Making ceramic tile production greener with reused heat

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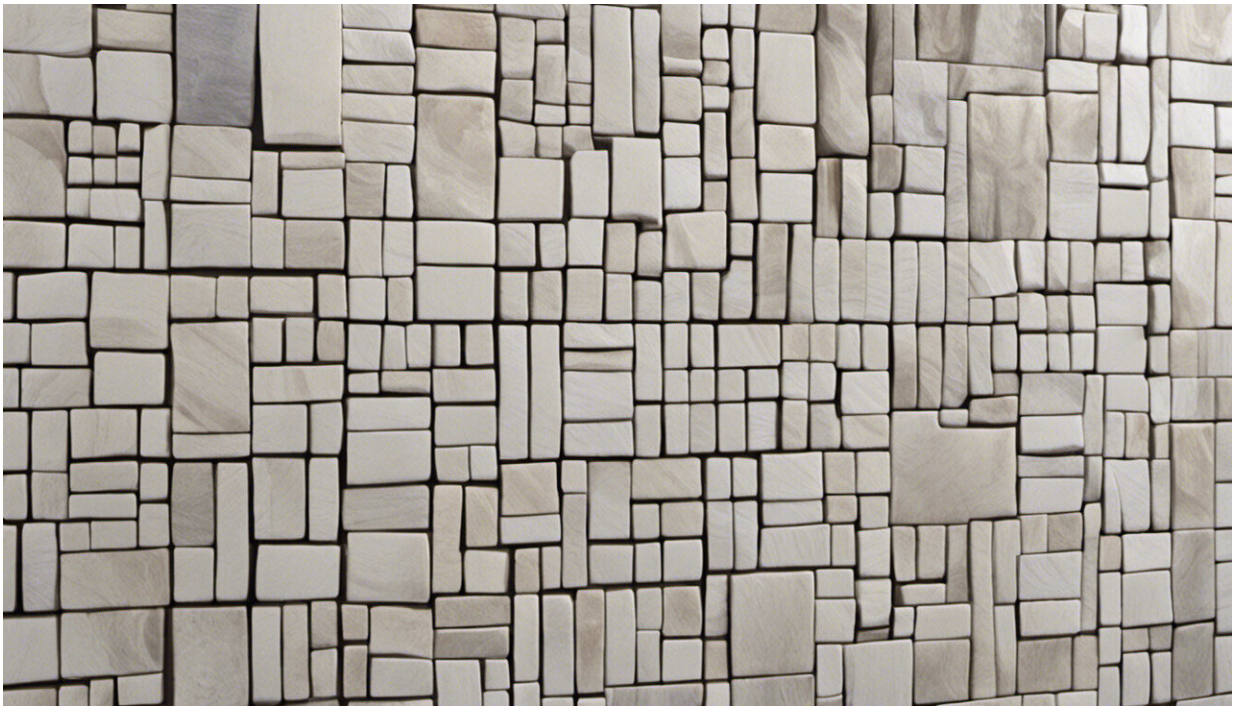

Credit: AI-generated image (disclaimer)

With its wide range of applications from construction to consumer goods, industrial processes and cutting-edge technologies, the ceramics industry is an integral part of EU manufacturing. A key component of energy-intensive industries (EIIs) that include sectors like iron, steel, cement, chemicals, pulp and paper, ceramics also have a climate

footprint and their production processes involve high costs.

According to a report by the Institute for European Studies of Vrije Universiteit Brussel, EIIs are responsible for about 15 percent of EU total direct greenhouse gas emissions. This is because several EIIs require high-temperature heat for processes that still rely on fossil fuels. Most ceramic sectors are also energy intensive, as energy can account for up to 30 percent of their total production costs. The EU-funded ETEKINA project is addressing these issues by improving the energy performance of industrial processes.

Recovering heat for reuse

At ETEKINA's core is a heat pipe prototype. This will help reduce both the environmental impact and energy bills of three different production plants in the aluminum, steel and ceramics sectors based in Spain, Slovenia and Italy, respectively. A news item on the project website notes that "there are savings to be made by implementing more energy efficient processes, and the European ceramics industry is experimenting with heat pipe heat exchangers (HPHEs) to recapture energy lost from piping hot kilns and transferring that energy to another point in the production chain."

A kiln is a thermally insulated chamber, a type of oven used for firing, burning or drying porcelain or bricks. The primary energy use in ceramic manufacturing is for kiln firing and, in many processes, drying of intermediates also requires energy consumption. Natural gas, liquefied petroleum gas and fuel oil are used for most drying and firing operations, but solid fuels, electricity, liquefied natural gas and biogas/biomass are also utilized.

The same news item reports that "ETEKINA HPHEs will be tested on two kilns present within the new pilot plant at Ceramiche Atlas

Concorde Spa." It adds: "Rather than dispose of the heat, Ceramiche Atlas Concorde Spa wants to collect it and then use it within other processes inside the plant." Quoted in the news item, Luca Manzini, in charge of energy management for Ceramiche Atlas Concorde Spa, part of Gruppo Concorde, says: "We will save some natural gas in this way. The idea is not a breakout in technology, it's not like going to the moon. It's something that we already do to some extent. But up until now we didn't have the technology in order to recover the kiln exhaust energy."

The ETEKINA project website explains the technology: "A heat pipe transfers thermal energy passively from a hot to a cold stream by a boiling condensation cycle inside a hermetically sealed metal tube. In this way, heat from the hot area can be transferred very efficiently to a cold part of the pipe. In the ETEKINA project, the engineers will combine many heat pipes to create a heat exchanger design according to the specific needs of each production plant."

The ongoing ETEKINA (Heat Pipe Technology For Thermal Energy Recovery In Industrial Applications) project is scheduled to end in 2021. As noted on the project website, it aims to recover 57-70 percent of the waste heat stream in EIIs.

More information: ETEKINA project website: www.etekina.eu/

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