."

İhsan Acar - Power Plant Manager

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RESULTS

\$700K+

Annual fuel savings

15%

Reduction in NOx emissions

1,320MW

Plan powered by 2 GE Ultra Super Critical Boilers and 2 GE Steam Units



Start improving your coal plant operations today

Contact your GE representative today to receive a comprehensive overview of how GE BoilerOpt solution can contribute to a more efficient operation and a competitive advantage in a changing market.

About GE

GE Digital transforms how our customers solve their toughest challenges by putting industrial data to work. Our mission is to bring simplicity, speed, and scale to digital transformation activities, with industrial software that delivers breakthrough business outcomes. GE Digital's product portfolio – including grid optimization and analytics, asset and operations performance management, and manufacturing operations and automation – helps industrial companies in the utility, power generation, oil & gas, aviation, and manufacturing sectors change the way industry works. For more information, visit [ge.com/digital](https://www.ge.com/digital).

Learn more about BoilerOpt.
Schedule a call today.

GET STARTED