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The ceramics industry is a major source of greenhouse gas emissions, producing an estimated 1.84 million tonnes of carbon dioxide globally each year. A prototype kiln tested by the LIFE ECONOMICK project has shown significant improvements in energy performance.

The project is led by the Italian group SE.TE.C, which set out in July 2016 to develop a shuttle kiln for firing sanitaryware and tableware with similar levels of specific fuel consumption to a tunnel kiln. Shuttle kilns are more flexible than tunnel kilns, but they are also more energy intensive. “They lack the internal heat recovery systems typical of tunnel kilns,” explains project manager Antonio Fortuna.

To reduce energy consumption, LIFE ECONOMICK has focused on two crucial aspects of shuttle kilns: heat recovery and insulation. A patented technology is being used to recover heat from flue gases to pre-heat combustion air. “Significantly, this technology does not use flues or additional pipes and above all does not alter the fluid dynamics of the flue gases in any way,” notes Mr Fortuna.

Insulation materials have been selected so as to achieve the best combination of weight and thermal conductivity. The result is “a lining that minimises thermal inertia and at the same time has a cool wall temperature of below 60°C,” he adds.

Testing the prototype

A prototype of the new shuttle kiln was installed in April 2018 at the facilities of project partner

Kerasan. The company is a well-known sanitaryware manufacturer in the Civita Castellana cluster in Viterbo province, north of Rome.

The 9 cubic metres kiln was tested for six months in order to monitor consumption and productivity levels during single firing of ceramic sanitaryware.

By pre-heating combustion air, optimising insulation and using software to better manage air and gas flows in the kiln, results have more than met expectations. The project reports 45-47% lower energy consumption and carbon dioxide emissions compared to a conventional shuttle kiln. Nitrogen oxide emissions are also lower. In terms of productivity, “complete cycles (cold-to-cold) can be performed in 12 hours, making it possible to perform up to 2 cycles/day,” says Mr Fortuna. In addition, since the prototype kiln has a cool face temperature of less than 50 degrees Celsius, there is “greater well-being and safety of operators present in the kiln area,” he adds.

Stages to commercialisation

“Now that tests have been completed in the Kerasan factory, the Economick kiln will be installed at the facility of Ceramica Bianca in Romania for sanitaryware refiring,” says Mr Fortuna. A third round of tests - for tableware firing - will subsequently take place at Ceramica Cuore's factory in Civita Castellana, Italy.

SE.TE.C is already planning to commercialise the technology through trade fairs and direct contact with its main customers. “This technology is valid for sanitaryware, tableware and in general for all ceramics,” says Mr Fortuna. Emissions could be further reduced if it becomes possible to recover residual flue gas heat as well.

More information

- [LIFE ECONOMICK project website](#) [2]

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