Clean Energy, Restored Lands:
The Path Forward for Coal Regions

Bochum, Germany

29 - 30 September 2026

Organised by European Commission | Research Fund for Coal & Steel | EURACOAL powering transition in Europe, European Association for Coal and Lignite AISBL | Technische Hochschule Georg Agricola

Under the patronage of Die Landesregierung Nordrhein-Westfalen

Practical information kit for in-person participants

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Contents

Working agenda

29 September 2026 – Day 1 at the German Mining Museum

Focus on **research & innovation projects**. Master of Ceremony: Tobias Häusler (WDR TV & radio).

Timing	Session description
08:30 – 09:00	**Registration**
09:00 – 09:45	**Welcome ceremony and keynotes** Welcoming remarks from hosts: • **Prof. Christian Melchers,** Scientific Director & Vice President, Research Center of Post-Mining at University of Applied Sciences Georg Agricola • **Jörg Lukat,** Mayor of Bochum Opening speeches from high-level speakers: • **Martin Špolc,** Director for Prosperity, Directorate-General for Research and Innovation, European Commission • **Silke Krebs,** NRW State Secretary for Economic Affairs, Industry, Climate Action and Energy • **Bärbel Bergerhoff-Wodopia,** Member of the Board, RAG-Stiftung • **Prof. Alicja Krzemień,** President, EURACOAL
09:45 – 10:15	**Keynotes on EU water policy and water use to restore the Rhenish lignite region** • **Veronica Manfredi**, Director for Zero Pollution, Water Resilience and Green Urban Transition, Directorate-General for Environment, European Commission • **Dr. Christian Eling**, Head of Mine Planning, RWE Power
10:15 – 11:00	**Coffee break**
11:00 – 13:00	**Session 1 – RFCS projects on energy production and energy storage** This session will explore how former coal mines and power plant sites can become strategic assets for Europe's future energy system through the presentation of three RFCS projects, followed by a panel discussion and a Q&A. Project pitches: • **Dr.-Ing. Thomas Kempka,** Head of Working Group Coupled Processes in Hydrosystems, GFZ Helmholtz Centre for Geosciences (ATLANTIS – **Pumped-hydro power storage at former open pit mines**, and introducing TRIDENT on thermal energy storage) • **Dr.-Ing. Jochen Ströhle**, Deputy Head of the Department of Energy Systems and Technology, Technical University of Darmstadt (CORAL – **Novel energy storage for heat and power using metal oxidation/reduction**, with links to HIGHWAY for energy storage & HELIA for hydrogen production) • **Dr. Jerzy Jagoda**, Design and Research Specialist, KOMAG Institute of Mining Technology, and **Dr. Dariusz Jasiulek**, Head of Projects and Implementation Department, ENNECOR Sp. z o.o. / Coordinator of SCoLINE, KTKM Sp. z o.o. (POSTEN – **Floating solar PV farms with single-wire power transmission** and SCoLINE – **Anchoring solar PV systems on mine spoil heaps**) Panellists:

	• **Thomas Brandenburg**, Managing Director, LEAG Clean Power GmbH • **Dr. Oliver Then**, Managing Director, vgbe energy e.V. • **Leon Riedel**, Project Specialist, United Nations Industrial Development Organization (UNIDO) Global Alliance for Responsible and Green Minerals • **Michael Weberink**, Chief Executive Officer, German Association for the Coal Industry and Post-Mining e. V. (bsn) • **Rajko Kravanja**, Chair of the City Council & Head of the City Administration, City of Castrop-Rauxel Moderation by: **Véronique Marx**, Team Leader, Directorate-General for Energy, European Commission
13:00 – 14:15	**Networking lunch**
14:15 – 16:00	**Session 2 – Challenges linked to site restoration and risk management in the coal and lignite regions** This session will look at how the application of R&I results can help in the restoration of post-mining landscapes safely and sustainably in line with Europe's environmental and circular-economy goals. The format will be keynotes, a presentation of three RFCS projects, followed by a panel discussion and a Q&A. Project pitches: • **Dr. Julia Haske**, Head of Land Use & Transition, Research Center of Post-Mining, Technische Hochschule Georg Agricola (DMT-THGA) (POTENTIALS – **On the opportunities for end-of-life coal mines and coal-fired power plants**, and introducing CRMsDataSpace) • **Dr. Barbara Rogosz**, Director, Poltegor Institute (REECOL – **Rehabilitation of post-mining areas**, building on MiDSafe & RAFF) • **Krasimira Ilieva**, Head of Project Management Unit, Investment Department, Mini Maritsa Iztok EAD (PRIMI – **Production of traditional and novel construction materials from waste clay at lignite mines**) Panellists: • **Garrelt Duin**, Director, Regional Ruhr Association RVR • **Dr. Alexey Alekseenko**, Head of the Resource Nexus Laboratory for Post-Mining Inclusive Transition (REPOINT), United Nations University, Dresden • **Joachim Löchte**, Technical Director, RAG AG • **Dr. Christian Eling**, Head of Mine Planning, RWE Power AG • **Prof. Ulrich Paetzel**, Chairman of the Board of Directors, Emschergenossenschaft & Lippeverband (EGLV) • **Dr. Ioannis E. Zevgolis**, Associate Professor, School of Mining and Metallurgical Engineering, National Technical University of Athens (PRISMINE project) Moderation by: **Dr. Sebastiano Fumero**, Head of Unit for Future Low Emission Industries, European Research Executive Agency
16:00 – 16:30	**Future opportunities, conclusions and closing remarks** This closing session will present the RFCS Annual and Big-Ticket Calls 2026-2027 and other future opportunities that will be offered by RFCS. Speakers: • **Carsten Schierenbeck**, Head of Unit for Industrial Transformation, Directorate-General Research and Innovation, European Commission

	• **Dr. Sebastiano Fumero**, Head of Unit for Future Low Emission Industries, European Research Executive Agency • **Alejandro Ulzurrun**, Head of Unit ENER.B1, Directorate-General for Energy, European Commission Moderation by: **Brian Ricketts**, Secretary-General, EURACOAL
16:30 – 18:00	**Networking drinks**

Day 1 is funded by the EU under an Accompanying Measures project of the Research Fund for Coal and Steel under grant agreement no. 101295753.

