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Italcer patents the transformation of CO2 into valuable raw materials

Behind the industrial patent registered by the Italcer group, which has just received approval from the European Commission with a score of 69—well above the threshold of 55 from the Life program (the EU funding tool for green projects)—there are over two years of work and 2 million euros invested in research and development. This patent opens up a revolutionary scenario not only for the ceramics sector but for many energy-intensive industries using fossil fuels. It eliminates carbon dioxide and pollutants like sulfur and nitrogen oxides from industrial processes, turning them into "high-value secondary raw materials."

The Rubiera-based holding company (Reggio Emilia) plans an additional 50 million euros in investment over the next seven years to scale the invention, created in the Imola laboratories by chemist Isidoro Giorgio Lesci (the same person who patented Advance, the anti-pollution and antibacterial porcelain stoneware from Italcer six years ago), into an industrial-scale plant capable of eliminating all emissions from the Reggio Emilia ceramics group. The process requires no energy consumption, no harmful substances (it uses natural biomimetic processes), but instead creates jobs and pure materials that can be reused in other production processes—a perfect example of the circular economy.

Professor Lesci himself explains the method for transforming pollutants into wealth, substances previously considered a challenge for European manufacturing competitiveness: "Exhaust fumes are directed into a system made of separate chambers that take advantage of the chemical-physical properties of each component, causing them to precipitate separately through spontaneous reactions similar to those occurring in nature. And without requiring external energy, because the heat from the fumes, which exit the factory at 120 degrees, is recovered. It's a continuous process; the gas passes through various 'rooms' with different temperatures and pH levels, trapping sulfuric acid in the first room (which is water-soluble), and capturing another gas in the subsequent ones by changing the conditions. It's a job for chemists, not engineers."

Italcer has estimated that, over seven years, the revenue from applying the patent in its factories will reach 80 million euros, through the sale of secondary raw materials and savings from CO2 taxes (the controversial ETS mechanism), with a record margin of 50% and 120 new jobs. This is not insignificant for a group that generated 350 million euros last year from slabs and tiles, and aims to reach 380 million by the end of 2025. The first pilot plant will be launched as soon as the financing for the Life Climate Action subprogram is approved, with an investment of around 6 million euros to be completed by spring 2026. This initial step will allow for the removal of 5,500 tons of CO2 per year from the atmosphere, in

addition to saving 3,700 tons through the production of precipitated calcium carbonate as a by-product, rather than through a primary process.

In full operation, in seven years, the 117,000 tons of CO₂ emitted annually by Italcer's three Emilia-based factories will be transformed into 200,000 tons of pure precipitated calcium carbonate, ready to be reused in the pharmaceutical or cosmetic industries. Other gases will be converted into calcium nitrate (over 1,400 tons), useful as a fertilizer in agriculture; potassium sulfite (a food antioxidant); calcium sulfate, i.e., gypsum. Odorous molecules will also be oxidized and neutralized, and all water vapor will be recovered—about 15,000 liters of water per hour from just the three atomizers.

"The recognition from the European Union fills us with pride and confirms our commitment to decarbonize industrial processes with realism, gradualness, and an economically sustainable approach," emphasizes Graziano Verdi, co-founder and CEO of Italcer, a benefit company controlled by investment funds Mindful Capital, Miura, and Capital Dynamics. Italcer has been a pioneer in green ceramics (it installed the first 100% electric kiln last year), ranking first among Italian companies in the Sustainability Award 2024. "It's an extraordinary innovation, even in its simplicity. With this patent, we enter a new business, which is theoretically scalable and easily replicable not only in ceramics but also in the glass, brick, pasta, and automotive industries," concludes Verdi. "We are also considering granting the patent for royalties. But this solution cannot be adopted by all energy-intensive industries because it could lead to an excess of secondary raw materials, compared to demand, and thus pollution."

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