

The Coaltech Research Brief

The month's developments from the Coaltech research portfolio and beyond.

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COALTECH.CO.ZA

THE MONTH IN BRIEF

Mintek filed its final report on biological brine treatment, giving water teams a third route beside evaporation ponds and crystallisers.

Building components made from coal discards passed their composite evaluation at Wits, completing the project's technical work.

The HELE clean combustion programme began Phase 2 planning with the CSIR, Eskom and SANEDI.

UJ completed its first analyses of reprocessed eMalahleni discards as a source of critical elements, and the agrivoltaics trial site is established at Kriel.

Six final reports are available to download, and the next Masterclass runs on Wednesday 30 September at 15h00.

Abroad, the United States committed another USD 237 million to recovering critical minerals from coal ash.

WHAT MOVED THIS MONTH

SURFACE ENVIRONMENT

A biological route for treating brine

E2024-2 · BIOLOGICAL BRINE TREATMENT · MINTEK

Mintek has filed its final report on biological treatment of mine-water brines, the concentrated reject stream left after reverse osmosis. Brine has no easy disposal route: evaporation ponds and crystallisers are costly and create their own long-term liabilities. The work tested biological pathways for breaking down and stabilising brine constituents as a third option.

AT THE OPERATION Any mine that treats water has a brine problem. This report gives your water team another route to evaluate.

MINING & PROCESSING

Discard-based building materials pass their composite evaluation

P2024-1 · BUILDING COMPONENTS FROM COAL WASTE · UNIVERSITY OF THE WITWATERSRAND

The Wits team making building components from coal discards completed the composite evaluation of its materials in June. That is the test which decides whether discard-derived products hold up as real construction material. With that, the project's technical work is complete and the final report is published.

AT THE OPERATION If the material proves out, dumps near settlements become a source of building material. The [final report is in the research library](#) and sets out what the material can do and what a production route would need.

FUTURE TECHNOLOGIES

HELE CFB programme starts Phase 2 planning

F2025-4 · HELE CFB LOCALISATION PROGRAMME · CSIR WITH COALTECH, ESKOM AND SANEDI

The project leadership committee for the high-efficiency, low-emissions circulating fluidised bed programme met in June, and Phase 2 planning is under way across the four parties: Coaltech, the CSIR, Eskom and SANEDI. CFB furnaces can burn low-grade coal and discards cleanly, so material now sitting on dumps could be used as fuel.

FUTURE TECHNOLOGIES

Solar panels over rehabilitated mine soil, with crops underneath

F2025-1 · AGRIVOLTAICS ON REHABILITATED LAND · UNIVERSITY OF THE FREE STATE

The agrivoltaics trial puts solar panels over crops on rehabilitated mine soils and on spoils without topsoil. The panels create a microclimate that shelters growth on ground where topsoil is short, and the soil itself is under measurement through the trial, which runs to mid-2028.

AT THE OPERATION Every closure plan carries a land use question. This trial is building South African evidence on whether power generation and agriculture can share rehabilitated ground.

FUTURE TECHNOLOGIES

UJ tests reprocessed discards as a source of critical elements

F2026-1 · RESOURCE VALORIZATION AND CRITICAL MINERALS · UNIVERSITY OF JOHANNESBURG

The UJ project is testing whether reprocessed discard coal from a processing plant in the eMalahleni coalfield can serve as a source of critical elements. Samples drawn from points through the reprocessing plant go through geochemical and mineralogical analysis to establish what the material holds and which minerals host it. The first activity, preconcentration and analyses, was completed in June, and the results have been accepted for presentation at the ICCP symposium in Lisbon in September.

AT THE OPERATION If the material left after reprocessing carries recoverable elements, discard piles shrink and gain value at the same time. Members running reprocessing plants can offer sample points.

MINING & PROCESSING

Safety wearables and the digital platform get under way

M2026-2 WEARABLE TECHNOLOGIES, RIIS · M2026-1 DIGITAL EVALUATION PLATFORM, DIGITAL TWIN

Two of the FY2026/27 modernisation projects are under way. The wearables project is building the evidence base for what wearable safety technology must actually do for mineworkers, grounded in structured interviews and behavioural research rather than vendor claims. The digital evaluation platform is assembling a way for mines to weigh digital technology options on cost, efficiency and safety before committing capital.

AT THE OPERATION Both projects need mine input for their next phases. Taking part in the interviews or offering a site is the cheapest way to get first access to the results.

