Decarbonized
& Sustainable
Industry

POSTERS

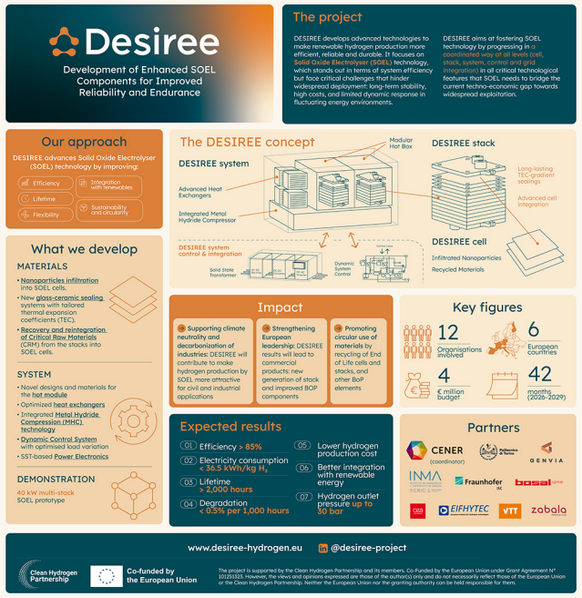
Posters Area.
Pabellón 2 – C30

DS Industry 2026

Efficient zero-emissions gas turbine POWER system for MARitime transport

marpower

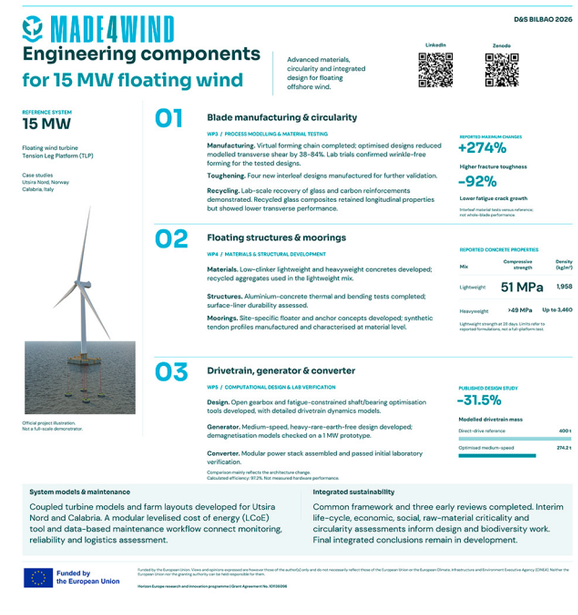
A01



Development of Enhanced SOEL Components for Improved Reliability and Endurance

Desiree

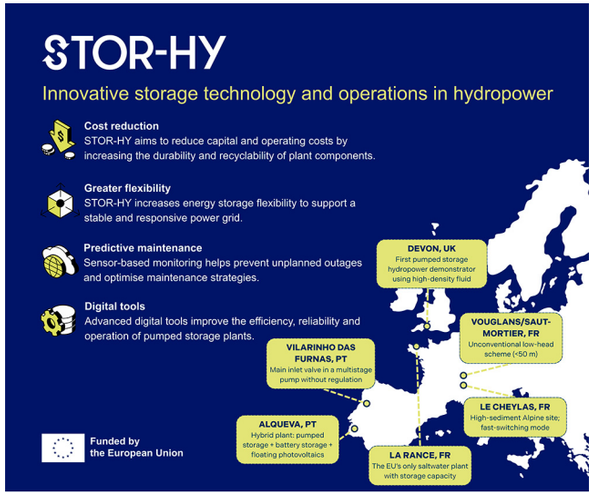
A02



Engineering components for 15MW floating wind

MADE4WIND

A03



Innovative storage technology and operations in hydropower

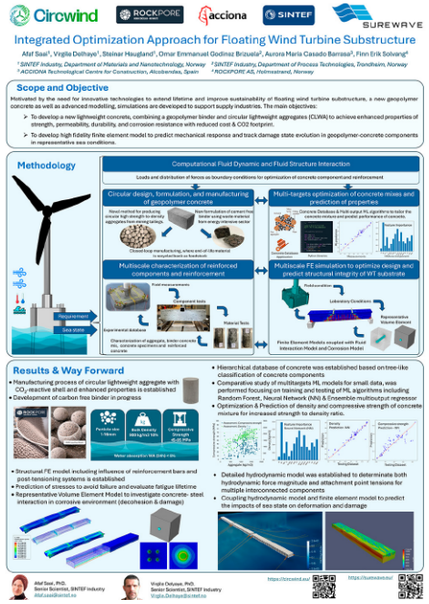
STOR-HY

A04

SHERPA

SHERPA

B01



Integrated Optimization Approach for Floating Wind Turbine Substructure

