Session	Energy Efficiency in Glass Production
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Chair	Tolga Uysal

Step Change Reduction in Scope 1 CO2 Emissions by Converting Air-Regen Furnaces to Oxy-Fuel with OPTIMELT™ Heat Recovery Systems

Shrikar Chakravarti, Hisashi Kobayashi, Chao Liang, Matthias Görisch, Davide Razzari, Herbert Groiss

Linde Inc., USA

Biography

Dr. Shrikar Chakravarti is currently Global Glass Strategic Account and Business Development Director at Linde Inc. He is responsible for building and maintaining senior management relationships at key global glass customers, as well as working with applications teams within Linde to commercialize and migrate new glass applications technologies.

Shrikar has been with Linde for 27 years. Since 2017, he has focused on actively promoting Linde's glass technology portfolio including low NOx burners, oxygen supply systems and OPTIMELT™ heat recovery systems. Prior to this, Shrikar has served technical / business development roles in multiple areas including CO_2 Capture from Flue Gases, Specialty Gases for Electronics, Bio-fuels, Gasification and Ceramic Membranes for Syngas Production.

Shrikar has been recognized for his outstanding contributions through several Innovation Awards and is an inventor on over 25 US patents.
Shrikar holds a BS degree from Indian Institute of Technology – Bombay, MS from the University of Texas at Austin and a PhD from the University of Wisconsin – Madison, all in Chemical Engineering.

Abstract

Due to increased emphasis on sustainability, glass companies are looking for ways to substantially reduce CO_2 emissions from their operations. Several glass companies have made definitive commitments for CO_2 reduction as part of the Science Based Targets Initiative.

One approach to economically achieving reduction in CO_2 emissions is by converting traditional air-regen furnaces to oxy-fuel furnaces with OPTIMELT™ Thermo-Chemical Regenerator (TCR) systems. Flue gases typically exit an oxy-fuel glass furnace at 1400 – 1500°C. Linde's novel OPTIMELT™ technology recovers energy from the flue gas to preheat and reform natural gas. This results in a reduction of 25 – 30% in fuel-based Scope 1 CO_2 emissions.

The first commercial OPTIMELT™ system has been successfully operating for over seven years at a high-quality tableware furnace in the Netherlands. Two other OPTIMELT™ projects are underway with startup scheduled for 2H'25. This presentation will provide a summary of the experience from the field and share preliminary information related to the ongoing projects.

Flue gas typically exits the OPTIMELT system at 600 – 750°C, a temperature high enough to allow for further heat recovery. Also to be considered are schemes for using the flue gas leaving the OPTIMELT™ system for secondary heat recovery, e.g. preheat batch & cullet / oxygen. This could further decrease the fuel-based CO_2 emissions by 6 – 10%; reducing fuel-based Scope 1 CO_2 emissions by 30 – 40% versus the traditional air-regen case.

The combination of OPTIMELT™ heat recovery and secondary heat recovery could provide glass companies an economical and low risk pathway to achieving their 2030 CO_2 reduction targets. Also, OPTIMELT™ & secondary heat recovery technologies are compatible with low carbon fuels like green / blue hydrogen, bio-ethanol, and ammonia. Furnaces that convert to oxy-fuel with OPTIMELT™ and secondary heat recovery systems achieve an immediate reduction of 30 – 40% in CO_2 emissions while being ready to achieve complete carbon neutrality when low carbon fuels become economically viable.

Notes

This presentation is suitable for the topic "Decarbonizing the Glass Industry" as well as for the topic "Energy efficiency in Glass Production"