High-Level
European coal in transition

30 September 2026 – Day 2 at Technische Hochschule Georg Agricola student centre

Focus on **policy & implementation**. Master of Ceremony: **Carsten Rothballer** (Head of Sustainable Energy Systems, ICLEI Europe).

Timing	Session description
08:30 – 09:00	**Registration**
09:00 – 09:30	**Opening session** This scene-setting session will include a presentation of EU energy policy and its relevance for coal regions. Through a fireside chat, the importance of synergies between research and policy, as well as approaches on how to bridge the gap between innovation policy and commercialisation, will be highlighted. **Speaker:** • **Alejandro Ulzurrun**, Head of Unit ENER.B1, Directorate-General for Energy, European Commission **Fireside chat:** • **Cyril Robin-Champigneul**, Deputy Head of Unit E3, Directorate-General Research and Innovation, European Commission • **Anna Brussa,** Deep Development Teams Orchestrator, EIT Climate-KIC Post Coal Future Lab
09:30 – 10:50	**Panel 1 – Renewable energy and energy storage at former coal sites: lessons for policy and process** Building on the first day's good practices and a recently published study on siting renewable energy, this session will showcase concrete examples from CRiT regions where former coal infrastructure is already in use or is planned to be used for clean energy production and storage. Technological and policy approaches will be discussed through an interactive panel. Speakers: • **Elke Mugova,** Post-Mining-Exploitation, Fraunhofer IEG • **Vécsi György,** Chief Executive Officer, MVM Matra • **Luca Manzella**, Vice President of Business Development and Sales EMEA, Energy Vault • **Daniel Dietze,** Expert for Energy Storage and Flexibility, NRW.Energy4Climate Moderation by: **Timon Wehnert**, Co-head of Research Unit International Energy Transition, Wuppertal Institute
10:50 – 11:20	**Networking coffee break**
11:20 – 12:40	**Panel 2 – Mine restoration in practice: examples and lessons learned from coal+ regions** Building on the first day's good practices, this session will include a presentation of CRiT-supported regions where mines have been successfully rehabilitated, highlighting practical approaches and lessons learned. Ongoing and planned projects will also be discussed in a panel discussion with particular attention given to challenges around nature restoration, risk management and the recovery and reuse of materials. **Keynote speech:**

	• **Eva Nussmüller**, Head of Unit REGIO.G1, Directorate-General for Regional and Urban Policy, European Commission Panel speakers: • **Eva Nussmüller**, Head of Unit REGIO.G1, Directorate-General for Regional and Urban Policy, European Commission • **Frank Dudda,** Mayor, Municipality of Herne • **Beate Zimmerman,** Director, Research Institute for Post-Mining Landscapes (FIB) • **Karel Tichy**, Project Manager, Economic and Social Council of the Ústí Region and **Jana Falterová Zudová**, City Councillor for Grants, Most City Council • **Maria Lorenzo Conto,** Director of Energy and Business Development, Hunosa Moderation by: **Eva Srnová,** Policy Officer, Directorate-General for Energy, European Commission
12:40 – 13:00	**Closing session** This session will summarise the key messages and connect research with policy implementation. Finally, the new activities under the CRiT will be presented to the audience. Speakers: • **Alejandro Ulzurrun**, Head of Unit ENER.B1, Directorate-General for Energy, European Commission • **Dr. Sebastiano Fumero**, Head of Unit for Future Low Emission Industries, European Research Executive Agency
13:00 – 14:30	**Networking lunch and division into groups for site visits**
14:30 – 17:00	**Site visits – three options**
	Landscape Park Hoheward at Ewald Colliery in Herten This site visit will take participants to the Hoheward landscape park, a slag heap rising 51 meters above sea level and constructed from 180 million tonnes of mining waste. The peak of the landscape park provides an unobstructed panoramic view from the plateaus of the Ruhr mining area which has been transformed into an extraordinary recreational and cultural landscape known for astronomical observations, the 'Dragon bridge' and ring promenade.
	Zollverein mine and cokery (UNESCO world heritage site) + BRYCK Innovation Hub, Essen This site visit will take participants to the Zollverein coal mine and coking plant, a landmark of the Ruhr Valley. Formerly known as the world's largest coal mine, this site has, in the meantime, turned into a symbol of industrial transformation and an attractive hub for culture, leisure, education, and business. The 100-hectare site hosts unique industrial architecture, as well as the Ruhr Museum with permanent exhibitions, guided tours and several cultural events throughout the year. During the summer, visitors can use the ice-skating rink, while the "factory" pool opens its gates in summer. The tour will also include a presentation of the start-up and innovation hub BRYCK (launched by the RAG-Stiftung) which aims to attract tech start-ups and to establish an ecosystem of sustainable industries.
	Garzweiler open pit lignite mine[1] During the visit, participants will get a first-hand impression of coal mining at scale by visiting the lignite mine that supplies the nearby 950-MW thermal power plant at

[1] This site visit will take circa 5 hours with an estimated departure at 13:15 and participants will not return to Bochum after the visit. Participants will be transferred to Cologne main station.

Niederaußem. Visitors will be introduced to the efforts made by RWE to restore land as well as other post-mining activities in line with their green transition strategy. This includes plans for the restoration of Garzweiler, by developing a lake on the former mining site. Visitors will also be shown the 2.2-metre diameter pipelines to be soon used to pump water from the River Rhine.

Event information

Venues

Außenansicht hoch Deutsches Bergbau-Museum Bochum © Hauke Dressler

Image courtesy of the THGA Media Office

The event will be split across two venues, both located close to Bochum city centre and within walking distance of each other. On **29 September**, sessions will take place at the **German Mining Museum Bochum**, Am Bergbaumuseum 28, 44791 Bochum.

The sessions will be held in the Auditorium. At the entrance of the museum, you will **check-in at the registration desk to receive your badge** and information on how to connect to the WiFi and the interpretation services during the conference.

