Modernizing the Merom Coal-Fired Power Station

One Presentation Spanning Two Independent Phase I Awards

Hallador Power Company, LLC · Merom Generating Station · Sullivan County, Indiana

Two Independent Phase I Awards — DE-FE0032738 (Dual-Firing, Unit 1) & DE-FE0032742 (Co-Firing, Unit 2)

Stabilize and Optimize Coal Power: Program Portfolio Kick-off Meeting — Session 6: Fuel Flexibility
NETL, Morgantown, WV · Wed, Oct 7, 2026, 1:45–3:30 PM

J. Scott McGuire — Vice President of Engineering and Principal Investigator, Hallador Power Company

This presentation is based upon work supported by the Department of Energy under Award Numbers DE-FE0032738 and DE-FE0032742.

CONTEXT FOR BOTH PROJECTS

Plant History

1978
Boiler design contracts signed with Riley Stoker (now Babcock Power)

1982–83
Units 1 & 2 commissioned for Hoosier Energy Rural Electric Cooperative

2020
Hoosier Energy announces plan to retire Merom by 2023

Oct 2022
Hallador Power Company, LLC acquires Merom, preserving jobs and continued operation

Today
Two independent Phase I awards pursue modernization rather than retirement

Why This Matters

Merom was slated for retirement in 2023. Hallador Power's acquisition — and the two independent Phase I awards that follow, one per unit — represent a deliberate pivot: extending both units' reliable, cost-effective role in the MISO grid through fuel flexibility rather than retiring the plant as originally planned.

Project Background

Plant Profile

1,080 MW nameplate, combined — 540 MW per unit; approximately 980 MW net summer capacity. In commercial operation since 1982–1983 (~43–44 years); a critical MISO-region baseload generator.

Fuel & Firing

Bituminous coal, pulverized by 3 Riley Ball Tube Mills/unit; Riley Turbo Dry Bottom Furnace, front-wall-fired.

Steam Generator

Subcritical drum-type, split-backpass. Main steam: 3,900,000 lb/hr @ 1005°F / 2,630 psi.

Existing Emissions Controls

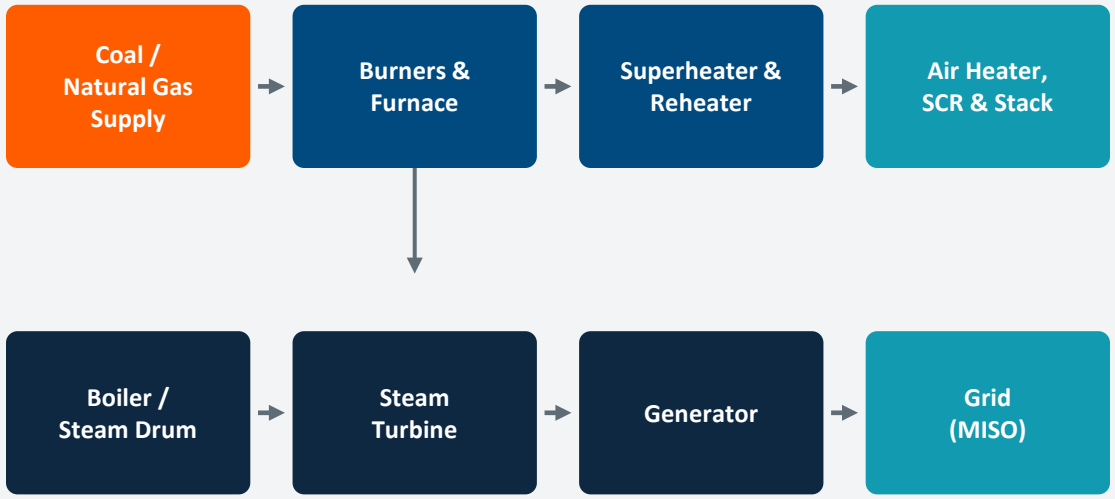
Selective Catalytic Reduction (SCR) for NOx, Electrostatic Precipitator (ESP) for particulate control, and a wet oxidation FGD system for SO2 control.

TWO INDEPENDENT RETROFIT AWARDS

Unit 1 → Dual-Firing (DE-FE0032738)

Unit 2 → Co-Firing (DE-FE0032742)

SIMPLIFIED PLANT PROCESS FLOW



Illustrative process flow — not to scale; simplified for presentation purposes.

UNIT 1 · DUAL-FIRING

Project Overview — Dual-Firing (Unit 1)

Project Location

Merom Generating Station, Unit 1 — Sullivan, Indiana (Southwest Indiana), within the MISO grid footprint.

Project Goal

Enable Unit 1 to achieve reliable 0–100% natural gas dual-firing while preserving coal firing with oil ignition, integrating a transmission-level gas supply, and delivering a safe, code-compliant retrofit that improves flexibility, emissions performance, and grid support.

Project Performance Period

Phase I: 12 months total — approximately 9 months of technical work followed by a ~3-month DOE downselect period before advancing to Phase II.