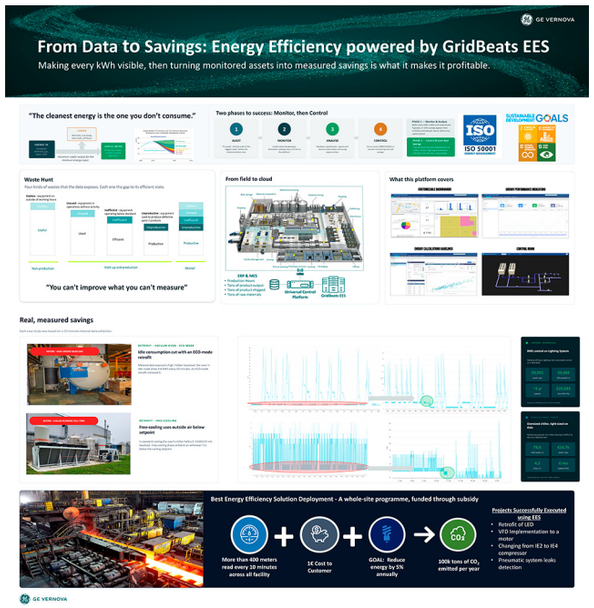
Circwind

B02

INDUCE

zabala INNOVATION

B03



From Data to Savings: Energy Efficiency powered by GridBeats EES

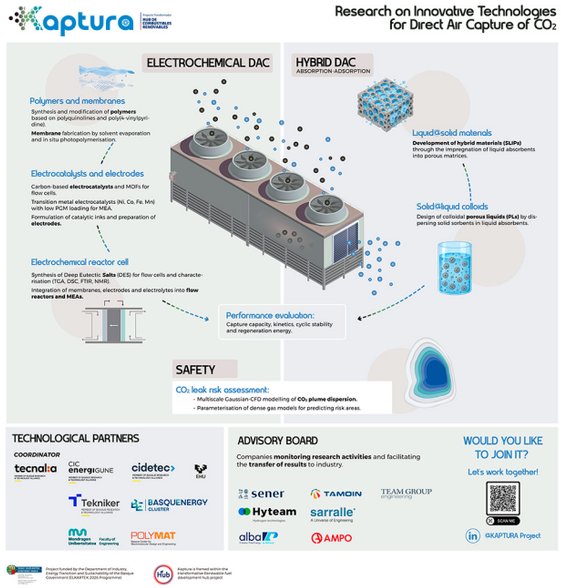
GE VERNOVA

B04

Research on innovative surfaces and materials for CO transport, distribution, storage and management

CO_2 GEST

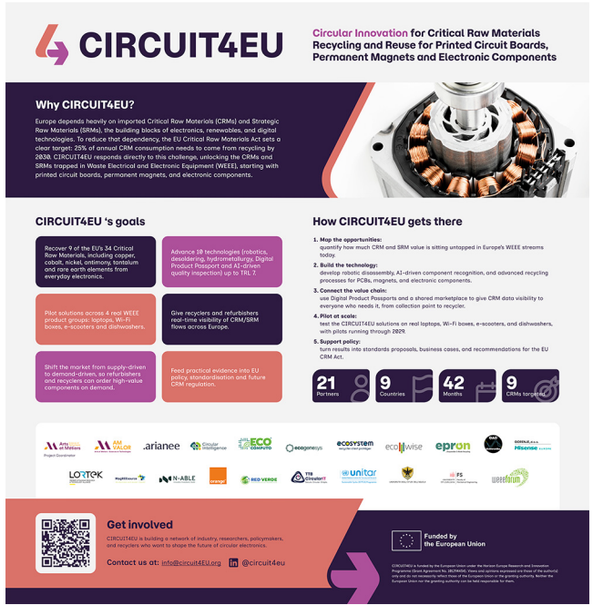
C01



Research on Innovative Technologies for Direct Air Capture of CO2

aptura

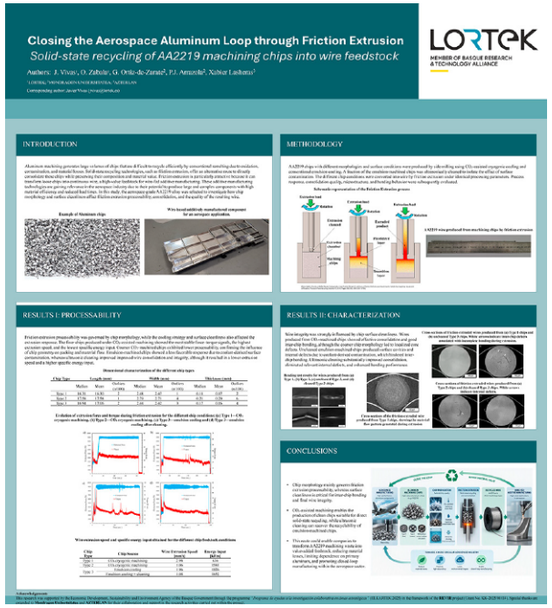
C02



Circular Innovation for Critical Raw Materials Recycling and Reuse for Printed Circuit Boards, Permanent Magnets and Electronic Components