On **30 September**, sessions will take place at **Technische Hochschule Georg Agricola's (THGA) student centre**, Herner Str. 45, 44787 Bochum. Participants should follow event signage and staff guidance on arrival. To access the student centre, participants must enter via the main entrance 'Haupteingang' and should follow event signage and staff guidance to reach entrance C on the campus map below. At the entrance of the centre, you will **check-in for the day** and receive information on how to connect to the WiFi and interpretation services during the conference.

Please note that to use the underpass at the "Bochum Deutsches Bergbau-Museum" subway station, a valid ticket is needed.

Language interpretation

During the plenary sessions, remote interpretation will be available in English and German. We kindly ask participants to bring their own earphones to listen to the interpretation if desired during the event. More information on how to use interpretation services will be provided to onsite and online attendees.

Please note that **site visit tours will be delivered in English only**.

How to reach Bochum

By plane

There are three international airports near Bochum which are easy to commute via train, car or bus. Those are:

- Düsseldorf Airport – we recommend transferring via this airport if possible
- Dortmund Airport
- Cologne Bonn Airport

By train

The easiest and quickest way to reach Bochum is by using the German railway system that connects cities across the country. We invite you to consult the DB website or the DB Navigator application, to find the best connections and purchase tickets.

Transfer from Düsseldorf Airport

From Düsseldorf Airport, you will need to take the SkyTrain and purchase a regional (RE) or ICE train ticket to **Bochum Hauptbahnhof (Hbf).** Trains run approximately every 20-30 minutes and the total journey will take approximately 45 minutes. Tickets can be purchased in advance via the Deustche Bahn website or the DB Navigator app. Alternatively, tickets can be purchased at machines at the airport station. Prices start from 11€ depending on flexibility and booking time.

Transfer from Dortmund Airport

From Dortmund Airport, you will need to take the Airport Shuttle to **Dortmund Hbf** and then purchase a ticket to **Bochum Hbf.** The journey will take approximately 35-45 minutes. Tickets can be purchased at the airport/bus/station machines, the Deutsche Bahn website or on the DB Navigator App. Prices usually start from 10€ depending on when you book your ticket.

Transfer from Cologne Bonn Airport

From Cologne Bonn Airport, you will need to take a train to **Cologne (Köln) Hbf** and transfer to an ICE or RE train to **Bochum Hbf**. The journey will take approximately 1 – 1.5 hours. Tickets start from 21€ depending on the train type.

By car

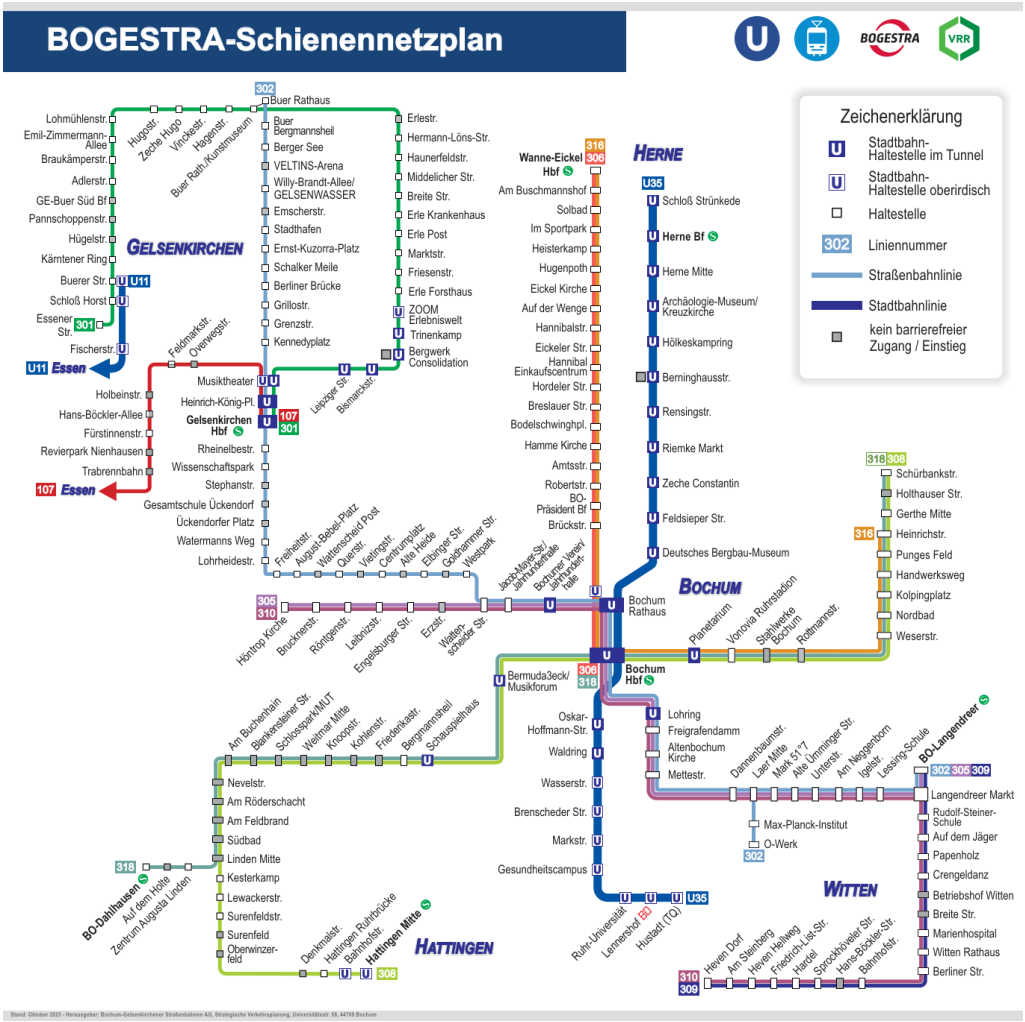
Bochum is accessible via the A40 and other regional roads. Parking may be limited near the venues, so participants travelling by car should check parking options in advance.

Getting around Bochum

Public transportation in Bochum is managed by the Rhine-Ruhr Public Transport Association (VRR) and is one of the largest transport associations in Europe. Tickets can be purchased online via the DB Navigator and the Mobil.NRW application or via ticket machines and points of sale in stations. Please

note that some machines may dispense tickets that are already validated, buying tickets in advance is not possible at those machines. Please consult this website for more information on public transportation within the Ruhr region.

