27th World Mining Congress
LIMA PERU
JUNE, 24th - 26th, 2026

INSTITUTO DE INGENIEROS DE MINAS DEL PERÚ

Mine to H2
RFCS JT PROJECT



Repurposing a former coal mine: green hydrogen for the transport sector using the circular economy and coupled with the heating sector

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World Mining Congress 2026
Mining For The Future:
Trust, Transformation and Technology
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Why Europe invests in green hydrogen for mobility?

Green hydrogen is a strategic option for decarbonising heavy-duty transport and industrial mobility where direct electrification is difficult.

- Reduces emissions in hard-to-abate sectors.
- Strengthens energy security by replacing imported fossil fuels with European renewable energy.
- Provides long range and fast refuelling for buses, trucks and mining machinery.
- Boosts European industry: electrolysers, storage, HRS and fuel cells.
- Links the energy transition with new jobs in mining regions.

H_2 value chain for mobility



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MINE-TO-H2 Project

Co-funded by the European Union

Research Fund for Coal & Steel

Mine toH2
RFCS JT PROJECT

Call: RFCS-2023-JT
Start date: 01/04/2024
End date: 30/09/2028
Total costs: 18 052 926 €

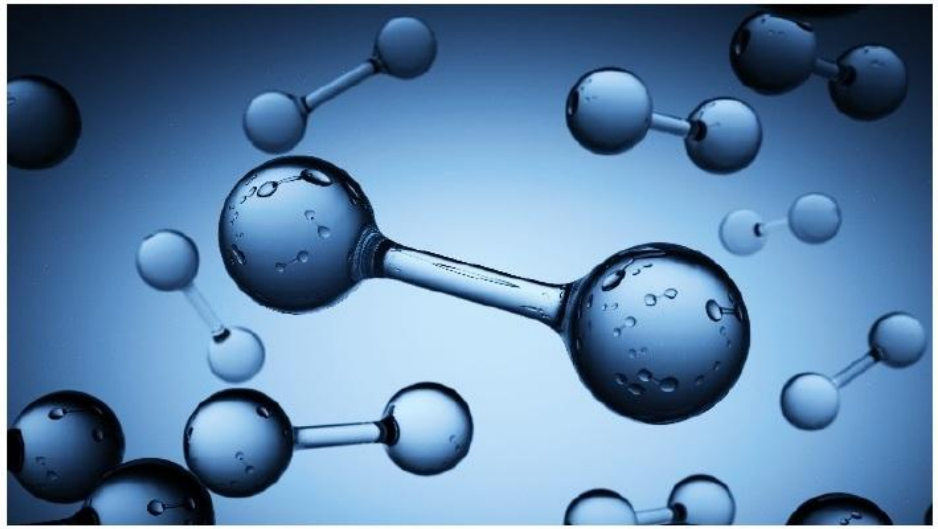
Project partners:

- **Central Mining Institute – National Research Institute (POLAND)**
- **HULLERAS DEL NORTE SA (SPAIN)**
- **DURO FELGUERA (SPAIN)**
- **HYREN (SPAIN),**
- **ALSA (SPAIN)**
- **UNIVERSIDAD DE OVIEDO (SPAIN)**
- **FAEN (SPAIN)**



