

Demonstration of Innovative Wastewater Treatment Solutions in Coal Power Plants and Address Reliability Emergency, to Uniquely Position for Data Centers (DISRUPT)

Award Number: DE-FE0032736

Prime Recipient: Baker Hughes Energy Transition LLC

Subrecipient: Penn State University

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Technical Solution and Innovation

Integrated Wastewater-to-Value Platform

Feed Streams

- Coal plant wastewater
- Sludge streams
- Plant operating data and coal characterization

Treatment Train

1. Sample characterization and analysis
2. Chemical coagulation/flocculation
3. Clarification and filtration
4. Smart monitoring and process control
5. Water reuse qualification
6. Metal recovery and product conversion

Key Innovations

- Multi-component treatment strategy versus single-target treatment
- Mobile skid-mounted deployment capability
- Digital monitoring and optimization
- Circular economy approach through metal recovery and water reuse

End Products

- Recycled water for data center cooling
- CCUS (utilization of captured carbon)
- Recoverable metal products (e.g., selenium compounds)

Execution Plan & Schedule

Phase I Work Plan

Task	Description
Task 1	Project Management and Planning
Task 2	Wastewater Treatment Technology for CFPPs
Task 3	Pre-FEED of Wastewater Treatment System
Task 4	CCUS Conceptual Design
Task 5	Business Case, Site Selection & Environmental Review
Task 6	Phase II Application Preparation

Key Technical Activities

Activity	Q1	Q2	Q3	Q4
Collect wastewater and coal samples from CFPPs	■	■		
Wastewater Characterization	■	■	■	
Bench-Scale Testing		■	■	
Technology Optimization		■	■	
Pre-FEED Development			■	■
Site Evaluations			■	■
Business Case Development				■
Phase II Proposal Preparation				■

Success Metrics and Expected Impact

Delivering Water, Energy and Environmental Benefits

Technical Targets

- 60–80% contaminant removal efficiency
- 60% compliance improvement relative to baseline treatment
- ≥90% treated water qualified for reuse
- ≥50% recovered sludge converted into valuable products

Strategic Benefits

- **Reduced environmental liability** for coal power plants
- **Lower freshwater demand** for data centers for water sustainability
- **Utilization/conversion of captured CO₂** for critical mineral extraction/recovery
- **New revenue streams** from recovered materials
- **Enhanced reliability and competitiveness** of coal generation assets

Project DISRUPT creates a circular economy (water management) that transforms coal plant wastewater into a strategic resource for energy, industry, and data infrastructure.

Project Information Summary

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Funding Summary:

Federal Share / Cost Share / Total Project Value

Organization	DOE Share	Cost Share
Baker Hughes	\$258,799	\$64,896
Penn State University	\$137,868	\$35,546
Total Phase 1 Costs	\$396,667	\$100,442
Cost Share (%)	20.21%	

Host Site: TBD during Phase I

Location: U.S. coal-fired power plant sites

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