The event venues and recommended hotel are easy to reach by underground, tram, bus and on foot. From Bochum Hbf, take the U35 underground line towards Herne and get off at the Deutsches Bergbau-Museum and walk about five minutes to the venues. Alternatively, from Bochum Central Tain station Kurt-Schumacher, take bus number 336 heading to Dortmund Lütgendortmund and get off at Bochum Brückstr. Within a three to eight-minute walk you will reach the Garner Hotel or the event venues.

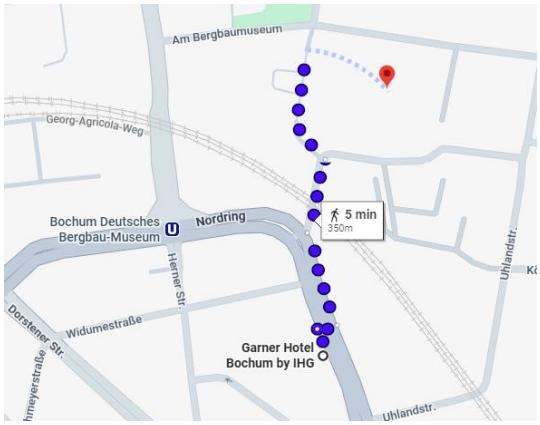


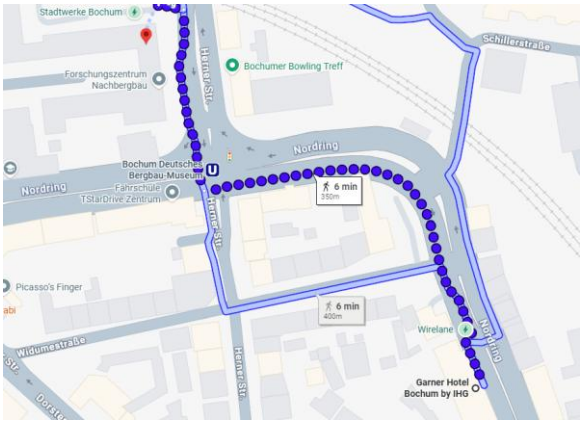
Accommodation

Top recommendation

The top recommended accommodation for the “Clean energy, restored lands: The path forward for coal regions” is the Garner Hotel which is approximately 5 minutes away on foot from both event venues. To ensure a convenient experience throughout the event we strongly encourage booking your accommodation at the Garner Hotel.

Route from the Garner Hotel to the German Mining Museum	Route from the Garner Hotel to the THGA





Other recommendations

Mercure Hotel Bochum

Walk to German Mining Museum/THGA: 20 minutes

Public transportation: 15 minutes

Address: Massenbergstraße 19 21, 44787 Bochum, Germany

To book please contact the hotel:

Phone: +492349690

E-mail: reservierung.bochum@eventhotels.com

Website: https://www.mercure-hotel-bochum.de/

Welcome Parkhotel Bochum ****

Walk to German Mining Museum/THGA: 15 minutes

Public transportation: 15 minutes

Address: Klinikstraße 43-45, 44791 Bochum, Germany

To book please contact the hotel:

Phone: +4923461000

E-mail: boc.info@welcome-hotels.com

Website: https://www.welcome-hotels.com/hotels/parkhotel-bochum/

Best Western Bochum

Walk to German Mining Museum/THGA: 27 minutes

Public transportation: 22 minutes

Address: Stadionring 22, 44791 Bochum, Germany

To book please contact the hotel:

Phone: +49234925660

E-mail: info@hotel-bochum.bestwestern.de

Website: https://www.bestwestern.de/

Four Points Flex by Sheraton Bochum ***

Walk to German Mining Museum/THGA: 30 minutes

Public transportation: 20 minutes

Address: Alleestraße 140, 44793 Bochum, Germany

To book please contact the hotel:

Phone: +49234944320

E-mail: hello@fourpointsflexbochum.com

Website: https://www.marriott.com/en-us/hotels/dtmbf-four-points-flex-bochum/

The site visits

Important practical note: Site visits may involve extended periods of walking, standing and moving through outdoor or uneven areas. Participants should wear comfortable closed shoes and clothing appropriate for the weather. Site visit tours will be delivered in **English only**. Should any participants have a change of plans, they should contact bochum@euracoal.eu.

Landscape Park Hoheward at Ewald Colliery in Herten

© Gerd Koch

This site visit will take participants to the Hoheward landscape park, a slag heap rising 51 meters above sea level and constructed from 180 million tonnes of mining waste. The peak of the landscape park provides an unobstructed panoramic view from the plateaus of the Ruhr mining area which has been transformed into an extraordinary recreational and cultural landscape known for astronomical observations, the 'Dragon bridge' and ring promenade. This site visit will be a 2 hours and 30 minutes tour of the park with a guide providing explanations. Upon arrival the guides will split the group into smaller groups to ensure an optimal experience.

Meeting point: Werner-Heisenberg-Str. 14 (Ewald Colliery, former pay hall)

Zollverein mine and cokery (UNESCO world heritage site) + BRYCK Innovation Hub, Essen

Photo by Wolfgang Weiser

This site visit will take participants to the Zollverein coal mine and coking plant, a landmark of the Ruhr Valley. Formerly known as the world's largest coal mine, this site has, in the meantime, turned into a symbol of industrial transformation and an attractive hub for culture, leisure, education, and business. The 100-hectare site hosts unique industrial architecture, as well as the Ruhr Museum with permanent exhibitions, guided tours and several cultural events throughout the year. During the summer, visitors can use the ice- skating rink, while the "factory" pool opens its gates in summer. The tour will also include a presentation of the start-up and innovation hub BRYCK (launched by the RAG-Stiftung) which aims to attract tech start-ups and to establish an ecosystem of sustainable industries.

Meeting point for the start of the site visit: The Mine restaurant (Gelsenkirchener Str. 181, 45309 Essen-Stadtbezirke VI, Germany)

We kindly inform participants that the Zollverein coal mine and coking plant is not barrier-free. Participants requiring accessibility accommodations are kindly invited to contact the organising team at bochum@euracoal.eu to find alternative solutions.