Problem identification

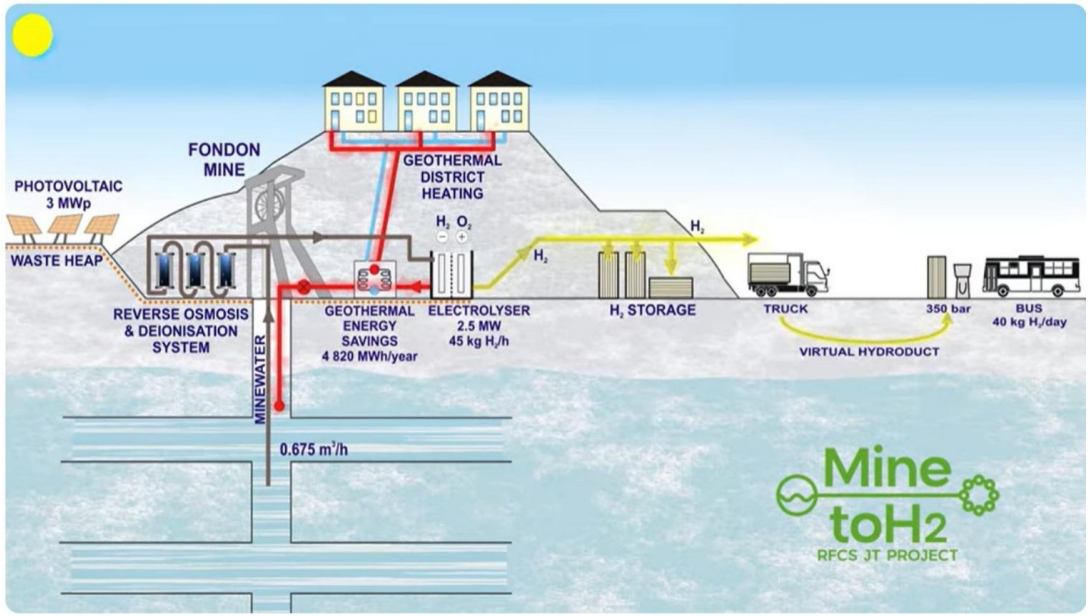
- The European Green Deal is supported by the Fit for 55 package, which states that all Union actions and policies, including the RFCS, should pull together to help the Union achieve a successful and **just transition towards a sustainable future**.
- **Hydrogen production and its coupling with the heating sector** is an excellent option to support the just transition of the coal sector and regions most affected by the transition by repurposing end-of-life coal mines and developing a power sector based mainly on renewable energies.
- **Hydrogen can be used as a fuel, an energy carrier or a feedstock and could reduce emissions** in hard-to-abate sectors, particularly in industry and transport.



From mine closure to clean energy hub

Project overview

- Use mine water for electrolysis, saving water from the population supply.
- Install photovoltaic power on former waste heaps and mining land.
- Recover electrolyser cooling heat for geothermal district heating.
- Demonstrate the economics of green H_2 plants.
- Train and re-skill former coal miners.



System integration target: from component maturity to operational demonstration (TRL 8).

Project results

- Operating green hydrogen plant.
- Hybridisation with an existing geothermal plant.
- PV plant in a former coal open-pit mine.
- Storage and distribution facility for H_2 at 500 bar.
- Virtual hydroduct, hydrogen refuelling station (HRS) and two intercity H_2 bus prototypes: Fuel Cell Electric Vehicle & Internal combustion.
- Training and reskilling programmes for former coal mining workers.

H2 STORAGE
500 bar



DIGITAL TWIN



BLENDING
- Testing
- Limits ¿?



Project impact

Environmental

Lower climate impact of passenger transport and decarbonisation where electrification is not available.

Economic

More than 95% reduction in refuelling time compared with electric vehicles; energy efficiency gains through heat recovery.

Technological

Avoiding complementary cooling systems for the electrolyser and developing intercity coaches using 350 bar infrastructure.

Social

Protect workers vulnerable to transition through access to re-skilling programmes and jobs in new sectors.



Mobility use case: fast refuelling, high autonomy and industrial duty cycles.

Technical and economic parameters

Description	Value
Functioning hours of the installation for one year	6,000 h
Hourly production of hydrogen	45 kg/h
Annual hydrogen production	270,000 kg/year
Annual photovoltaic functioning hours	1,200 h/year
Photovoltaic energy production	3,600 MWh/year
Tolls and charges for electricity supply	15 €/MWh
Operating expenses (personnel, maintenance, repairs)	250,000 €
Electrical consumption of the plant	3 MWh

Key figures: 45 kg H_2/h, 270,000 kg H_2/year, 3,600 MWh/year PV production and 3 MWh electrical consumption of the plant.

Lessons learnt: economic feasibility

The economic assessment showed that hydrogen production via electrolysis is not feasible unless a specific subvention of at least 50% is obtained for developing the Green Hydrogen Plant.

- Current investment conditions require public support to bridge the economic gap.
- Sensitivity to financing conditions and energy price assumptions remains decisive.
- Demonstration projects help reduce uncertainty for future deployment.

$$NPV = -10{,}170 + \frac{571}{(1+0{,}08)} + \frac{571}{(1+0{,}08)^2} + \cdots + \frac{571}{(1+0{,}08)^{15}} = -2$$