CIRCUIT4EU

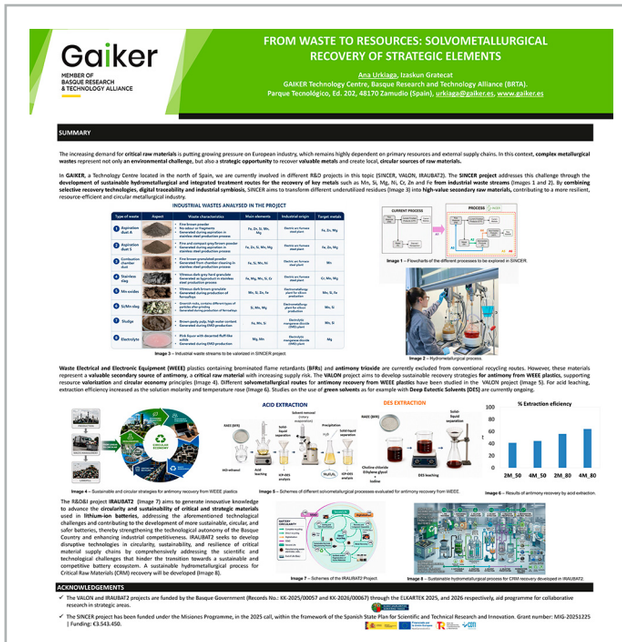
C03



Closing the Aerospace Aluminum Loop through Friction Extrusion

LORTEK
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

C04



From waste to resources: solvometallurgical Recovery of strategic elements

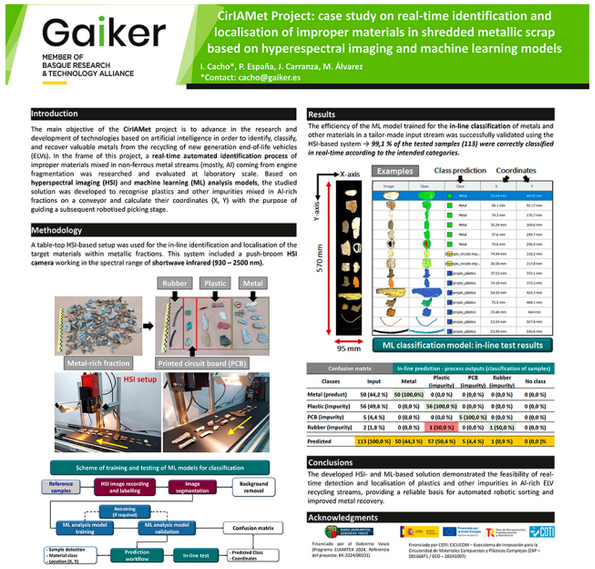
Gaiker
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

D01

COMPLESOLV Project: depolymerization and solvent-based processes to activate the circularity of complex plastic waste

Gaiker
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

D02



CirlAMet Project: case study on real-time identification and localisation of improper materials in shredded metallic scrap based on hyperespectral imaging and machine learning models

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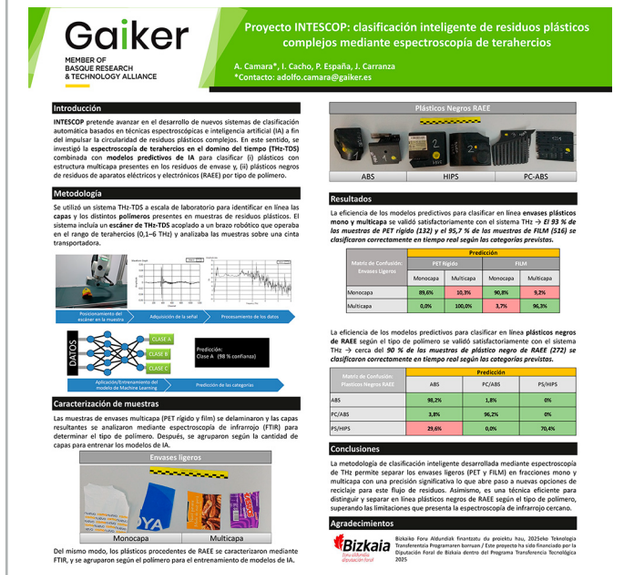
D03



Proyecto INTESCOP: clasificación inteligente de residuos plásticos complejos mediante espectroscopía de terahercios

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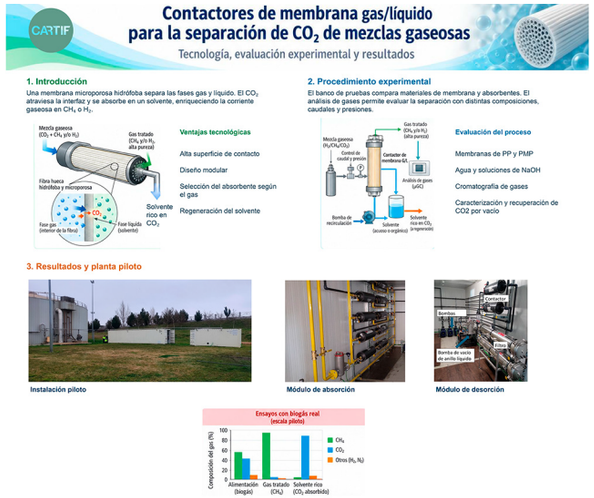
D04

Descarbonización de la demanda energética mediante bombas de calor, aprovechamiento de calor excedentario y almacenamiento térmico en el terreno