Garzweiler open pit lignite mine

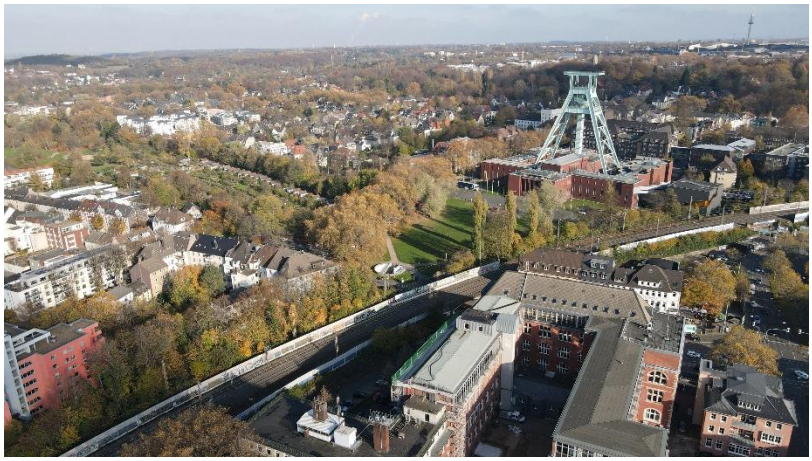
Route of the Rhine water transport pipeline to flood the Hambach and Garzweiler mines to create new lakes (credit: Oliver Berg/dpa/Alamy Live News)

We kindly remind participants attending the Garzweiler open pit lignite mine that there is no return to Bochum and participants will be transferred to the Cologne Hbf with an estimated arrival time of 17:50 at Cologne Hbf.

During the visit, participants will get a first-hand impression of coal mining at scale by visiting the lignite mine that supplies the nearby 950-MW thermal power plant at Niederaußem. Visitors will be introduced to the efforts made by RWE to restore land as well as other post-mining activities in line with their green transition strategy. This includes plans for the restoration of Garzweiler, by developing a lake on the former mining site. Visitors will also be shown the 2.2-metre diameter pipelines to be soon used to pump water from the River Rhine.

We kindly remind participants attending the Garzweiler open pit lignite mine that there is no return to Bochum and participants will be transferred to the Cologne Hbf.

Bochum – the hosting city



Bochum is located in the Ruhr region of North Rhine-Westphalia, an area strongly shaped by coal, steel and industrial transformation. Today, Bochum combines its mining heritage with universities, research institutions, cultural venues and green public spaces. The German Mining Museum and nearby former industrial sites offer participants a direct link to the region's coal history and its ongoing transition.

The weather in Bochum in late September can be classified as a cool autumn weather. Daytime high temperatures are usually around 15°C and overnight temperatures are usually around 7°C. Rain is usually more frequent during this period.

Currency

The official currency in Germany is the Euro (EUR). Payments in cash or by credit card are both accepted. For small sums, cash is often preferred.

Other information

Should you need additional information, please reach out to **bochum@euracoal.eu**

Tourist information

Please reach out to the Tourist Information Centre in Bochum **using this link** for any additional information on tourism within Bochum.

RFCS projects presented on 29 September

Acronym	Project title and summary
ATLANTIS Research Project: 101034022 September 2021 – August 2024 Total budget: €2.717 million	**"An interdisciplinary feasibility study on hybrid pumped-hydro power storage of excess energy in open-pit coal mines"** GFZ Helmholtz Centre for Geosciences, Germany (GFZ, DE), Technical University of Berlin (TU Berlin, DE), Centre for Research and Technology Hellas, Greece (CERTH, EL), Public Power Corporation S.A. (PPC, EL), PGE Gornictwo i Energetyka Konwencjonalna S.A. (PGE GiEK, PL), Główny Instytut Górnictwa – Państwowy Instytut Badawczy (GIG-PIB, PL) *ATLANTIS assessed the feasibility of repurposing former open-pit coal mines into energy storage projects, namely with hybrid pumped-hydro power storage (HPHS). Excess energy from renewable energy sources can thus be stored, while increasing the added economic value of former mine sites, helping to stabilise the regional job market and contributing to EU energy supply security.*
CORAL Research Project 101155814 September 2024 – February 2028 Total budget: €3.985 million	**"Combustion of rechargeable metal fuels in fluidised-bed boilers"** Technische Universität Darmstadt (TU Darmstadt, DE), Pometon S.p.A. (IT), Sumitomo SHI FW Energia Oy (SFW, FI), Consejo Superior de Investigaciones Científicas (CSIC, ES), Chalmers University of Technology (CUT, SE), Lappeenranta-Lahti University of Technology (LUT, FI), Politecnico di Milano (Polimi, IT), Fortum Power and Heat Polska Sp. z.o.o. (FPHP, PL), vgbe energy e.V. (VGBE, DE) *CORAL, on the cyclic reduction/oxidation (redox) of metal oxide/metal, is a promising approach for energy storage and flexible CO_2-free heat and power. The project explores a novel concept of metal oxidation retrofitted at modified coal-fired fluidised bed power plants. Hydrogen is used for the direct reduction of metal oxides, and this redox process tested at various scales up to 1 MW thermal power. Computer models will be validated by experiments, and used to make design modifications. The novel concept will be assessed for electrical efficiency, socio-economic value, and environmental impacts.*
CRMsDataSpace Research Project 101216677 July 2025 – June 2028 Total budget: €3.967 million	**"Common European Data Space on Critical Raw Materials for the Green Deal: Recovery Potential from Closed Extractive Coal Waste Facilities"** Główny Instytut Górnictwa – Państwowy Instytut Badawczy (GIG-PIB, PL), Grupo SATEC (SATEC, ES), University of Oviedo (UNIOVI, ES), Desarrollo de Estrategias Exteriores S.A. (DEX, ES), Universidad de Burgos (UBU, ES), National Research and Development Institute for Mining Safety and Anti-Explosion Protection (INSEMEX, RO), Technische Hochschule Georg Agricola (DMT-THGA, DE), European Association for Coal and Lignite (EURACOAL, BE) *CRMsDataSpace aims to develop a Common European Data Space on Critical Raw Materials (CRMs) with a strong focus on recovering valuable raw materials from closed extractive coal waste facilities. This initiative aligns with the European Critical Raw Materials Act (CRMA) and seeks to enhance Europe's autonomy and sustainability in securing key materials for strategic industries such as renewable energy, digital technologies, defence, and healthcare.*
GreenDEALCO2 Accompanying Measures Project 101034035 August 2021 – July 2024	**"Green Deployment of E-fuels and Liquids based on CO_2 for closed and end-of-life coal-related assets"** University of Stuttgart (UNI-STUTTGART, DE), Mitsubishi Power Europe GmbH (MPE, DE), Public Power Corporation S.A. (PPC, EL), RWE Power AG (RWE, DE), Motor Oil CORINTH REFINERIES A.E. (MOH, EL), Meo Carbon Solutions GmbH (MEO, DE), National Technical University of Athens (NTUA, EL), Technical University of Leoben

