

**STRYDOM, Wian** (Engineering)

**Natural draft direct dry cooling system performance at various application scales under steady and transient conditions**

Natural draft direct dry cooling systems (NDDDCSs) present an efficient alternative to traditional cooling technologies, reducing complexity and auxiliary power use. This study developed 1-D, 3-D CFD, and co-simulation models to evaluate NDDDCS performance across various scales under steady and transient conditions. Key findings include the importance of geometric design, which varies by scale, and the impact of recirculation and crosswinds on cooling efficiency. Novel performance recovery was observed at higher crosswind speeds. The study demonstrates effective turbine islanding capabilities and suggests design modifications to improve start-up performance. The findings provide actionable insights for enhancing NDDDCS performance and industrial applicability. **(100 words)**

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