Syngas for cleaner glass melting, courtesy of GLASS SERVICE

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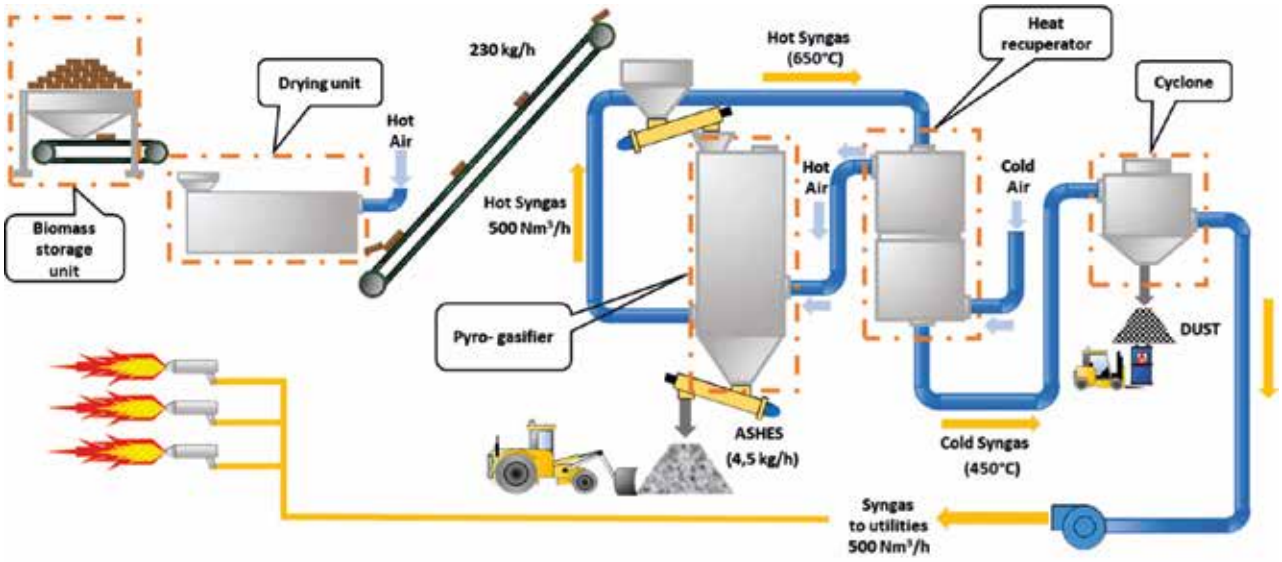
For the glass industry, achieving deep decarbonisation requires reliable alternatives to fossil fuels - especially in high-temperature melting processes. Research presented by Glass Service Italy highlights how syngas, from woody biomass, is a credible solution - aligning with European Net-Zero 2030 targets whilst offering operational, economic and environmental advantages

BIOMASS QUALITY AND FUEL POTENTIAL

Generated through controlled thermochemical gasification (700-1100 °C), Syngas contains a fuel-rich mix of CO, H_2 and CH_4, which makes it suitable for melting furnaces. Indeed when derived from high-quality wood chips with optimal moisture between 10 and 15 percent its calorific capacity, combustion behaviour and stability meet the essential requirements of industrial glass production

The raw-material markets in Italy and Europe provide substantial availability of biomass, with prices influenced by quality class, water content and supply-chain logistics. Here quality classes defined by UNI EN ISO 17225-4, including A1 and B1, show clear cost-performance relationships that impact syngas yield and overall efficiency.

Growing pressure for alternative fuels is driving the glass industry to explore various avenues. Produced from woody biomass, Syngas offers a promising route to reduce natural-gas consumption, CO_2 emissions and operating costs. GLASS SERVICE technical analyses and prototype data show its potential to meaningfully support decarbonisation in high-temperature glass melting.



SYSTEM ARCHITECTURE AND PROTOTYPE RESULTS

Glass Service's analysis details the full system architecture: storage units with moving floors, drying systems, heat recuperators, pyro-gasifiers, dust-separation cyclones and high-temperature exhaust fans. Prototype installations developed with Biosyn and UNIPI confirm syngas compositions averaging 22 percent CO, 18 percent H_2, 2 percent CH_4 and a PCI of 5-6 MJ/Nm³.

With production of up to 500 Nm³/h, the system can replace approximately 80 Stdm³/h of natural gas, saving around 600,000 Stdm³ annually over 7,500 operating hours. This corresponds to an estimated reduction of 1,200 t CO_2-eq and significant economic gains based solely on gas and ETS-certificate savings.

INTEGRATION IN INDUSTRIAL FURNACES

Integration strategies include installing syngas burners in unused tower-burner stations or introducing staged-combustion burners in strategic furnace zones, particularly the front area of end-port furnaces, where excess air is typically managed. These solutions maintain melting performance while lowering fossil-fuel dependence.

In conclusion, Glass Service's evaluation shows that a pyrogasifier delivering 500 Nm³/h of syngas can reduce natural gas demand by roughly 8 percent. When combined with electrical boosting optimisations or oxy-combustion, potential savings rise to 30-40 percent. Utilizing waste heat for biomass drying further enhances system efficiency and reduces feedstock cost - strengthening the case for syngas as a key contributor to decarbonising this hard-to-abate industrial sector. ■

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