Total budget: €2.560 million	(MUL, AT), VERBUND Thermal Power GmbH & Co KG (VERBUND, AT), vgbe energy e.V. (VGBE, DE) *GreenDEALCO2 examined the sustainable re-purposing of closed or end-of-life coal-related assets. The project promoted investment into e-fuels with cost- and energy-efficient power-to-fuel processes at closed coal power plants. GreenDEALCO2 also considered how sector coupling could use these stranded assets with novel retrofitting to boost alternative energy carriers and bio-CCU. The main objective was to determine optimal production paths for sustainable e-fuels at coal power plants where CAPEX and OPEX costs can be reduced through process simulation, techno-economic evaluation and sustainability analysis. A pilot certification exercise tested the regulatory framework for the emerging e-fuels. GreenDEALCO2 studied many retrofit options for end-of-life coal power plants (biomass, alternative solid fuels and hydrogen), complemented by combustion experiments on promising alternative energy carriers (ammonia, silicon and hydrogen). New business plans for the coal industry could sustain more than 200 000 jobs and open new prospects for the coal regions in transition.*
GrEnMine Research Project 101157790 July 2024 – June 2027 Total budget: €3.552 million	**“Gravitational Energy storage in the post-Mine areas”** University of Wrocław (UWR, PL), AGH University of Kraków (AGH, PL), Complexul Energetic Oltenia S.A. (CEO, RO), Poltegor Institute (POLT, PL), Technical University of Crete (TUC, EL), University of Petroșani (UPET, RO), VUHU A.S. (VUHU, CZ), Four Point Sp. z o.o. (4PT, PL), PGE Gornictwo i Energetyka Konwencjonalna S.A. (PGE GiEK, PL), Lignitorycheia Achladas A.E. (LAAE, EL) *GrEnMine address the need for more electric energy storage during the energy transition. Globally, pumped hydro storage (PHS) dominates, with 180 GW of capacity accounting for c.98% of total storage. However, PHS has limitations linked to its high cost and topography. GrEnMine aims to develop a novel, gravity-based energy storage system in former mining areas by storing and releasing energy through the movement of heavy blocks or bulk granular materials between different elevations. Rigorous benchmarking and evaluation using mathematical models are in progress, as well as tests using small-scale gravitational energy storage systems. A comprehensive tool will assess the potential suitability of open pit mines for such gravity energy storage technology. The project facilitates coal industry diversification by repurposing post-mining areas as energy storage sites, thus supporting a just transition of the coal regions.*
HELIA Research Project 101296172 October 2025 – March 2030 Total budget: €4.932 million	**“Sustainable hydrogen production via metal-steam redox cycles in circulating fluidised bed systems”** Lappeenranta-Lahti University of Technology (LUT, FI), Technische Universität Darmstadt (TU Darmstadt, DE), Eindhoven University of Technology (TU/e, NL), Tallinn University of Technology (TalTech, EE), Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (Fraunhofer, DE), Sumitomo SHI FW Energia Oy (SFW, FI), RINA Consulting S.p.A. (RINA-C, IT), Osmosys Technology Oy (Osmosys, FI) *HELIA advances polygeneration by retrofitting carbon-free hydrogen production from metals at existing fossil fuel-fired circulating fluidised beds (CFB) using a steam oxidation process while co-producing heat and power. The system can be integrated with variable renewable energy sources to maximise hydrogen yield. Design modification will address the feed/extraction of metal/metal oxide particles, AI-enabled process control and off-gas treatment to ensure high-purity hydrogen production and effective heat recovery. The metal oxide is regenerated (reduced) to metal using renewable hydrogen, so a closed cycle to carry hydrogen with minimal waste. Water for oxidation in the CFB and electrolysis in the reduction plants is supplied by an innovative seawater desalination system that maximises freshwater production while minimising brine discharge through the recovery of valuable salts (e.g. lithium and potassium). Experimental investigations at the lab-scale, 100 kW and 1 MW will support development*