telur geotermia y agua

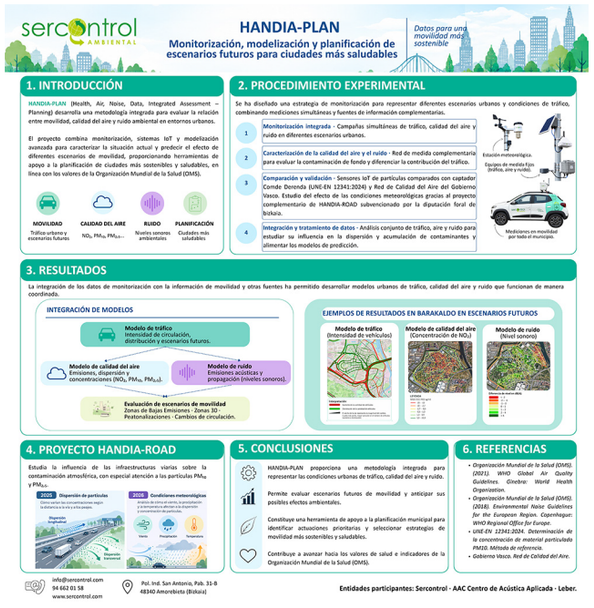
E01



Conectores de membrana gas/líquido para la separación de CO2 de mezclas gaseosas

CENTRO TECNOLÓGICO CARTIF

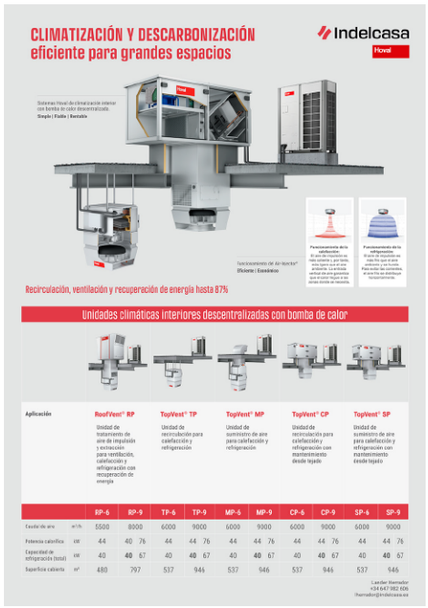
E02



HANDIA-PLAN Monitorización, modelización y planificación de escenarios futuros para ciudades más saludables

sercontrol AMBIENTAL

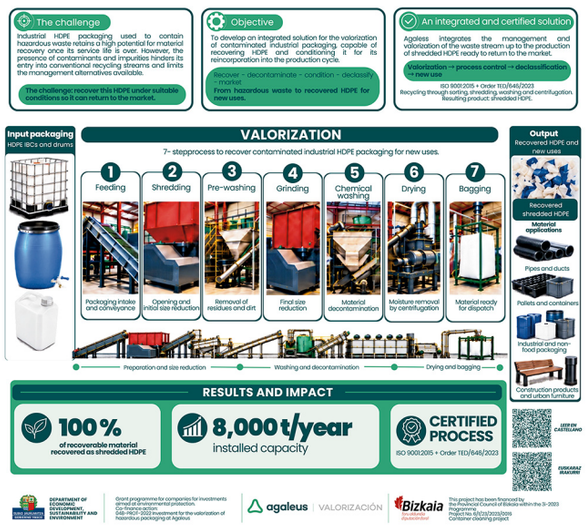
E03



Climatización y descarbonización eficiente para grandes espacios

Indelcasa Hoval

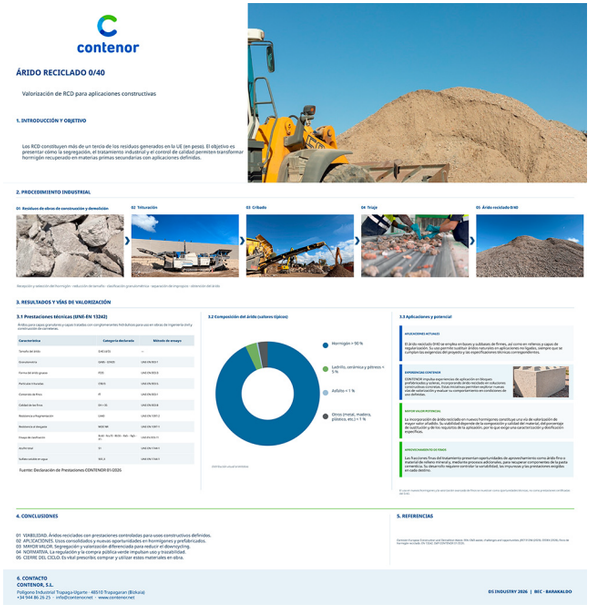
E04



HDPE recovery from contaminated industrial packaging Valorization process for its reincorporation into the production cycle

agaleus

F01



ÁRIDO RECICLADO 0/40 Valorización de RCD para aplicaciones constructivas

contenor

F02

De residuo a recurso: la reutilización de tierras excavadas para la producción de materiales de contrucción

AFESA

F03

CSR de alta calidad Impulsando la descarbonización de la industria

prezero

F04

Production of the first batch of green aluminium worldwide using hydrogen (h2) on an industrial scale

fives
Industry can do it

G01

Flexible, Decarbonized Industrial Heat

BRENMILLER
THERMAL ENERGY STORAGE

G02

Hydrogen solution

HyDemoBox
HYDROGEN SOLUTION

G03

Hasta 40 % de ahorro de energía

Larraioz

G04

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Radiant Heat Recovery in Steel Production: Development and Industrial Integration of an Innovative Heat Recovery System

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Steel Products Radiative Heat Recovery

Hot steel products release substantial amounts of thermal energy as they cool after continuous casting, representing an opportunity for waste heat recovery in steel production plants. Within EEETHOS project, a **radiative heat recovery system for slabs** is being developed to capture this otherwise unused energy, targeting a thermal recovery capacity of approximately 1 MW and heat-transfer-fluid temperatures of up to 330 °C. The recovered heat will support steam generation for the plant's existing 5 bar steam network, reducing reliance on fossil-fuel-based steam production and its associated CO_2 emissions. Beyond this application, additional potential uses include other internal industrial processes, electricity generation through Organic Rankine Cycles (ORC) or steam engines, industrial symbiosis with neighbouring facilities requiring thermal energy, etc.

- 1Mw thermal recovery
- Up to 330ºC
- Industrial steam generation & CO_2 reduction

Radiative Collector Optimisation

Radiative Heat Recovery System Configuration

The collector design was developed through a parametric assessment of alternative configurations, focusing on the number and positioning of radiative receiving surfaces and the degree of enclosure around the hot slabs. This analysis supported the selection of a configuration incorporating upper and lower receivers.
Collector dimensions were subsequently optimised considering the available installation space and the variability of slab formats processed at the plant, with the objective of maximising the annual amount of recovered thermal energy.

