



East Kentucky Power Cooperative (EKPC)

Evaluation & Mitigation of Natural Gas (NG) Co-firing Impacts on Flue Gas Desulfurization & Zero Liquid Discharge (ZLD) Process Operations and Performance at an Existing Coal-fired Power Plant (Award Number DE-FE0032740)

Department of Energy – Improving Efficiency, Reliability, and Flexibility of Coal-Based Power Plants

Notice of Funding Opportunity Number: DE-FOA-0003606

Topic Area 3: Development and Testing of Natural Gas Cofiring Systems



A Touchstone Energy Cooperative 

Project Overview

The primary objective is to determine the effects of natural gas retrofit on air pollution control devices and water systems (e.g., evaluate the impacts on mercury emission controls and the zero-liquid discharge process).

Background



EKPC received approval to retrofit coal-fired electric generating units to co-fire with NG (up to 50%). EKPC will add state-of-the-art NG burners to existing pulverized coal-fired boilers (Spurlock Units 1 and 2). Successful execution will optimize NG co-firing without requiring costly redesign. Detailed performance information from this project will provide technical information of the impacts of NG co-firing on combustion technologies and advance environmental control systems.

Project Goals

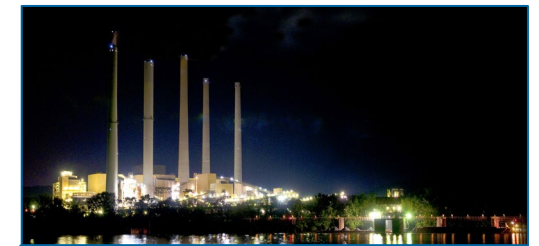


- Assess the effects of NG co-firing on air pollution control devices (e.g., SCR, ESP, WFGD, WESP)
- Evaluate impacts on mercury emission controls and the zero-liquid discharge process through data collection and analysis
- Conduct a conceptual post-combustion CCUS design for a feasibility analysis
- Share relevant findings to the public domain to improve environmental performance

Application Details



- **Prime Applicant:** East Kentucky Power Cooperative (EKPC)
- **Sub-Recipient:** University of Kentucky Research Foundation (UKRF)
- **Location:**



**Spurlock Station
Maysville, KY**



Project Overview (Cont'd)

The primary objective is to determine the effects of natural gas retrofit on air pollution control devices and water systems (e.g., evaluate the impacts on mercury emission controls and the zero-liquid discharge process).

Key Personnel



EKPC

Jerry Purvis, Business Point of Contact & Project Director

- Sr. Vice President, Environmental Affairs

Sean Alteri, Principal Investigator

- Sr. Environmental Engineer, Environmental Compliance

Tabitha DeBellis, Project Manager

- Environmental Engineer

EKPC Spurlock

Brandon Bettinger, Project Support

- Operations Manager

Logan Pickrell, Project Support

- Production Manager

John Allen, Project Engineer

- Environmental Engineer

UK

Dr. Jesse Thompson, Project Director

- Associate Director, University of Kentucky Institute for Decarbonization & Energy Advancement (UK IDEA)

Dr. Chin Ng, Principal Research Engineer

- UKy IDEA, Ph.D., Chemical Engineering

Dr. Jinwen Wang, Principal Research Engineer

- UKy IDEA, Ph.D., Chemical Engineering

Financials

		EKPC	UKRF	Total
Phase I	DOE Funds	\$200k	\$200k	\$400k
	Cost Share	\$100k	-	\$100k (20%)
Phase II	DOE Funds	\$2M	\$750k	\$2.75M
	Cost Share	\$2M	-	\$2M (42%)
Phase III	DOE Funds	\$5M	\$1M	\$6M
	Cost Share	\$8M	-	\$8M (57%)
Total	DOE Funds	\$7.2M	\$1.95M	\$9.15M
	Cost Share	\$10.1M	-	\$10.1M (52%)

Project Milestones (Phase I)