	to TRL6, including synergies with the steel industry, and validation of computational models.
HIGHWAY Research Project 101216794 December 2025 – May 2029 Total budget: €4.100 million	**"High-temperature thermal energy storage enabling a second life for existing fluidised-bed boilers with a high efficiency"** Lappeenranta-Lahti University of Technology (LUT, FI), Carbon-Clean Technologies GmbH (CCT, DE), Technische Universität Darmstadt (TU Darmstadt, DE), Tallinn University of Technology (TalTech, EE), Politecnico di Milano (Polimi, IT), Eesti Energia (EE, EE), vgbe energy e.V. (VGBE, DE) *HIGHWAY, on modifying existing fossil-fired fluidised-bed power plants for high-temperature thermal energy storage, is a promising approach for the flexible provision of CO_2-free heat and power. Charging is carried out using a 100-kW electric heater to heat air to 1200°C which is then passed through a bed of aluminium oxide particles. To discharge, cold air is fed into the bed which gives up its stored heat. The now hot air is fed into a 100-kW superheated steam boiler. The charging/discharging cycles will be tested using a 1-MWh storage system for at least 500 operating hours. Numerical models will be used, validated with experimental data, to inform design modifications, and the concept's efficiency, socio-economic viability and environmental impacts will be evaluated.*
MiDSafe Research Project 101157379 July 2024 – June 2027 Total budget: €2.797 million	**"Advancing post-mining waste dump safety and sustainability"** Poltegor Institute (POLT, PL), National Technical University of Athens (NTUA, EL), Technical University of Crete (TUC, EL), SYSTRA SUBTERRA Ingenieria S.L. (SSI, ES), Complexul Energetic Oltenia S.A. (CEO, RO), University of Petroșani (UPET, RO), VUHU A.S. (VUHU, CZ), Główny Instytut Górnictwa - Państwowy Instytut Badawczy (GIG-PIB, PL), Lignitorycheia Achladas A.E. (LAAE, EL), University "1 December 1918" of Alba Iulia (UAB, RO), University of Wrocław (UWR, PL) *MiDSafe aims to enhance the safety and sustainability of coal and lignite mine waste dumps by identifying, analysing, and mitigating geotechnical and associated risks as well as environmental hazards to improve waste management practices. An extensive geotechnical database supports this risk assessment alongside the development of a practical monitoring system. Innovative materials such as geopolymers and zeolites to mitigate specific risks in these waste dumps are being trialled, as well as an advanced monitoring system and 3D modelling for assessing slope stability. The project is also evaluating options for repurposing waste dumps.*
PALADIN Research Project 101295307 October 2026 – September 2029 Total budget: €2.44 million	**"Postmining information model and digital twin"** VUHU A.S. (VUHU, CZ), TU Bergakademie Freiberg (TU-Freiberg, DE), National Technical University of Athens (NTUA, EL), SYSTRA SUBTERRA Ingenieria S.L. (SSI, ES), Central Mining Institute – National Research Institute (GIG-PIB, PL), Poltegor Institute (PL), Polska Grupa Górnicza S.A. (PGG, PL), Fundación Santa Bárbara (FSB, ES) *PALADIN will establish a harmonised, digital framework to support the sustainable transition of coal regions which face complex environmental, geotechnical and socio-economic challenges. With interoperable tools for risk management, land-use planning and stakeholder co-ordination, PALADIN offers the first universal Post-mining Information Modelling (PIM) standard, leveraging off open Building Information Modelling (BIM) standards. It will be validated at sites in Czechia, Poland, Germany and Spain using spatial, temporal and environmental data on a cloud-based platform compliant with the INSPIRE Directive. PALADIN will pioneer the extension of PIM into a full-scale Digital Twin (DT) of legacy coal infrastructure for real-time monitoring, hazard prediction and land-use scenario simulations. A PALADIN guide, stakeholder engagement, and a PIM standard informed by the work of standards bodies (CEN/TC 442, buildingSMART)*

	will ensure broad uptake and so greater capacity for evidence-based decision-making in the post-mining regions.
POSTEN Big-Ticket Project 101193769 March 2025 – February 2029 Total budget: €13.733 million	**"Scalable, innovative floating photovoltaic power plant using energy buffer storage and easily relocatable single-wire power transmission"** KOMAG Institute of Mining Technology (KOM, PL), Novum Servis s.r.o. (NOVUM, CZ), Główny Instytut Górnictwa – Państwowy Instytut Badawczy (GIG-PIB, PL), SWE Sp. z o.o. (SWE, PL), Silesian University of Technology (SUT, PL), KTKM Sp. z o.o. (KTKM, PL) *POSTEN aims to develop and implement a distributed energy system for a solar PV farm based on an innovative composite structure together with an innovative single-wire power distribution system. The entire system will be designed for deployment on degraded, post-mining areas, wetlands and water reservoirs.*
POTENTIALS Accompany Measures Project 101034042 July 2021 – June 2023 Total budget: €0.794 million	**"Synergistic potentials of end-of-life coal mines and coal-fired power plants, along with closely related neighbouring industries: update and re-adoption of territorial just transition plans"** Główny Instytut Górnictwa – Państwowy Instytut Badawczy (GIG-PIB, PL), vgbe energy e.V. (VGBE, DE), University of Oviedo (UNIOVI, ES), Hulleras del Norte, S.A. (HUNOSA, ES), Centre for Research and Technology Hellas, Greece (CERTH, EL), Technische Hochschule Georg Agricola (DMT-THGA, DE) *POTENTIALS focused on former coal mines and coal-fired power plants, along with related industries, to examine the potential for new economic activities, jobs and added value in coal regions in transition. The project identified and assessed synergistic opportunities, enabling business models to be developed based on renewable energy, energy storage, and the circular economy to guarantee a sustainable use of assets and resources in support of Territorial Just Transition Plans.*
PRIMI Big-Ticket Project 101193556 July 2025 – June 2029 Total budget: €6.517 million	**"Piloting Research and Innovation at Maritsa Iztok using waste clay extracted during lignite mining for traditional and alternative construction materials"** Mini Maritsa Iztok EAD (MMI, BG), Università degli Studi di Modena e Reggio Emilia (UNIMORE, IT) *PRIMI is a pilot project at the Maritsa Iztok Complex, comprising lignite mines and several major coal-fired power plants near Stara Zagora that are vital for Bulgaria's electricity supply. A structural shift in the energy market and a coal phase-out by 2038 mean a transition that requires new jobs and land reclamation while complying with EU environmental law. The Just Transition Fund supports these efforts, including repurposing projects. The PRIMI project will allow MMI to pilot the use of waste clay from lignite mining to produce (through chemical synthesis) new construction materials with improved performance, thus creating new jobs and promoting a circular economy with the use of a high percentage of the waste clay in mining overburden. During synthesis, other waste materials will be added to improve the performance of the new construction products.*
PRISMINE Research Project 101296093 October 2026 – September 2029 Total budget: €3.41 million	**"Predictive indicators and AI-model simulation for mine monitoring and recovery"** National Technical University of Athens (NTUA, EL), VUHU A.S. (VUHU, CZ), Główny Instytut Górnictwa - Państwowy Instytut Badawczy (GIG-PIB, PL), Institut national de l'environnement industriel et des risques (INERIS, FR), Poltegor Institute (PL), KOMAG Institute of Mining Technology (KOM, PL), Premogovnik Velenje, d.d. (PV, SI), Technische Hochschule Georg Agricola (DMT-THGA, DE), SYSTRA SUBTERRA Ingenieria S.L. (SSI, ES), Strata Mechanics Research Institute, Polish Academy of Sciences (IMG-PAN, PL), Lignitorycheia Achladas A.E. (LA, EL)