Performance Assessment

The selected collector configuration was further developed and assessed using a dynamic thermofluidic model (Dymola®) that accounts for heat-transfer-fluid temperature evolution along the hydraulic circuits and the transient cooling of successive steel slabs.
Simulations were performed for two operating scenarios, with target outlet temperatures of 230 °C (steam generation) and 330 °C (maximum temperature). The results show a repeatable cyclic response, with maximum outlet temperatures consistent with the specified targets.
The detailed analysis supported the refinement of the collector design and verification of the applicable thermal and hydraulic requirements.

Simulated outlet temperature evolution during successive slab passages, showing repeatable cyclic behaviour

Next Steps – Industrial Demonstration

A full-scale demonstrator is scheduled for installation in 2027 at APERAM's facilities in Belgium, where it will undergo more than 2,000 hours of testing under real production conditions.

The demonstration campaign will validate the design models, assess system performance and demonstrate the implementation of digital twin-based services for preventive maintenance. The results will also guide potential design improvements, supporting the subsequent scale-up and industrial deployment of the technology.

- Full scale demonstrator
- Installation 2027
- 2000 h

eeethos

This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No. 101178624

Radiant Heat Recovery in Steel Production: Development and Industrial Integration of an Innovative Heat Recovery System

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H01

Soluciones de eficiencia energética para la industria siderúrgica. Experiencias reales y resultados

stratenergy velatia

La industria del acero es uno de los sectores más intensivos en consumo energético a nivel industrial, con una demanda térmica y eléctrica significativa derivada de los procesos de fusión, colada continua, laminación, tratamiento térmico, y servicios auxiliares como aire comprimido, bombeo y ventilación.

En plantas integradas, la energía térmica —principalmente en forma de gas natural— puede llegar a representar hasta el 80% del consumo de gas y hasta el 75% del consumo energético total, mientras que en acería eléctrica la energía eléctrica asociada a hornos de arco puede superar el 50%.

Una de las fuentes de mejora energética más relevantes se encuentra en la optimización de hornos de recalentamiento, tratamiento térmico y cabinas auxiliares.

Mejorar la eficiencia de combustión mediante ajustes de relación aire-combustible y recuperación de calor de gases de escape permite reducir considerablemente el consumo de combustibles fósiles. La instalación de recuperadores de calor o regeneradores en hornos de alta temperatura posibilita precalentar aire de combustión o alimentar circuitos de agua caliente industrial, optimizando el uso de energía térmica disponible.

La gestión de vapor, aunque de menor magnitud en comparación con otras industrias, mantiene importancia en los sistemas de descapado y en servicios auxiliares como sistemas de calefacción, lavado y limpieza de equipos.

Estos gases, que anteriormente se desperdiciaban o se quemaban sin aprovechamiento, hoy se valorizan mediante calderas de recuperación y turbinas de vapor, disminuyendo la compra de electricidad y reduciendo las emisiones de CO_2 de la planta.

En paralelo, los consumos eléctricos en la industria siderúrgica son relevantes, especialmente en hornos de fusión, sistemas de bombeo, ventilación forzada, captación de polvos, trenes de laminación y circuitos de refrigeración.

Los sistemas de aire comprimido, de uso intensivo para accionamientos neumáticos, limpieza y control de válvulas, suelen presentar importantes pérdidas por fugas —entre el 20% y el 30% en plantas sin gestión adecuada— y sobredimensionamientos que generan consumos innecesarios. Una gestión eficiente incluye detección y reparación de fugas, ajuste de presiones, control secuencial de compresores y la incorporación de variadores de frecuencia (VFD) para modular su operación según la demanda real.

Asimismo, los sistemas de bombeo y ventilación en circuitos de agua de refrigeración, sistemas de captación y limpieza de gases suelen estar sobredimensionados o funcionar a velocidad fija. La instalación de VFD, junto con sensores de presión y temperatura, permite modular caudales según las necesidades reales del proceso, reduciendo el consumo eléctrico que puede llegar a ahorrar entre el 20% y el 40% en estas aplicaciones.

Un aspecto crítico en las plantas siderúrgicas son los sistemas de enfriamiento, que drenan el calor generado en hornos, laminadores y equipos de fusión. Una limpieza periódica de intercambiadores, torres y rellenos y distribución deficiente del agua reducen su capacidad de disipación térmica. Esto eleva la temperatura de retorno al sistema y obliga a los equipos de bombeo y enfriamiento a trabajar en condiciones menos eficientes. El mantenimiento preventivo, la regulación de caudales y velocidades, el tratamiento químico del agua (antiincrustantes, biocidas, inhibidores de corrosión) y la incorporación de VFD en los sistemas de bombeo permiten optimizar su rendimiento, reducir consumos y extender la vida útil de los equipos asociados.

En conjunto, la combinación de estas acciones permite a las plantas siderúrgicas reducir su consumo energético global, mejorar su competitividad y reducir su huella ambiental, en un contexto en el que las regulaciones sobre emisiones y la presión de los mercados internacionales exigen procesos cada vez más eficientes y sostenibles.

Stratenergy ha desarrollado e implementado, durante los últimos años soluciones de eficiencia energética en industrias de este sector, que han generado reducciones significativas en los consumos de gas y electricidad.

