



**Research on new materials and high-performance product design
through the reduction of critical raw materials for Low Carbon
applications.**

PROJECT DESCRIPTION – ZE-2024/00034

As part of the DIMEC project, several companies from the TUBACEX Group are carrying out the development and validation of new materials and advanced coatings with low content of critical metals (CM) such as titanium, platinum, nickel, cobalt, and tungsten. The aim is to replace these materials with more sustainable and efficient solutions without compromising mechanical strength, durability, or corrosion resistance in harsh environments, such as highly corrosive media (presence of acids, ammonium carbamate...), extreme temperatures and pressures, or cryogenic conditions. To this end, research is being conducted on special stainless steels and new coating techniques that minimize the use of critical elements while maintaining the required technical performance.

The project includes the application of these developments in three key case studies within the Green Urea production chain: the bipolar plates of PEM electrolyzers for green hydrogen generation; the strippers in urea plants, which are critical due to their extreme operating conditions; and components exposed to cryogenic and contaminating environments in carbon capture and storage (CCS) processes.

The consortium companies are working on manufacturing process design, prototype creation, and validation testing under representative conditions in order to demonstrate the technical and environmental feasibility of these solutions compared to current technologies.

TUBACEX INNOVACIÓN is leading the development of new materials and advanced metallurgical processes, contributing its expertise in stainless steels, thermodynamic simulation, and alloy design. Its work ranges from the analysis of technical requirements and the design of optimized chemical compositions to the selection and adaptation of materials and manufacturing processes, including technologies such as advanced welding, additive manufacturing (L-PBF), and coatings via HIPIMS. In addition, it conducts extensive characterization of prototypes at both the microstructural and

mechanical levels and performs specific tests that replicate extreme operating conditions. At the same time, it leads the project's results dissemination strategy, promotes the publication of scientific content, and fosters collaboration with other technological stakeholders.

CONSORTIUM

Coordinator:

- ACERÍA DE ÁLAVA S.A.

Partners:

- TUBACEX TUBOS INOXIDABLES S.A.
- TUBACEX SERVICIOS DE GESTIÓN S.L.U

Agents of the Basque Network of Science, Technology and Innovation (RVCTI):

- TUBACEX INNOVACIÓN S.L.
- TECNALIA RESEARCH & INNOVATION
- AZTERLAN
- TEKNIKER

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- Total consortium budget: €3,617,212
- Duration: 2024 – 2025

