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**RED POTTERY - INNOVATION IS THE KEY TO A SUSTAINABLE
FUTURE**

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ABSTRACT

This paper presents a technological innovation results achieved through the efforts of Santa Catarina Gas Company - SCGÁS, by Research and Technological Development (R&TD) in the Red Pottery Industry, also known as Structural Ceramics.

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Paper

1. INTRODUCTION

The natural gas in this segment is progressing slowly, in large part by competition from biomass, considered a low-cost energy source. As we see in Figure 1, the use of biomass as a rule is accompanied by archaic methods of production, generating substantial environmental impact, hitherto ignored by the industry. Beyond collaborating for the greenhouse effect, the black smoke filled with particulates and tar poured for most of the ceramics, affects the health of the surrounding population, which is a greater risk of respiratory diseases.



Figure 01 (a) and (b) - Traditional technology

Mindful of Red Pottery Industry problematic, the SCGÁS organized a meeting with industry union representatives, attended by researchers, engineers and entrepreneurs. This meeting led to proposal a new concept of tunnel kiln with atmosphere control technologies, similar those used by the porcelain industry, for the naturally white tiles production from natural gas.

2. CHALLENGE

Among companies with greater potential for environmental damage, are those naturally white tiles manufacturers, by using a reducing atmosphere, obtained by the incomplete burning of firewood. The challenge is the development of environmental solution from natural gas, enabling the viability of these enterprises, meeting the standards established by the legislation.

Given this reality, the environmental agencies of Santa Catarina set targets for reducing gas emissions, with a limit of 110 ppm of particulate matter, and the issuance of the furnaces in the region reaches 3346 ppm. The solution initially adopted by companies was install filters like "scrubber" which, despite the contributions brought, were insufficient to accomplish the goals; the best case the emissions were still at around 700 ppm.

3. STRATEGY

As integrating agent, like we see in Figure 2, SCGÁS has partnered with the Maximiliano Gaidzinski Institute (IMG), to assess, quantify and disclose to ceramics segment, through the CP (Cleaner Production) methodology, eco-efficiency indicators and sustainability parameters of proposal technology. Besides the cost of deploying, operating costs and all indirect gains were properly counted towards consolidating this initiative.

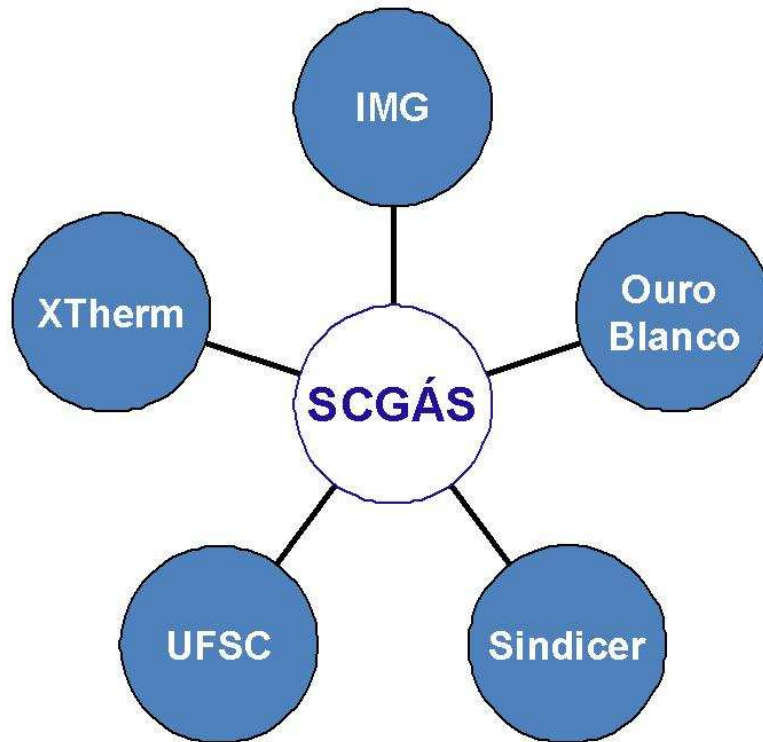


Figure 2 - SCGÁS as integrating agent

As part of strategy started in 2009 the deployment of a pilot plant by an entrepreneur who was interested in new technology and invested about US\$ 1,5 million was completed in 2010. An engineering company has developed all over the equipment and control software involved. The SCGÁS landed yet the amount of natural gas needed to operate the continuous kiln developed throughout the testing, adjustment and start-up stages.