$$Internal\ rate\ of\ return\ (IRR) = 7\,\%$$

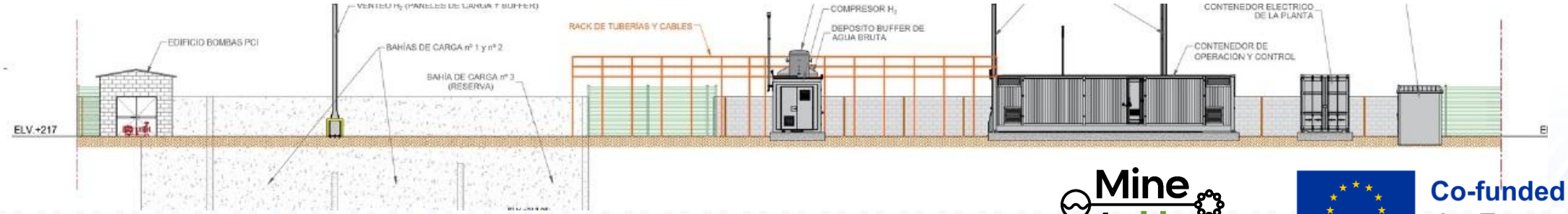
$$NPV = -5{,}000 + \frac{571}{(1+0{,}08)} + \frac{571}{(1+0{,}08)^2} + \cdots + \frac{571}{(1+0{,}08)^{15}} =$$

$$Internal\ rate\ of\ return\ (IRR) = 8\,\%$$

Original economic assessment excerpt

Lessons learnt: permitting and authorisations

- The concession to use water from La Nalona mine for green hydrogen production was granted (October 2024).
- The strategic environmental assessment was approved by the Principality (June 2025).
- Access and connection to the electricity grid was requested and authorised, including high-voltage equipment (July 2025).
- Langreo City Council gave final approval for the urban planning modification enabling transformation of Pozo Fondón de Sama (February 2026).
- Basic Engineering and the Procurement phase were developed in parallel to manage equipment lead times and supplier negotiations.
- Requests for information covered the electrolyser, compressor, HRS, high-pressure loading panels, heat exchanger and interconnection piping.
- Detailed engineering started in September 2025; civil works for earth movements were already advancing.



Next steps

Implementation roadmap

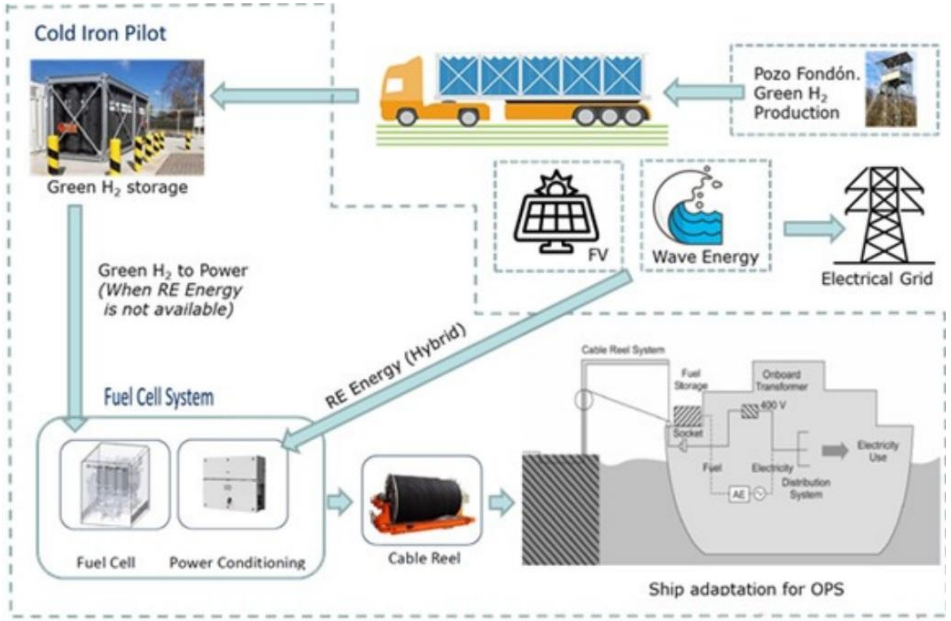
A common database of potential off-takers near the project has been developed, collecting hydrogen volumes, technical and operational supply conditions and price references for future MoU / term sheet discussions.

New collaborations

- H_2 industry: priority off-takers are current hydrogen users, mainly chemical companies and steel manufacturers.
- H_2 mobility: initiatives discussed at national and regional level, including cooperation with the National Centre for Hydrogen and the H_2 LOGIN project.

Towards industrial applications

- **Potential applications beyond project targets:** exploring further pilots involving other stakeholders, e.g. Onshore Power Supply (OPS).
- **Pathway to scalability and reproducibility:** engaging potential off-takers such as regional and national bus fleets, urban fleets, waste management fleets, retail and logistics fleets, and industrial plants.



Replication logic: clean power + mine assets + H_2 demand = regional hydrogen ecosystem

Project overview



https://youtu.be/mYJsP5SgdvA?si=bNxD5QFb3gA8H5uj

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Thank you for your attention!



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