Funding Summary

Federal Share: $399,268 | Recipient Cost Share: $100,000 (20%) | Total Project Value: $499,268.

Key Project Participants

Hallador Power Company, LLC (Recipient); Babcock Power Services (engineering contractor); U.S. DOE / NETL (Federal sponsor).

UNIT 1 · DUAL-FIRING

Technical Approach — Dual-Firing

Objective

Enable Unit 1 to fire coal and/or natural gas across each mill-and-burner set, gas flow will be controlled on a Unit-Based heat input / flow control basis, with the burner/mill groups firing gas will NOT be simultaneously capable of firing coal. This lets the unit range from 100% coal to 100% natural gas while fully preserving existing coal-firing capability.

Burner & Ignition Retrofit

Field-proven, utility-scale low-NOx center gas gun burners with patented direct-spark ignition — eliminating separate gas igniters, simplifying Burner Management System (BMS) logic, and lowering O&M costs.

Controls Integration

Fully integrated with Unit 1's Distributed Control System (DCS) to deliver rapid, automatically controlled fuel-switching between coal and natural gas.

CCUS Conceptual Design

A post-combustion CCUS conceptual design sized to process the entire plant's flue gas streams (both units) — a deliverable unique to this award.

DESIGN BASIS & SUCCESS METRICS

Phase I Targets

- 0–100% coal-to-gas range confirmed in design, achieved by selecting the fuel per mill/burner sets — Unit 1 reaches 100% of its original MCR steam flow on either fuel.
- Full NG-only operation is tuned to a lower ~10% excess-air design point (vs. ~20% for coal) — the study found this measurably reduces NOx relative to coal-only firing.
- 50% final design completed, sufficient for construction bidding invitations for Phase II.
- Preliminary BCA and EIV both delivered with the Phase II application.
- Full-plant CCUS conceptual design delivered under this award only (DE-FE0032738) — not duplicated under the companion Co-Firing award.

UNIT 1 · DUAL-FIRING

Execution Plan & Schedule — Dual-Firing

Phase I: ~9 months technical work + ~3 months DOE downselect (per NOFO 3606, Part 1)

1.0 Project Management & Planning

Direct the project to a Project Management Plan; quarterly risk reporting.

2.0 Engineering & Design for Bids

Pre-FEED study and 50% design-for-bid packages for the on-site NG addition.

3.0 Teaming Analysis

Secure Phase II commitment letters and cost share; baseline BABA / Davis-Bacon plans.

4.0 Compliance Planning & Submission

Permitting matrix and Environmental Information Volume (EIV) for Phase II NEPA.

5.0 Business Case Analysis

Preliminary BCA: operating costs/revenues, cash flows, EBITDA, tax credits, ROI.

6.0 CCUS Conceptual Design

Full-plant post-combustion CCUS conceptual design, sized to entire flue gas stream.

UNIT 1 · DUAL-FIRING

Intended Impact & Risk Management

INTENDED IMPACT

- Critical near-term resource adequacy, operational flexibility, and fuel-arbitrage benefits.
- Near-term emissions reductions from fuel switching to natural gas.
- Preserves high-wage O&M jobs in southwest Indiana; BABA-compliant sourcing supports domestic manufacturing.
- Reliable, lower-emissions capacity for the MISO grid, including high-growth data-center loads.
- Investigates a potential pathway toward future decarbonization via CCUS.

KEY RISKS & MITIGATIONS

Technical: At minimum NG-only load, the SCR/air-heater gas-inlet temperature is predicted at ~530°F — colder than typical reliable SCR thresholds.
Mitigation: Confirm minimum reliable SCR operating temperature with the catalyst manufacturer before finalizing min-load limits.

Schedule: Aligning design freeze with Phase II procurement and outage milestones.
Mitigation: Baseline schedule, milestone log, and risk register tracked under the PMP.

Budgetary: Securing Phase II/III cost-share commitments.
Mitigation: Phase II team commitment letters secured under Task 3.0 (Teaming Analysis).

Environmental: NEPA / permitting timeline risk.
Mitigation: EIV prepared and submitted with the Phase II Application to initiate NEPA early.

UNIT 2 · CO-FIRING

Project Overview — Co-Firing (Unit 2)

Project Location

Merom Generating Station, Unit 2 — Sullivan, Indiana (Southwest Indiana), within the MISO grid footprint.

Project Goal

Enable Unit 2 to achieve natural gas co-firing while preserving coal firing with oil ignition, integrating a transmission-level gas supply, and delivering a safe, code-compliant retrofit — developing an optimal co-firing level and system design that maximizes gas co-firing capability without requiring major redesign of the boiler steam/superheat/reheat system.

Project Performance Period

Phase I: 12 months total — approximately 9 months of technical work followed by a ~3-month DOE downselect period before advancing to Phase II. Tracked independently of the companion award.