THE PORTFOLIO AT A GLANCE Seventeen projects are running across the three research streams: five in Mining & Processing, five in Surface Environment and seven in Future Technologies. The full register, with what each project is solving for, is on page 5.

NEW KNOWLEDGE IN THE LIBRARY

Final reports filed over the past two months, available to download.

HELE CFB Project, Final Report

F2025-4 · CSIR

The feasibility phase, run by Coaltech with the CSIR, Eskom and SANEDI, concludes that a 500 kW thermal circulating fluidised bed test facility is technically feasible, with Eskom Rosherville the preferred site. Detailed engineering follows.

[Download the report](#)

The Carbon Farming Model, Final Report

E2023-1 · UNIVERSITY OF PRETORIA

Three years of measurement on what rehabilitated land can grow and earn: biomass to 41 tonnes per hectare and bio-methane above 2,700 cubic metres per hectare.

[Download the report](#)

Building Components from Coal Waste, Final Report

P2024-1 · UNIVERSITY OF THE WITWATERSRAND

The final report on converting coal-processing residues into durable composite building materials, with the feasibility work and life cycle assessment pointing to pilot-scale development next.

[Download the report](#)

Biological Brine Treatment, Final Report

E2024-2 · MINTEK

The complete findings on biological routes for treating RO reject brine, with performance set against conventional disposal. Relevant to any operation running a water treatment plant or planning one.

[Download the report](#)

Coal-Waste Concrete Segment Pavements, Final Report

P2025-2 · CSIR

Paving blocks made with coal waste fines and bottom ash replacing part of the fine aggregate: at the optimised levels, strength and durability hold or improve while aggregate and disposal costs fall.

[Download the report](#)

Scope 1 and 2 Emissions, Final Report

F2025-3 · PROMETHIUM

Sets a 2024 baseline for Scope 1 and 2 emissions across the coal mining sector, naming diesel, fugitive methane and electricity as the main drivers, and maps where reporting needs work.

[Download the report](#)

WORTH YOUR HOUR

A Masterclass every month

A 45 minute online talk by a leading researcher on the last Wednesday of every month at 15h00, followed by questions, free for member staff. Around 70 of your peers attend live and every session is recorded.

Next: Wednesday 30 September, 15h00 · [Recordings on YouTube](#)

FY2027 Call for Proposals closes this week

Researchers and members with project ideas for the next cycle have until Thursday to submit.

Deadline: Thursday 4 September 2026 · coaltech.co.za

DID YOU KNOW?

Five findings from the archive of 186 published Coaltech reports.

Old pillar workings hold over 100 million tonnes

Defunct collieries in the northern eMalahleni-Highveld coalfield hold well over a hundred million tonnes of coal locked in old pillars, mapped and categorised to SAMREC standards.

[Read the pillar resources report](#)

Discards carry rare earths at coal-seam grades

Wits work on rare earth recovery measured total rare earth contents in South African discards on par with the run-of-mine coal they came from, at roughly 260 parts per million.

[Read the rare earths report](#)

Soil can be made from fine discard

UCT researchers fabricated growth media from ultrafine coal waste and established vegetation on it, a possible use for the waste class that is hardest to store.

[Read the fabricated soils report](#)

Coal can be washed without water

Dry beneficiation trials on South African coals delivered saleable product at yields between 37 and 80 percent depending on the feed, with no process water at all.

[Read the dry processing report](#)

Coal as a material feedstock

In some markets coal is worth more as a material than as a fuel, and Coaltech mapped the routes. [Read the report](#)

THE WORLD RADAR

Recent developments in coal research and funding abroad.

The US commits another USD 237 million to minerals from coal ash

The US Department of Energy committed USD 237 million across July and August to recovering rare earths and critical minerals from coal and coal ash, on top of a USD 134 million demonstration facility programme. The US has the most mature ash market in the world and is now treating ash as a mineral resource. The technology proven with this money will be available to buy, and South African ash grades are competitive feedstock for it.

[Read the USD 75 million award](#) · [the USD 162 million award](#)

India funds a fly-ash pilot and Japan invests in Namibia

India has funded a fly-ash rare earths pilot through NLC and the Bhabha Atomic Research Centre, and Japan's JOGMEC is investing up to USD 34 million in the Lofdal heavy rare earths project in Namibia. Buyers of this material are already active in the region, which puts members holding ash or discards closer to a market than commonly assumed.

