Waste-Heat-Powered Thermal Evaporation of FGD Wastewater

Stabilize and Optimize Coal Power Program Portfolio Kick-off Meeting

October 6–7, 2026 | NETL Morgantown

Award DE-FE0032735

Heartland Water Technology, Inc.
oneheartland.com

Commercial Technology Proven in Coal Power

HEARTLAND CONCENTRATOR

Direct-contact thermal evaporation for difficult wastewater

HIGH-TDS + VARIABLE FEED

Designed for wastewater chemistries that challenge conventional treatment.

DIRECT-CONTACT PROCESS

No membranes or heat-transfer surfaces in the wastewater path.

FLEXIBLE THERMAL INPUT

Operates on natural gas or available plant waste heat.

SIGNFICANT VOLUME REDUCTION

Typically reduces liquid volume by 95–98% ahead of solidification.

NRG W.A. PARISH GENERATING STATION | TEXAS

- 2 × 50,000 GPD Concentrators treating FGD wastewater
- Natural gas is primary heat source
- Commercial operation since November 2025
- 98%+ availability, residual incorporated into gypsum stream for ZLD

COMMERCIAL TRACK RECORD

25+	installations across 10 U.S. states
1.8B+	gallons of wastewater processed
1.4M+	operating hours
2009	first installation still operating

DOE project: scale the proven platform to 200,000 GPD and integrate waste heat, water recovery, beneficial reuse of residuals and CCUS

Project Objectives and Phase I Outcomes

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OVERALL OBJECTIVE

Establish the technical, environmental and execution foundation for a full-scale demonstration at an operating coal-fired power plant.

01

Waste-heat-powered ZLD

Develop the pre-FEED basis for a 200,000 GPD thermal evaporation system using waste-heat. Define system architecture, major equipment, controls, SCADA concepts and performance across variable FGD chemistry and plant load.

02

Water recovery + residuals

Define condensation and operating conditions for clean distilled-water recovery and onsite reuse. Characterize high-recovery residuals, reduce disposal volume and evaluate beneficial-value pathways.

03

Full-stream CCUS integration

Develop a screening-level conceptual design sized for the host plant's full flue-gas stream. Define capture and compression interfaces, energy and water impacts, CO_2 product quality, and transport, utilization or storage pathways.