Soluciones implementadas y resultados

- Rediseño de los sistemas de refrigeración de la acería, mediante la transformación de circuitos abiertos por circuitos cerrados, sustitución de torres de enfriamiento por aero-refrigeradores y la incorporación de sistemas de caudal variable en los grupos de bombeo, con una reducción de un 45% en el consumo eléctrico y un 75% del consumo de agua.
- Valorización de los gases de combustión de horno de laminación, mediante recuperadores gases/aire cilíndrico para combustión y post-aprovechamiento de energía de los gases para generación de vapor mediante caldera de recuperación. Ahorro generado en consumo total de gas natural en la industria de un 10%.
- Implementación de sistema de oxi-recirculación en horno de tratamiento térmico. Ahorro en el consumo de gas un 30% y los tiempos de tratamiento en un 24%.
- Retrofit del sistema de generación de aire comprimido, mediante compresores de alta eficiencia y sistema de regulación inteligente para el ajuste de la demanda, con un ahorro eléctrico asociado a este servicio del 25%.

Nuevas soluciones en desarrollo

- Construcción de cámara para el precalentamiento de barras y rollos en horno continuo de hipertemple, mediante el calor residual de gases de combustión, con unos ahorros estimados del 10% en el consumo de gas natural y un incremento de la velocidad del proceso de tratamiento del 14%.
- Instalación de quemadores de oxi-gas para el secado y calentamiento de cucharas, con un ahorro estimado del 35% en el proceso.
- Incorporar un sistema de gestión inteligente de la demanda eléctrica en el horno de fusión, con un ahorro previsto del 5%.
- Precalentamiento de chatarra mediante la utilización de gases generados en el horno de fusión, con un ahorro estimado del 7% del consumo eléctrico del horno de fusión.

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Soluciones de eficiencia energética para la industria siderúrgica. Experiencias reales y resultados

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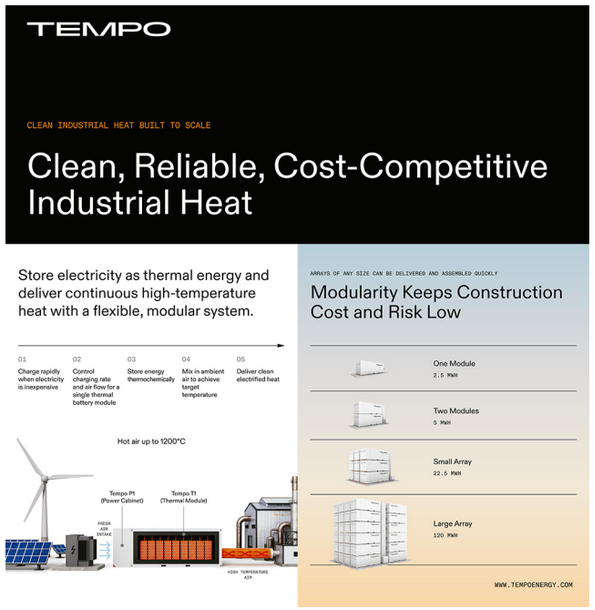
H02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Modularity Keeps Construction Cost and Risk Low

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Clean, Reliable, Cost-Competitive Industrial Heat

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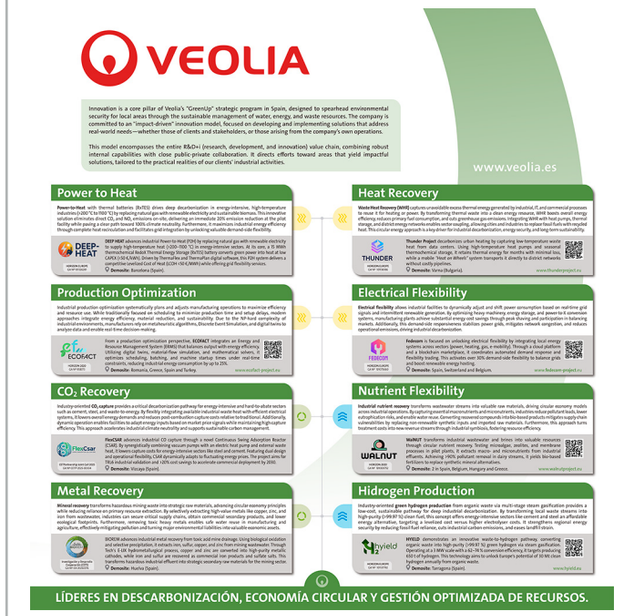
H03


VEOLIA

Innovation is a core pillar of Veolia's "GreenUp" strategic program in Spain, designed to spearhead environmental security for local areas through the sustainable management of water, energy, and waste resources. The company is committed to an "impact-driven" innovation model, focused on developing and implementing solutions that address real-world needs—whether those of clients and stakeholders, or those arising from the company's own operations.

This model encompasses the entire R&D+i (research, development, and innovation) value chain, combining robust internal capabilities with close public-private collaboration. It directs efforts toward areas that yield impactful solutions, tailored to the practical realities of our clients' industrial activities.

www.veolia.es

Power to Heat

Power-to-Heat with thermal batteries (PaTES) drives deep decarbonization in energy-intensive, high-temperature industries (>200 °C) by storing renewable electricity as a thermal buffer. This innovative solution eliminates direct CO_2 and NOx emissions on-site, delivering an immediate 20% emission reduction at the pilot facility while paving a clear path toward 100% climate neutrality. Furthermore, it maximizes industrial energy efficiency through complete heat recirculation and facilitates grid integration by unlocking valuable demand-side flexibility.