[Read about the NLC and BARC agreement](#) · [the JOGMEC release](#)

South African ash carries roughly twice the rare earth content of average crust

Work presented at World of Coal Ash 2026 by a University of Johannesburg team measured rare earth contents in South African fly and bottom ash at roughly double the level of the upper continental crust; the measurements are charted in The Figure below. That is local, peer-reviewed evidence that our ash dams hold a recoverable mineral endowment, and it strengthens every member's case for valorisation over perpetual storage.

[Read the conference paper](#)

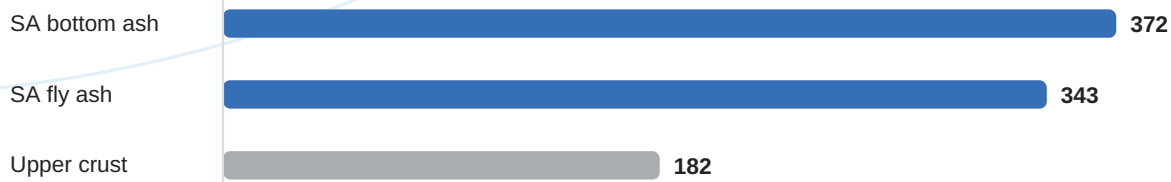
Pretoria names coal ash a critical minerals source

South Africa's Critical Minerals and Metals Strategy names coal fly ash as a secondary source of critical minerals, putting ash valorisation inside official minerals policy for the first time. Members approaching regulators about reprocessing ash or discards can now point to the strategy directly.

[Read the strategy summary](#)

THE FIGURE

Total rare earth content of South African coal ash, against average continental crust, parts per million.



Average total rare earth element contents measured by a University of Johannesburg team, presented at World of Coal Ash 2026; upper continental crust shown as the reference value.

MEMBER RETURN

One case from the Coaltech record, and what it gave back.

From 2006 to 2023, Coaltech funded the University of Pretoria and Mintek to answer a question no mine could settle alone: can mine-affected water grow crops? Trials on gypsiferous water showed commercial yields; Mintek's cloSURE process then treated acid mine drainage to irrigation standard, six grass species were screened for biomass on treated water and discard, and hay was baled on rehabilitated land. Water treated as a liability became a farming input, and the findings now sit in every member's hands. [Read the case study](#)

Ask Coaltech

The Coaltech library holds 27 years of member-funded research. If your team has a technical question, reply to this email and we will send you what the research says on it, with sources. This Brief may be shared freely within the Coaltech community; pass it on to colleagues who would use it.

[Reply to this email, or write to cbergman@coaltech.co.za](#)

THE ACTIVE PORTFOLIO

Every project currently running, and the problem it is working on.

MINING & PROCESSING

M2025-2	Safe Criteria Limits of Blast-Induced Ground Vibration UNIVERSITY OF THE WITWATERSRAND	Blast damage criteria that let opencast operations work safely near surface structures and communities.
M2026-1	Coal Mining Digital Evaluation Platform DIGITAL TWIN	A platform for mines to weigh up digital technology options on cost, efficiency and safety before investing.
M2026-2	Wearable Technologies for Mine Safety RIIS	Field research with mineworkers that defines what wearable safety technology must do before anything is built.
P2025-1	Waste to Resource: Washability Studies for the Circular Economy UNIVERSITY OF CAPE TOWN	Washability studies on discard streams from a Mpumalanga colliery, mapping what can be recovered and sold.
P2026-1	Development of a Fine Coal Discard Dewatering Strategy NORTH-WEST UNIVERSITY	Filtration and drainage test work to cut the moisture in fine discard so it can be handled and stored.

SURFACE ENVIRONMENT

E2020-4	Carbon Capture and Energy Recovery from Waste Water Using Algae UNIVERSITY OF CAPE TOWN	Algal systems that capture carbon and recover energy from mine and plant streams.
E2024-1	Irrigation of Natrophile Grass Species UNIVERSITY OF PRETORIA	Salt-tolerant grasses irrigated with mine-affected water, producing usable land and fodder.
E2025-2	Facilitating Irrigation as a Mine Water Management Strategy UNIVERSITY OF PRETORIA	Revising the best practice guidelines for irrigating unmined and rehabilitated land with mine-affected water.
E2025-3	Investigating Coal Mine-Influenced Water for Battery Metals UNIVERSITY OF CAPE TOWN	Recovery of battery metals from mine-water brines during treatment.
E2026-1	Waste Liner Innovation for Mine Closure ARC INNOVATIONS	Engineered liners made from coal ash and tailings to replace scarce clay in mine closure works.