PHASE I OUTPUT

Pre-FEED + AACE Class 4 estimate

9 months technical work

DOE Funding: $400,000
Non-DOE Funding: $108,010
Total Value: $508,010

Host site selected in Phase I

PROJECT PARTICIPANTS

Heartland, EPRI, Burns & McDonnell.
Seeking Utility host site

Technical Approach: Use available plant heat to drive ZLD

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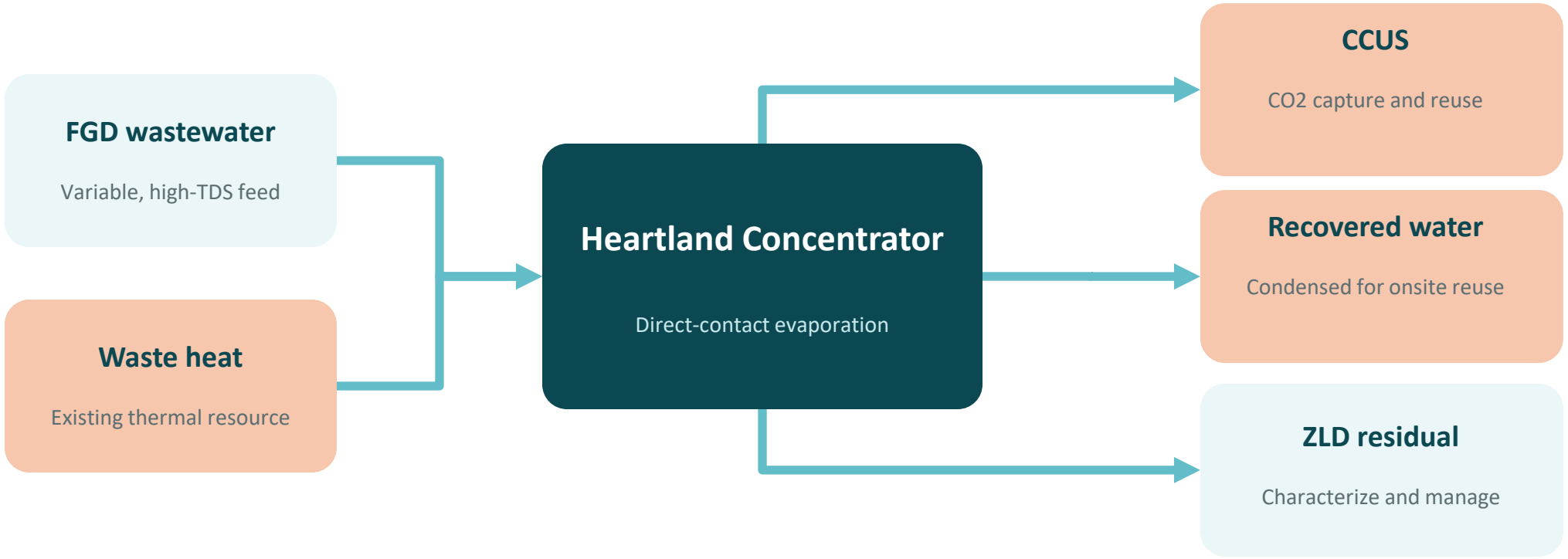

200,000 GPD
commercial-scale design basis

Up to 98%
liquid volume reduction target

≥10%
thermal-energy reduction target

CCUS
conceptual design

Commercial foundation

The Type 6 Concentrator concept scales the TRL 7+ platform capacity. Phase I will define waste heat integration, mass and energy balances, condenser configuration, residual handling, constructability and the CCUS concept.

Phase I Defines the Path to Commercial Demonstration

Heartland

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1

Host selection + data

Months 1–2

Confirm FGD stream, waste heat source, operating horizon and owner commitment

2

Design basis

Months 2–4

Characterize wastewater; complete mass and energy balances; size major equipment

3

Site integration

Months 4–6

Develop plot plan, tie-ins, constructability basis and permitting pathway

4

Economics + risk

Months 6–8

Prepare Class 4 estimate, schedule, risk register and business case

5

Readiness package

Month 9

Deliver pre-FEED package and Phase II go/no-go recommendation

INTENDED IMPACT

- **Lower cost and greater efficiency:** Use available waste heat to reduce the energy and operating cost of FGD wastewater ZLD.
- **Environmental protection:** Reduce wastewater volume requiring disposal and lower the risk of wastewater affecting groundwater.

RISKS & MITIGATION

- **Host site:** Screen candidates early against clear criteria.
- **Waste-heat availability:** Confirm temperature, flow and variability.
- **Water chemistry and residuals:** Test samples and define pretreatment and residual management.
- **Permitting and integration:** Begin NEPA and air/water planning; coordinate plant tie-ins and construction requirements.

The project is seeking an operating coal plant as the host site

HOST-SITE SELECTION DURING PHASE I

A lower-cost path to a zero liquid discharge solution for compliance with EPA's Effluent Limitations Guidelines

FGD wastewater

Active stream with enough flow to support the ≥50% slipstream requirement and 200,000 GPD design basis.

200–400k GPD is ideal

Available heat

A suitable waste-heat source and a practical route for thermal integration.

Target temperature: ~850–900°F+

Site + data

Historical flow and chemistry, samples, plot space, utilities, tie-ins, access and constructability inputs.

Data enables rapid pre-FEED

Operating horizon

A credible path through engineering, permitting, construction and at least six months of demonstration.

Potential for 50% cost share of deployment

If your site is interested in being a partner with Heartland, please connect with us during the conference or at info@oneheartland.com

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