Sustainable raw materials for glass production

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Abstract

Glass melting is an energy intensive process with a reported average energy consumption between 4 to 7 GJ/ton, which requires reaching high temperatures to obtain a glass melt by fusing the inorganic oxide raw materials namely; sand, feldspar, limestone, dolomite and soda ash. Combustion of fossil fuels and decomposition reactions of the raw materials that are taking place during melting accounts for the main greenhouse gas emissions, especially CO2. Glass melting process generates 0.6-0.8 kg of CO2 per kilogram of glass produced, ranking it one of the major CO2 emitting processes in globe. Approximately 2/3 of the emissions of the glass melting process originates from combustion of fossil fuels and 1/3 of the emissions arise from reactive and thermal calcination (decomposition) of carbonated raw materials which are limestone, dolomite, and soda ash. Total contribution of CO2 gas originating from decomposition reactions may reach up to 0.2 kg for each 1 kg of produced glass. To prevent irreversible damages and catastrophic effects of global warming, net emissions of CO2 need to decrease about %45 by 2030 and reaching net zero around 2050. This lecture aims to discuss the current situation and future prospects of raw materials used in glass production both from literature and industrial & laboratory experiences.

Keywords: melting, raw materials, sustainability

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