Task	Milestone Title/Description	Planned Completion Date	Verification Method
1	Project Management Plan	Update due 30 days after award.	Internal Review and Submittal to DOE
2	Team Composition	October 31, 2026	Internal Review, Communication, and Documentation
3	Spurlock's Unit 1 and 2 Historical Data Collection and Analysis	June 30, 2027	Data Packages segregated by calendar quarter
4	Air Permit Application Received	October 1, 2026	Agency Acknowledgement
5	WFGD Operation Parameter Verification and Confirmation	June 30, 2027	Peer Reviewed Verification
6	Pre-FEED Complete	June 30, 2027	Technical Report per SOPO Appendix D
7	EIV Completion	June 30, 2027	EIV and EHS risk assessment reports completed per SOPO Appendices B & F.
8	Preliminary Business Case Analysis Completed	April 30, 2027	Preliminary Business Case Analysis Report completed per SOPO Appendix E.
9	Phase I Topical Report Completed	May 31, 2027	Phase I Topical Report completed per SOPO Appendix A
10	CCUS Technology Down-Selection	December 31, 2026	Report evaluating commercially viable post-combustion CCUS configurations based on TRL, efficiency, and cost.
10	CCUS Conceptual Design Completed	February 28, 2027	CCUS conceptual design package per SOPO Task 10 guidance

Unit Summaries

Spurlock Unit 1

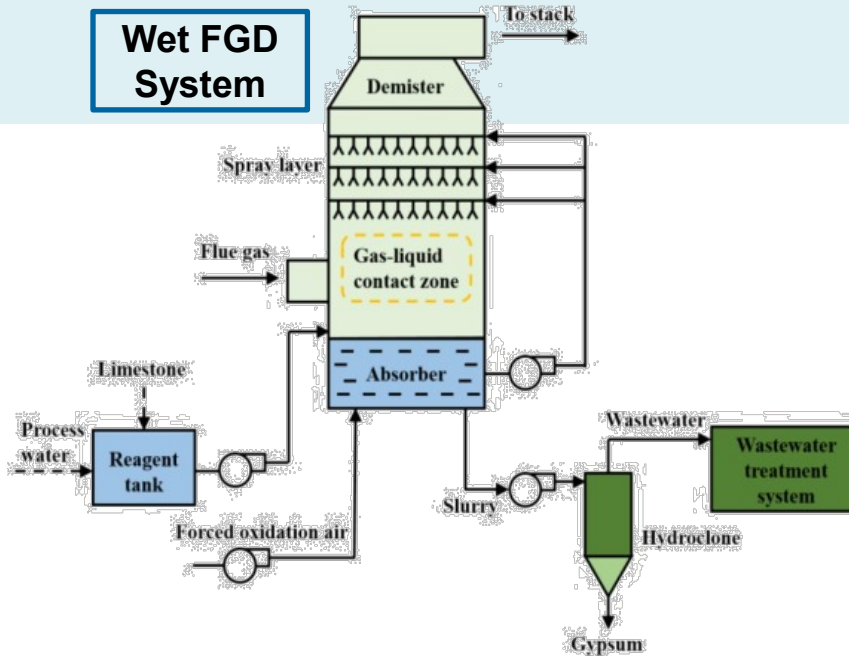
- **Nominal Gross Capacity:** 335 MW
- **Net Capacity:** 300 MW
- **COD:** 1977
- **Technology:** Pulverized Coal
- **Fuel Type:** Bituminous

Spurlock Unit 2

- **Nominal Gross Capacity:** 560 MW
- **Net Capacity:** 510 MW
- **COD:** 1981
- **Technology:** Pulverized Coal
- **Fuel Type:** Bituminous

