

Coal's Revival: From Maintenance Mode to Market Necessity

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A Surprising Comeback

For more than a decade, the U.S. coal industry has been in decline — with waning investment, shrinking capacity and the steady rise of gas and renewables. Yet in 2025, a different story is emerging. Across the country, coal units once scheduled for quiet retirement are being called back into service in ways few anticipated, driven not by nostalgia but by a new kind of demand shock: the rise of AI, data centers and industrial reshoring.

Massive, round-the-clock power needs from AI and cloud computing, along with “Made in America” manufacturing growth, have led to a capacity crunch that renewables and gas alone can't satisfy. Momentarily eased policy pressures have allowed coal plants a second act — one defined not on expansion, but on efficiency, reliability and return on investment.

From Survival to Selective Modernization

Over the past decade, most coal plants operated in “maintenance-only mode.” With low wholesale prices and high regulatory uncertainty, investment was deferred. Units slipped into lower efficiency levels, and chronic slagging and fouling became routine.

Now, utilities are being asked to do more, operate more efficiently and run cleaner without significant capital upgrades. This has pushed operators to focus on selective modernization, especially in areas that provide immediate, measurable benefits.

Reclaiming Lost Megawatts Through Chemistry

One of the most effective tools transforming coal economics is fuel chemistry optimization — led by Environmental Energy Services (EES) and its *CoalTreat™* additive program. These pre-combustion reagents chemically alter coal ash behavior before it reaches the furnace, raising fusion temperatures, decreasing fouling and freeing up lost megawatts.

In one 750 MW tangential-fired boiler, *CoalTreat™* eliminated reheater-section slagging that had previously caused derates. The unit increased output by 3% and lowered NO_x emissions by 0.02 lb/MMBtu.

Another 650 MW plant firing high-slag Illinois Basin and Northern Appalachian blends operated five consecutive days at full load — a feat once impossible — after treatment. Infrared boiler cameras confirmed clean pendant and nose-arch surfaces throughout the run.

The economic benefits are equally impressive. Switching from premium Central Appalachian to Illinois Basin fuel saved plants \$40 per ton while keeping output and compliance intact. At another location, reducing slagging lowered furnace exit-gas temperatures by 100°F, which improved heat rate by 2.5% and increased net annual revenue by \$2.5 million.

Inside the Process: How Additives Transform Ash

Slag formation begins when mineral impurities in coal — such as silicates, iron, sodium and potassium — melt during combustion, creating low-melting glassy deposits that stick to tube surfaces.

CoalTreat™ works by introducing specially designed chemical compounds before combustion. These additives change ash chemistry, promoting the formation of high-melting crystalline structures like anorthite and hematite instead of sticky amorphous glass.

The result:

- Deposits become friable and are easily removed by soot-blowing;
- Ash fusion temperatures increase by 150–200°F; and
- Forced outages and heat transfer losses decrease.

Verification is achieved through high-temperature probes that simulate tube-surface conditions. Probe data consistently show less slag adhesion and fewer “black glass” layers, confirming the chemistry's effectiveness in actual operating conditions.

Fuel Flexibility: The Competitive Edge

With additive-assisted combustion, utilities can confidently burn lower cost,

higher slagging coals without sacrificing performance. This capability to switch between fuel sources offers a hedge against volatile supply and prices and provides a strategic advantage as dispatch needs evolve with AI-driven baseload growth.

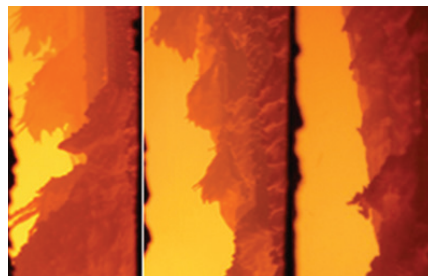
EES' latest *CoalTreat On Demand Systems (ODS)* are portable, intelligent treatment systems available for rapid deployment. Reagent dosages and blends are tailored to varying coal types and are capable of automatic control. ODS systems can be used for continuous applications to control persistent slagging or intermittent applications where particular coal blends/seams or operating conditions cause periodic issues.

As AI and reshoring drive unprecedented electricity demand, the existing coal fleet remains essential for system stability. For utility stakeholders, the message is practical: Invest selectively, measure diligently and optimize the assets you already have. Every avoided derate, every efficiency improvement and every ton of fuel flexibility counts in this high-demand environment.

The Takeaway

In the age of AI, coal isn't finished yet. By embracing targeted innovation and smarter fuel chemistry, operators demonstrate that legacy assets can adapt — delivering cleaner, more reliable and cost-effective power when the grid needs it most.

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Progression of pendant slagging under baseline conditions and after four and eight days of treatment. The reductions in slag accumulation are clearly present, highlighting the effectiveness of the additive treatment.



CoalTreat's impact on furnace slagging can be seen as waterwall and pendant slag shedding is observed within the first day of treatment. After a week of continuous treatment, the finer, friable consistency of treated bottom ash is observed.