DEEP HEAT advances industrial heat decarbonization by replacing coal or gas with renewable electricity to supply high-temperature heat (>200–500 °C) in energy-intensive sectors. At its core, a TES.MAN thermochemical Redox Thermal Energy Storage (ReTES) battery converts green power into heat at low CAPEX (<50 €/kWh). Driven by ThermaTec and ThermaPen digital software, this P2H system delivers a competitive Levelized Cost of Heat (LCOH <90 €/MWh) while offering grid flexibility services.

Demosite: Barcelona (Spain).

Heat Recovery

Waste Heat Recovery (WHR) captures unavoidable excess thermal energy generated by industrial, IT, and commercial processes to reuse it for heating and power. By transforming thermal waste into a clean energy source, WHR boosts overall energy efficiency, reduces primary fuel consumption, and minimizes the greenhouse gas emissions. Integrating WHR with heat pumps, thermochemical storage, & industry thermal energy for months with minimal loss, while a mobile "Heat on Wheels" system transports it directly to district networks without costly pipelines.

Thunder Project decarbonizes urban heating by capturing low-temperature waste heat from data centers. Using high-temperature heat pumps and seasonal thermochemical storage, it retains thermal energy for months with minimal loss, while a mobile "Heat on Wheels" system transports it directly to district networks without costly pipelines.

Demosite: Varna (Bulgaria).

Production Optimization

Industrial production optimization systematically plans and adjusts manufacturing operations to maximize efficiency and resource use. While traditionally focused on scheduling to minimize production time and setup delays, modern approaches integrate broader goals like energy reduction, and sustainability. Due to the NP-hard complexity of industrial environments, manufacturers rely on metaheuristics algorithms, Discrete Event Simulations, and digital twins to analyze data and enable real-time decision-making.

From a production optimization perspective, **ECOFACT** integrates an Energy and Material Flow Management System (EMFMS) with a Manufacturing Execution System (MES), utilizing digital twins, material flow simulation, and mathematical solvers. It optimizes scheduling, batching, and machine startup times under real-time constraints, reducing industrial energy consumption by up to 25%.

Demosite: Romania, Greece, Spain and Turkey.

Electrical Flexibility

Electrical flexibility allows industrial facilities to dynamically adjust and shift power consumption based on real-time grid signals and intermittent renewable generation. By optimizing heavy machinery, energy storage, and power-to-X conversion, industries can provide valuable grid services, unlock cost savings through peak shaving and participation in balancing markets. Additionally, this demand-side responsiveness stabilizes power grids, mitigates network congestion, and reduces operational emissions, driving industrial decarbonization.

Indoasun is focused on unlocking electrical flexibility by integrating local energy resources. Its platform aggregates distributed assets, such as solar, storage, and flexible loads, and acts as a flexibility marketplace, it coordinates automated demand response and flexibility trading. This activates over 30% demand-side flexibility to balance grids and boost renewable energy hosting.

Demosite: Spain, Switzerland and Belgium.

CO_2 Recovery

Industry-oriented **CO_2 capture** provides a critical decarbonization pathway for energy-intensive and hard-to-abate sectors such as cement, steel, and waste-to-energy. By flexibly integrating available industrial waste heat with efficient electrical systems, it lowers overall energy demands and reduces post-combustion capture costs relative to traditional. Additionally, dynamic operation enables facilities to adapt energy inputs based on market price signals while maintaining high capture efficiency. This approach establishes industrial climate neutrality and supports sustainable carbon management.

FlexCSAR advances industrial CO_2 capture through a novel Continuous Swing Absorption Reactor (CSAR). By synergistically combining vacuum pumps with electrical heat pumps and external waste heat, it overcomes the limitations of energy-intensive sorbent regeneration and current heating fuel dosage. Validated in a 200 kg/day CO_2 pilot demonstrator, the technology has reached TRL6 industrial validation and >20% cost savings to accelerate commercial deployment by 2030.

Demosite: Vizcaya (Spain).

Nutrient Flexibility

Industrial nutrient recovery transforms wastewater streams into valuable raw materials, driving circular economy models across industrial operations. By capturing essential macronutrients and micronutrients, industries reduce pollutant loads, lower eutrophication risks, and enhance water reuse. Converting recovered compounds into fertilizer-based products not only creates valuable revenue streams but also strengthens resource resilience by replacing non-renewable synthetic inputs and imported raw materials. Furthermore, this approach turns treatment costs into new revenue streams through industrial symbiosis, fostering resource efficiency.

WalNUT transforms industrial wastewater and brines into valuable resources through circular nutrient recovery. Testing municipal, textile, and membrane processes in pilot plants, it extracts macro- and micronutrients from industrial streams. Ultimately, it delivers high-purity, tailored products and streams, it yields fee-based fertilizers to replace synthetic mineral alternatives.

Demosite: 2 in Spain, Belgium, Hungary and Greece.

Metal Recovery

Mineral recovery transforms hazardous mining waste into strategic raw materials, advancing circular economy principles while reducing reliance on primary resource extraction. By selectively extracting high-value metals like copper, zinc, and iron from wastewater, industries can secure critical supply chains, attain commercial secondary products, and lower ecological footprints. Furthermore, removing toxic heavy metals enables safe water reuse in manufacturing and agriculture, effectively mitigating pollution and having major environmental liabilities into valuable economic assets.

BIOREM advances industrial metal recovery from toxic acid mine drainage. Using biological oxidation and selective precipitation, it extracts iron, sulfur, copper, and zinc from mining wastewater. Through TechS & LIX hydrometallurgical process, copper and zinc are converted into high-purity metallic products. Ultimately, it delivers high-purity, tailored products and streams, it yields fee-based fertilizers to replace synthetic mineral alternatives. This transforms hazardous industrial effluent into strategic secondary raw materials for the mining sector.