The success of this project represents an alternative to solve the serious problems of Red Pottery segment, consistent for all past efforts to establish good production practices, according to modern standards of production.

4. RESULTS

The project has obtained a technology that allows continuous production of high added value product, which is the natural white tile, typically intermittent process made from the incomplete burning of firewood. It is the development of a furnace (Figure 3) with controlled chemistry atmosphere, to obtain natural white tiles, ensuring environmental sustainability of the business. This technology can be easily replicated throughout the ceramic segment; only in the southern state of Santa Catarina being acquired by 15 companies, with increased natural gas sales at 52.000 m³/day (Table 1).

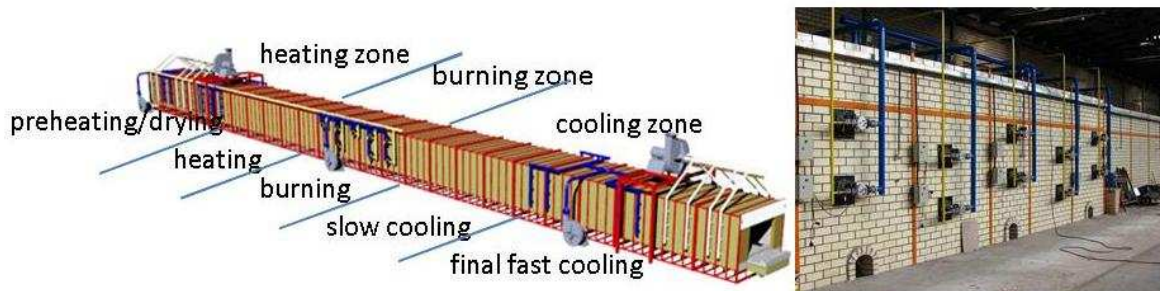


Figure 03: proposed new technology

	Conventional Tile	Naturally White Tile
Potential Market in South Santa Catarina State for N.G.	(firewood)	52.000 m ³ /day
Added Value Product US\$/ thousand	305.00	528.00
Consumption of Energy	1.200 kcal/kg	500 kcal/kg
Energy Cost US\$/ thousand	210	180
Production Cycle	105 hours	17 hours
Specific Emission	117 kg CO ₂ /GJ	18 kg CO ₂ /GJ
Relative CO ₂ Emissions	100%	4%
Particulate emission	700 – 3.346 ppm	ZERO
Planted Forest Area equivalent	-	53 football fields every year

Table 1: Summary of results

As benchmarks, the production time was reduced from 105 for 17h and energy consumption reduced from 500 to 1.200 kcal/kg of product. CO₂ emissions fell from 177 to 19 kg per GJ of heat energy used. These associated results represent reduction of 550.000 tons/year of CO₂ (-96%), equivalent to planting 100.000 trees every year. With the use of natural gas in controlled chemical atmosphere, particulate emissions were eliminated. Were also achieved the reductions required by environmental agencies in relation to liquid and gaseous effluents, as well as with the solid waste from the production process.

The reorganization of production has also brought advances in safety and health. These results are presented in technical reports as well as through a pilot plant for demonstration of its operation to other entrepreneurs.

The Figure 4 shows the naturally white tiles (a) before burning, (b) traditional technology and (c) with new technology



Figure 04: tiles

REFERENCES

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2. Nicolau, V. P. (2002). Numerical and Experimental Analysis of Tunnel Kiln Ceramics. In: 9th Brazilian Congress of Thermal Engineering and Sciences, Encit.
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