	PRISMINE addresses the long-term safety, resilience and sustainability of post-mining landscapes, where residual risks such as subsidence, mine water rebound, induced seismicity and ecological degradation may persist for decades after closure. The project will develop an integrated monitoring and forecasting system combining Sentinel satellite data, UAV-based photogrammetry, in-situ measurements, historical mining records and field campaigns within a centralised spatial data infrastructure. AI-based models will be developed to assess current conditions and predict the evolution of site-specific hazards, with validation across seven European case studies covering both underground and open-pit mines at different stages of reclamation and valorisation. Designed for planners, regulators, engineers and communities, PRISMINE will deliver dashboards, predictive risk layers and scenario tools to support routine monitoring, reclamation strategies and long-term land-use planning.
RAFF Research Project 847299 June 2019 – November 2022 Total budget: €3.418 million	**“Risk assessment of final pits during flooding”** Poltegor Institute (PL), VUHU A.S. (VUHU, CZ), Technical University of Crete (TUC, EL), Institut national de l’environnement industriel et des risques (INERIS, FR), Centre for Research and Technology Hellas (CERTH, EL), University of Nottingham (UK), Główny Instytut Górnictwa - Państwowy Instytut Badawczy (GIG-PIB, PL), University of Petroșani (UPET, RO), DIAMO státní podnik (DIAMO, CZ), CTL Maczki-Bór S.A. (CTL, PL), SYSTRA SUBTERRA Ingenieria S.L. (SSI, ES), Complexul Energetic Oltenia S.A. (CEO, RO) *RAFF researched pit lakes which are one of the most common uses of post-mining voids with plans for very large lakes at former lignite mines (c.1.5 billion cubic metres). During the filling of smaller pit lakes, serious geotechnical problems were encountered. To ensure the safe use of these lakes for recreational purposes, risk assessments and long-term monitoring are needed to ensure geotechnical stability, especially of slopes, and good water quality. RAFF created comprehensive models for risk assessments and guidelines to improve the safety, security, and environment aspects of flooded open pit mines based on in-situ investigation, laboratory tests, and numerical and physical modelling.*
REECOL Research Project 101112657 July 2023 – December 2026 Total budget: €2.861 million	**“Ecological rehabilitation and long-term monitoring of post mining areas”** Poltegor Institute (POLT, PL), VUHU A.S. (VUHU, CZ), Główny Instytut Górnictwa – Państwowy Instytut Badawczy (GIG-PIB, PL), Bureau de Recherches Géologiques et Minières (BRGM, FR), Institut National de l’Environnement Industriel et des Risques (INERIS, FR), KOMAG Institute of Mining Technology (KOM, PL), Public Power Corporation S.A. (PPC, EL), Valorhiz SAS (FR), Polska Grupa Górnicza S.A. (PGG, PL), Premogovnik Velenje, d.d. (PV, SI), Technical University of Crete (TUC, EL) *REECOL aims to improve post-mining rehabilitation, taking into account ecosystem degradation, future intended land uses, affordability of solutions, and the impact of climate change. New solutions for post-mining land reclamation, revegetation and ecosystem rehabilitation are being developed, tested and monitored at selected sites across different coal regions. The best-practice solutions being developed, including a certification method, will help establish appropriate ecosystems to control soil erosion, and to improve water quality, wildlife habitat, and the appearance of former mines as they are transformed to other uses.*
SCoLINE Big-Ticket Project 101254476 March 2026 – February 2030	**“Innovative composite slings system for PV and power line based on composite poles for live power line construction on post-mining areas to transform them into green energy production area”** KTKM Sp. z o.o. (KTKM, PL), Główny Instytut Górnictwa – Państwowy Instytut Badawczy (GIG-PIB, PL), NCT S.A. (NCT, PL), ENNECOR Sp. Z o.o. (ENN, PL), GFZ Helmholtz-Zentrum für Geoforschung (GFZ, DE), MKP Kompozit s.r.o. (MKP, CZ)

Total budget: €16.277 million	*SCoLINE responds to the need to expand and upgrade Europe's transmission and distribution networks for more renewables, including on post-mining areas. The project will demonstrate solar PV with a medium-voltage power distribution line based on hybrid steel-composite poles with a novel anchoring system or foundation. Materially efficient and with the added benefit of live construction, the new solution comprises a partial inner steel core bonded to a composite outer. At present, such poles are mainly made from steel, aluminium, steel reinforced concrete, or wood. The project will also demonstration a novel composite sled support structure for PV panels which will enable their installation on the slopes of mining waste heaps without the need for costly foundations.*
TRIDENT Research Project 101296055 October 2026 – September 2029 Total budget: €2.998 million	**"Thermal energy storage in post-mining lakes for district heating transformation"** GFZ Helmholtz Centre for Geosciences, Germany (GFZ, DE), Ramboll Deutschland GmbH (RAMBOLL, DE), PGE Górnictwo i Energetyka Konwencjonalna S.A. (PGE GiEK, PL), PGE Energia Ciepła S.A. (PG EEC, PL), Główny Instytut Górnictwa – Państwowy Instytut Badawczy (GIG-PIB, PL), Instytut Ekologii Terenów Uprzemysłowionych (IETU, PL), Solmax Geosynthetics GmbH (SOLMAX, DE), Institut National de l'Environnement Industriel et des Risques (INERIS, FR) *TRIDENT will examine the technical feasibility and scalability of pit thermal energy storage (PTES) at former open-pit lignite mines. The repurposing of former open-pit mines for thermal energy storage using excess heat and power from renewable energy sources and the electricity grid will contribute to the European Green Deal, while adding economic value in the coal region, providing jobs and contributing to EU energy supply security. The main objective of TRIDENT is to prepare a techno-economic feasibility study for PTES in post-mining lakes.*