

KN12 - Solar Energy for the Aluminium Industry's Transition into the Future

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Abstract

In many regions, apart from energy efficiency measures, solar energy utilization will be the way to reconcile future environmental and economic requirements of aluminum production. In the paper we present, analyze and compare options for solar energy utilization, namely concentrating solar-thermal (CSP) and photovoltaics (PV). The analysis is regarding cost, performance, decarbonization rate, i.e. reduction of attributable greenhouse gas emissions, and land requirements. The focus is on applications for solar thermal collectors, specifically on enclosed parabolic trough collectors providing heat at up to 430 °C, including configurations featuring integrated thermal energy storage. They are compared to systems using PV-trackers, again including systems featuring thermal energy storage. A cost comparison is performed using a 'Levelized Cost of Heat' calculation, performance is assessed using the publicly available tool 'Solar Advisory Model' plus a validated in-house model for solar-thermal technologies.

Keywords: Aluminium production, Solar energy, Concentrated solar power (CSP), Photovoltaics (PV), Decarbonization.