FUTURE TECHNOLOGIES

F2025-1	Agrivoltaics on Rehabilitated Land UNIVERSITY OF THE FREE STATE	Solar generation, agriculture and soil rebuilding on the same rehabilitated ground.
F2025-2	Recovery of Rare Earth Elements from Coal Discards Using Ion Exchange UNISA	Ion exchange chemistry for pulling rare earth elements out of coal-derived streams.
F2025-4	HELE CFB Feasibility Study and Pre-EPC Design CSIR	High-efficiency, low-emissions fluidised bed combustion that burns low-grade coal and discards cleanly; a four-party programme with Coaltech, the CSIR, Eskom and SANEDI.
F2026-1	Resource Valorization and Critical Minerals UNIVERSITY OF JOHANNESBURG	Assesses reprocessed coal discards from the eMalahleni coalfield as a source of critical elements.
F2026-2	Turning Ash into Assets: Critical Material Recovery MINTEK	Mild, low-reagent processes that recover aluminium, iron, silicon and rare earths from coal ash.
F2026-3	Viability of Sasol Coal and Ash as Sources of Critical Raw Materials UNIVERSITY OF THE WITWATERSRAND	Whether commercial-grade rare earth concentrates can be produced from Sasol coal and ash.
F2026-5	HELE CFB Phase 2 CSIR	Carries the four-party clean combustion programme of Coaltech, the CSIR, Eskom and SANEDI from feasibility into engineering design.

HOW A MEMBER NEED BECOMES A PROJECT

01

MEMBERS RAISE NEEDS

Operational problems come to the three steering committees.

02

THE CALL GOES OUT

The committees set priorities for the annual call for proposals.

03

PROPOSALS ARE CONTRACTED

Members evaluate the shortlist and contract the work.

04

RESULTS GO TO ALL

Every finding goes to the whole membership, whoever raised the need.

MEMBERS & PARTNERS

The organisations behind this research.

PRIMARY MEMBERS



ASSOCIATE MEMBERS

Companies that actively support our work.

 Sensor-based ore sorting for coal and minerals.	 Mine rehabilitation and ecological restoration.	 Processes and markets fly ash for cement and construction.
 Occupational hygiene monitoring and compliance.	 Dust suppression systems for mines and plants.	 Geological exploration, mine planning and technical advisory.
 Mining consultancy, exploration and laboratory services.	 Mineral processing engineering recovering ultra fine coal and minerals.	 Environmental science and advisory services.
 Dust control, wastewater evaporation and spontaneous combustion solutions.	 Tailings management and minerals processing services.	 Water, environmental and earth science consultancy.
 Coal processing plant operation.	 Mining and energy projects.	 Opencast mining contracting, load and haul, rehabilitation.
 Consulting engineers: geotechnical, mine infrastructure, environment.	 Mining measurement, modelling and planning software.	 Production monitoring and management systems for mines.
 Contract operation and maintenance of processing plants.	 Facilitates mineral beneficiation, waste recovery and mine rehabilitation across Southern Africa.	 Mine water treatment plants and operations.
 Coal mining group with operations in the Waterberg.	 Dust suppression, haulage and spontaneous combustion prevention.	 AI-driven predictive maintenance for mining equipment.
 Underground support products and timber systems.		

MEMBER BENEFITS

ALL FINDINGS, SHARED
Every result and all 186 library reports go to every member, whoever raised the need.

A SEAT AT THE TABLE
Members sit on the steering committees that set the research agenda.

SHARED COST AND RISK
Research is funded together, so no single company carries a project alone.

FIRST ACCESS
Members host trials and see results before anything is published.

PEOPLE AND EVENTS
Masterclasses, the colloquium and postgraduate pipelines, open to member staff.



coaltech.co.za/join-us



RESEARCH COUNCILS, UNIVERSITIES AND PARTNERS

CSIR · Mintek · Agricultural Research Council · University of Cape Town · University of Pretoria · University of the Witwatersrand · University of Johannesburg · University of South Africa · North-West University · University of the Free State · University of Venda · Colliery Training College · [FutureCoal](#) · [Water Research Commission](#) · [Mandela Mining Precinct](#) · [SA Colliery Managers Association](#) · [SACESHA](#) · [Nkangala Business Chamber](#)

STRATEGIC PARTNER



Coaltech is one of eleven Strategic Partners to [Investing in African Mining Indaba](#), Cape Town, 8 to 11 February 2027, placing the Association's applied research in front of investors, industry leaders and policy makers from across Africa. [Read the announcement](#)