



Converting seawater pollutants into useful chemicals

The European Union has funded the **ICONIC** project, coordinated by ICFO, that aims to tackle current global environmental challenges.

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In today's ever-changing world, sustainability and resource circularity are vital aspects of the fight against environmental challenges. Anthropogenic activities such as intensive agriculture, electricity generation and industrial processing have highly distorted the global carbon and nitrogen cycles in the last century. This has resulted in increasing greenhouse gas emissions and the degradation of water quality worldwide, leading to widely known global warming effects and increasing health issues and mortality.

Exploring novel approaches and finding innovative solutions to these problems requires bold ambition from research institutions and a clear vision from funding bodies. In this context, the European Innovation Council has funded several projects that aim to tackle these challenges under a portfolio approach, amongst which is project [ICONIC](#) - Integrated conversion of nitrate and carbonate streams - coordinated by Prof. at ICFO Pelayo Garcia de

Arquer.

Using as an inspiration how the natural carbon and nitrogen cycles operate, ICONIC presents itself as an **environmental remediation** and **sustainable production** technology. On the one hand, the aim is to help restore the ecosystem by capturing dissolved CO₂ and nitrates from seawater, pollutants responsible for ocean acidification and eutrophication that harm wildlife, disrupt the ecosystem balance, promote the bloom of disease-causing bacteria and viruses and ultimately, jeopardize our health. On the other hand, the project offers a circular solution by transforming those captured chemicals into useful industry products such as urea, the most important fertilizer precursor for agriculture and farming, and many other applications such as plastic or drug manufacturing.

Innovation and scientific entrepreneurship are at the base of ICONIC, where the proposed solution is based on novel electrochemical reactions and system designs aimed at developing **an integrated and scalable prototype** that can mitigate carbonate and nitrate presence **on-site**, reducing and recycling nutrient losses from agriculture and balancing back the carbon and nitrogen cycles. As a green technology solution, it will be **locally powered with renewable energy sources** to avoid any additional carbon footprint.

The team combines a multidisciplinary group of experts from ICFO, [ICN2](#), [ICMAB](#), [Trinity College Dublin](#), the [Technical University of Munich](#) and the [Delft University of Technology](#), consisting of both senior established and young emerging researchers with a track record of highly innovative achievements in chemistry, materials science, spectroscopy and engineering.

[The EIC CO₂ and Nitrogen Portfolio](#) is a collaborative initiative comprising eight research projects - ICONIC, CONFETI, DAM4CO₂, ECOMO, HYDROCOW, Mi-Hy, MINICOR, and SUPERVAL - these projects united under a common umbrella to create synergies and foster collaboration and address shared challenges and opportunities.?