Demosite: Huelva (Spain).

Hidrogen Production

Industry-oriented **green hydrogen production** from organic waste via multi-stage steam gasification provides a low-cost, sustainable pathway for deep industrial decarbonization. By transforming local waste streams into high-purity (>99.97 %) clean fuel, this concept offers energy-intensive sectors like cement and steel an affordable energy alternative, targeting a levelized cost versus higher electrolyser costs. It strengthens regional energy security by reducing fossil-fuel reliance, cuts industrial carbon emissions, and creates landfill diverts.

HYELO demonstrates an innovative waste-to-hydrogen pathway converting organic waste into high-purity (>99.97 %) green hydrogen via steam gasification. Operating at a 1 MW scale with a 62–78 % conversion efficiency, it targets producing 1,000 kg/day of clean hydrogen, aiming to unlock Europe's potential of 30 Mt clean hydrogen annually from organic waste.

Demosite: Tarragona (Spain).

LÍDERES EN DESCARBONIZACIÓN, ECONOMÍA CIRCULAR Y GESTIÓN OPTIMIZADA DE RECURSOS.

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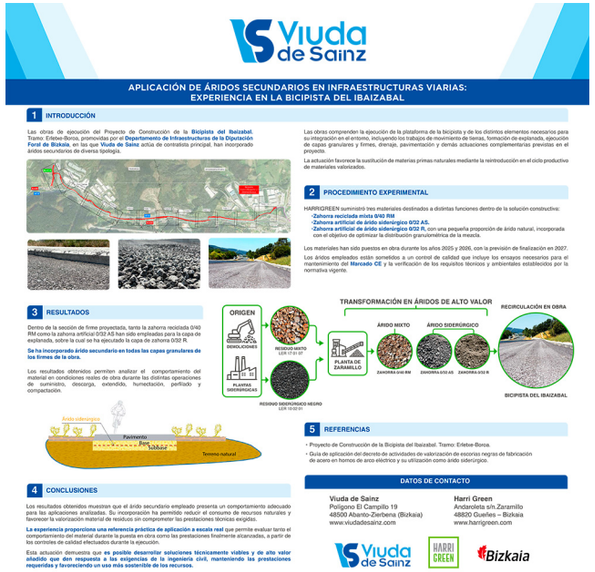
VEOLIA

H04



Aplicación de áridos secundarios en infraestructuras viarias: Experiencia en la bicipista del ibaizabal

Viuda de Sainz

I01

Accelerated Carbonation of Stainless Steel Ladle Furnace Slag: A Route for CO2 Capture and Circular Economy

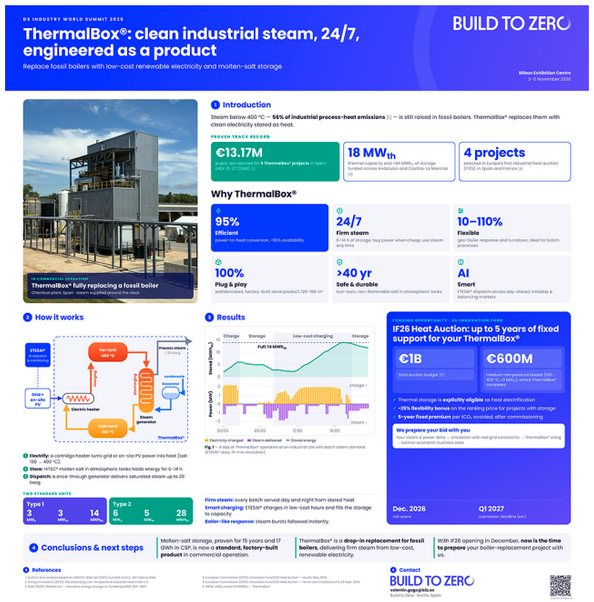
Industrial Symbiosis Hubs & Circularity · BIH4C Basque Industrial Hub for Circularity

I02

Soluciones de calor inteligente y sostenible en procesos industriales

NAWATTIA smart comfort

I03



ThermalBox®: clean industrial steam, 24/7, engineered as a product

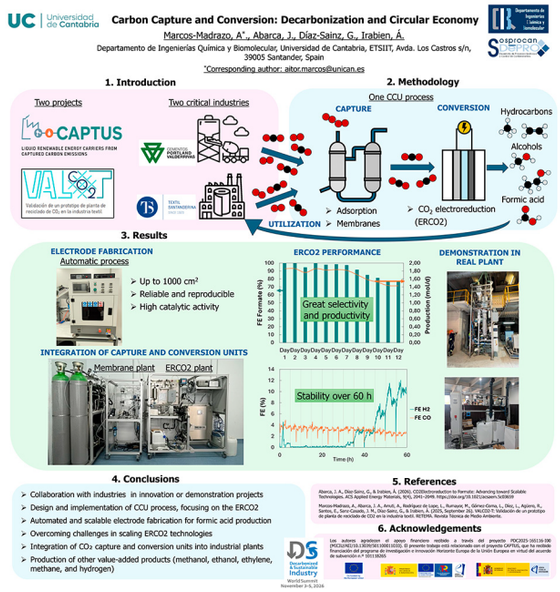
BUILD TO ZERO

I04

Del ahorro energético al valor económico para la industria

epsa

J01



Carbon Capture and Conversion: Decarbonization and Circular Economy

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J02

AIR4NRG

zabala INNOVATION

J03