Diagrams

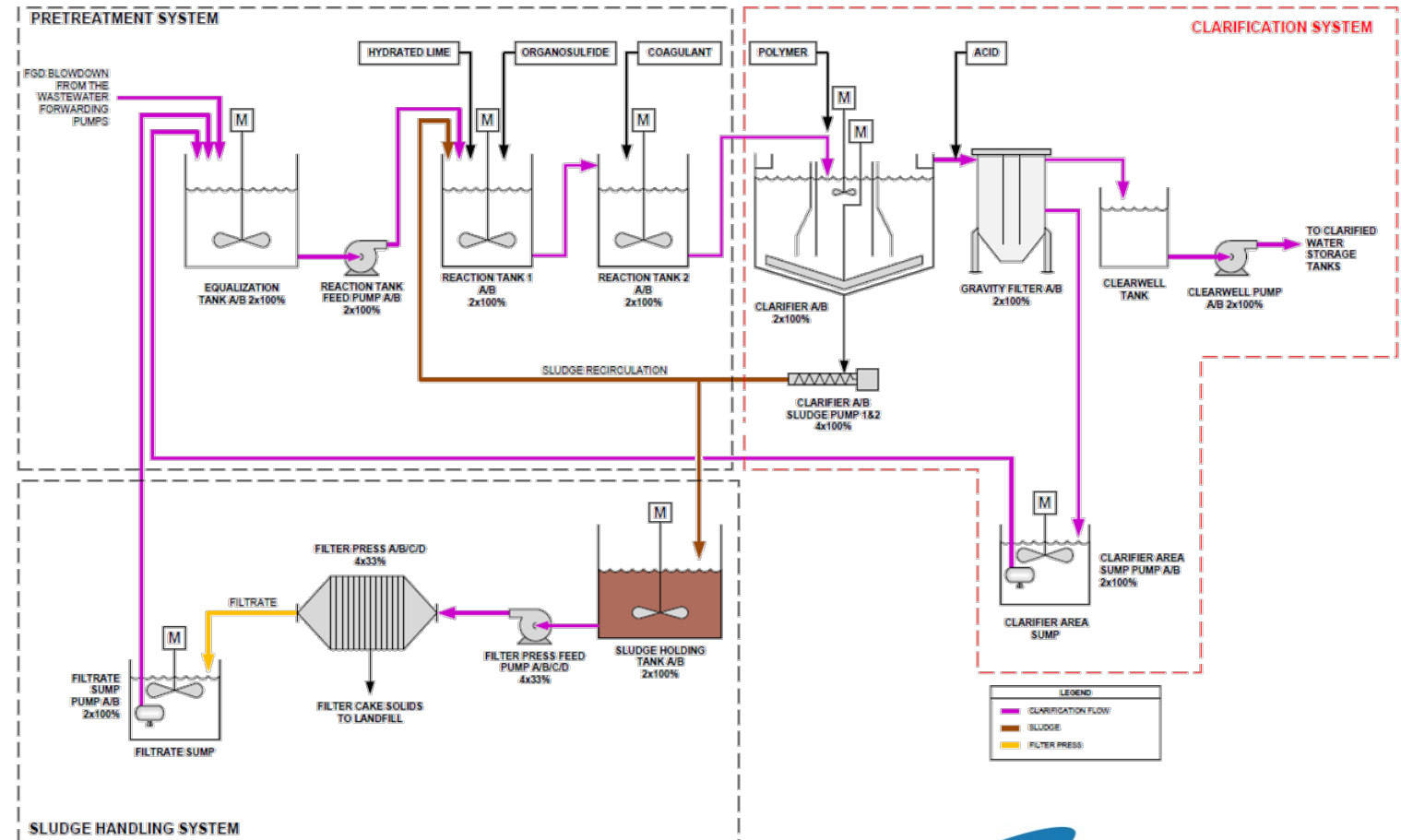
Wet FGD System



FGD Wastewater System

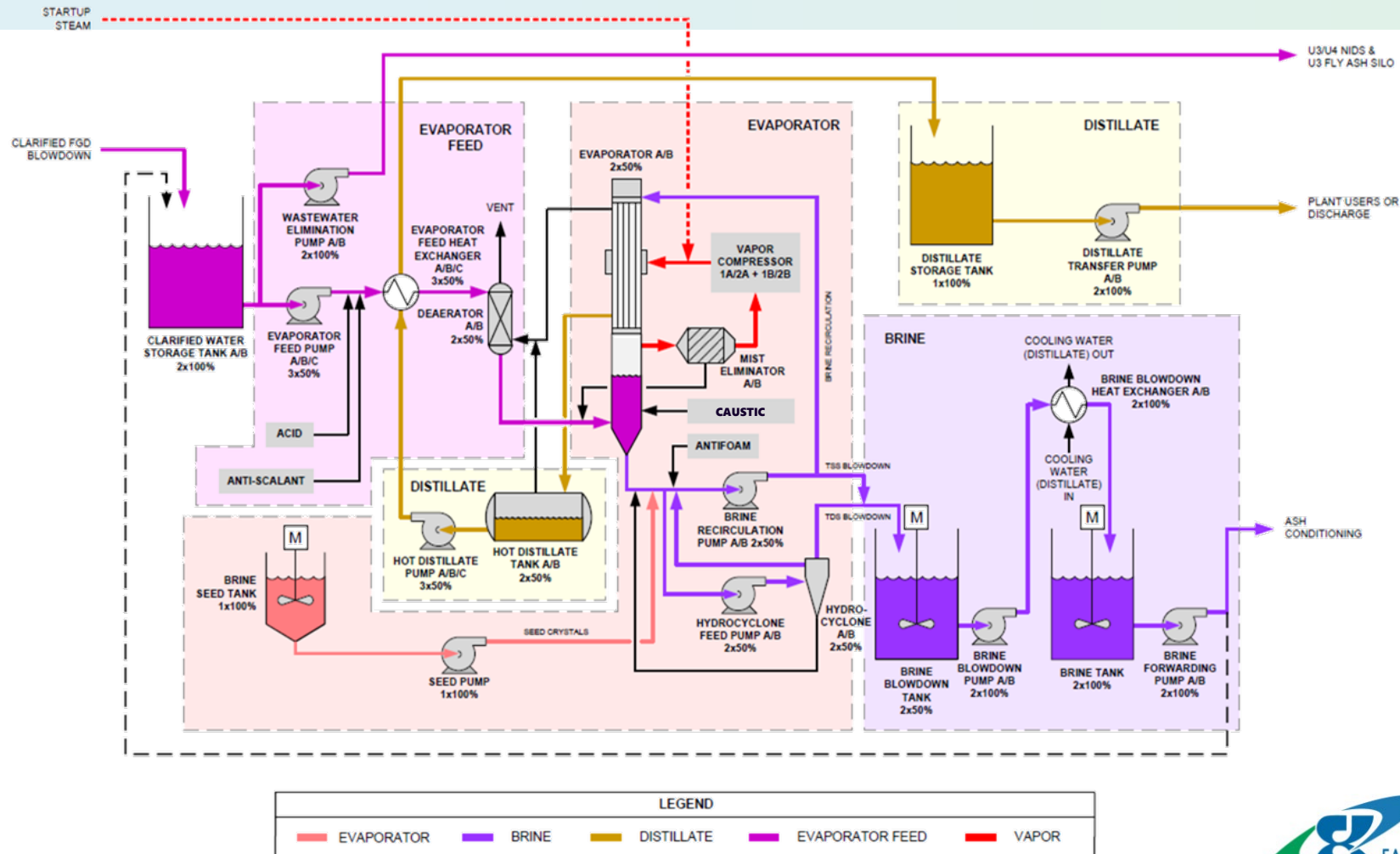


Wastewater System Equipment Flowpaths and System Groupings



Diagrams (Cont'd)

Thermal Evaporation System Flowpaths and Equipment Groupings



Risk Management Plan

Perceived Risk	Risk Rating (Low, Medium, High)			Mitigation Response Strategy
	Probability	Impact	Overall	
Financial Risks				
Subrecipient Insolvency	L	M	M	<ul style="list-style-type: none">Alternative subrecipients identified
Cost/Schedule Risks				
Project Cost Overrun	L	M	M	<ul style="list-style-type: none">Proactive identification of alternate suppliersProject team assistance with additional cost share provided by team
Project Schedule Overrun	L	M	M	<ul style="list-style-type: none">Proactive planning, no cost extension
Technical/Scope Risks				
Natural Gas Burner Performance Can't Match Project's Need	L	M	M	<ul style="list-style-type: none">Several other burner providers have expressed interest in partnering with EKPC on the NG co-firing retrofit
Heat Transfer Surface Distribution may not Match the Temperature Profile with NG Cofiring	L	M	M	<ul style="list-style-type: none">A computational fluid dynamics (CFD) model to verify/confirmTune the steam cycle parametersRearrange/modify the heat transfer surface
Late Design Changes by BOP Manufacturers	M	M	M	<ul style="list-style-type: none">Establish the all buy-in and open communication protocol with early alerts embedded.

Perceived Risk	Risk Rating (Low, Medium, High)			Mitigation Response Strategy
	Probability	Impact	Overall	
Management, Planning and Oversight Risks				
Subcontract Agreement Delay	L	M	M	<ul style="list-style-type: none">Dedicated UK IDEA staff identified
Communication Problems Among Parties Involved	L	M	M	<ul style="list-style-type: none">Careful coordination, routine meetings with entire project team
EH&S Risks				
Mercury and Regulated Air Pollutant Emissions Exceeds the Allowable Limits; Inability to Maintain ZLD Operations	L	M	M	<ul style="list-style-type: none">Revisit the SCR and WFGD chemistryAlternative chemical additives to WFGD to achieve new balance between oxidized and elemental species
External Factor Risks				
Pandemic Resurgence	L	M	M	<ul style="list-style-type: none">Proactive work planning with remote work, social distancing, and PPE
Natural Disaster	L	H	M	<ul style="list-style-type: none">Adjust project scope, schedule and budget as needed

Thank You

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