Funding Summary

Federal Share: $302,684 | Recipient Cost Share: $75,684 (20%) | Total Project Value: $378,368.

Key Project Participants

Hallador Power Company, LLC (Recipient); Babcock Power Services (engineering contractor); U.S. DOE / NETL (Federal sponsor); coordinated with, but independent from, the companion Dual-Firing award (DE-FE0032738).

Technical Approach — Co-Firing

Objective

Enable Unit 2's burners to fire coal and natural gas simultaneously within each mill-associated burner group — fuel flow control will be separately metered to each mill group of burners, allowing for simultaneous firing of gas and coal in the same burner groups — without requiring major redesign of the boiler steam/superheat/reheat system.

Burner & Fuel Train

Center gas nozzles with patented direct-spark ignition, paired with a fuel train split into three independently flow-controlled circuits — one per mill-associated burner group — enabling simultaneous coal and gas combustion within each group, with more operational flexibility and redundancy than a mutually-exclusive design.

Preserves Coal Firing

Existing coal-firing capability is fully preserved, with oil ignition retained, delivering a safe, modern, code-compliant retrofit.

Scope Boundary

Builds only on the incremental engineering unique to Unit 2 co-firing; no duplication of work performed under the companion Dual-Firing award (DE-FE0032738).

DESIGN BASIS & SUCCESS METRICS

Phase I Targets

- Determine the availability of space, as this option requires significantly more piping in an already crowded burner deck but will provide optimal co-firing level determination and flexibility for Unit 2.
- 50% design-for-bid packages completed, sufficient for construction bidding invitations for Phase II.
- Co-firing is tuned to the same ~20% excess-air point already used for coal — a higher air-flow condition than the companion Dual-Firing award's ~10% NG-only setpoint.
- 20–50% reduction in SOx, NOx, mercury, and CO2 vs. the coal-only baseline.
- Retrofit material costs held to approximately $50/kW, with the design targeting maintained boiler reliability and operational flexibility as stated in the project's Phase I objectives.
- CCUS: full-plant design delivered under the companion Dual-Firing award; this award contributes only the incremental co-firing CO2-reduction quantification.

UNIT 2 · CO-FIRING

Execution Plan & Schedule — Co-Firing

Phase I: ~9 months technical work + ~3 months DOE downselect (per NOFO 3606, Part 1) — tracked independently of the companion award

1.0 Project Management & Planning

Independent PMP for this award; quarterly risk reporting specific to Unit 2.

2.0 Engineering & Design (Incremental)

Additional design work, beyond DE-FE0032738, to develop 50% design-for-bid packages optimizing the Unit 2 co-firing level.

3.0 Teaming Analysis (Incremental)

Additional teaming/formation specific to the Unit 2 co-firing conversion.

4.0 Compliance Planning (Incremental)

Additional emissions modeling and permitting content specific to Unit 2.

5.0 Business Case Analysis

Preliminary BCA focused on the Unit 2 co-firing conversion economics.

6.0 CCUS (Incremental Only)

Co-firing-specific CO2 reduction quantification; full design completed under DE-FE0032738.

UNIT 2 · CO-FIRING

Intended Impact & Risk Management

INTENDED IMPACT

- A highly dispatchable, flexible power supply to meet MISO regional load growth and emerging large utility demands.
- A 20–50% reduction in SOx, NOx, mercury, and CO2 emissions vs. the coal-only baseline.
- Preserves high-wage O&M jobs in rural Sullivan County, Indiana.
- Measurable environmental and economic benefits to local cooperative and municipal utilities.
- Favorable generation economics from a retrofit cost target of approximately $50/kW.

KEY RISKS & MITIGATIONS

Technical: At the ~20% excess air needed for co-firing, studies found NOx trending above coal-only levels — the opposite trend from the Dual-Firing award's lower-excess-air point.
Mitigation: Further burner tuning capabilities and mill/burner configuration analysis planned for Phase 2 to manage & distribute air flow within the co-firing operating envelope.

Schedule: Coordinating with, but not duplicating, the companion Dual-Firing award's timeline.
Mitigation: Independently tracked PMP and milestones with a clearly defined scope boundary (Unit 2 only).

Budgetary: Securing Unit 2-specific Phase II/III cost-share commitments.
Mitigation: Dedicated teaming analysis conducted under Task 3.0, specific to this award.

Environmental: Incremental emissions modeling required for Unit 2 co-firing rates.
Mitigation: Supplemental EIV content submitted with this award's Phase II Application.

Thank You

Questions will be addressed in the panel Q&A session following all presentations in this group.

ACKNOWLEDGMENT

This presentation is based upon work supported by the Department of Energy under Award Numbers DE-FE0032738 (Dual-Firing, Unit 1) and DE-FE0032742 (Co-Firing, Unit 2).

DISCLAIMER

This portion of the presentation was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

J. Scott McGuire — Vice President of Engineering and Principal Investigator, Hallador Power Company | jsmcguire@halladorenergy.com