

Title: Optimisation towards a wind-resistant air-cooled condenser for the modern energy sector

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Thermal power plants, including concentrating solar and high efficiency natural gas combined cycles, require heat rejection to complete the thermodynamic cycle. Wet cooling systems perform this cooling task effectively but use large amounts of water, thus constraining the sustainability of the plants, regardless of heat source. Air-cooled condensers (ACCs) offer a water saving alternative but suffer from performance issues under windy conditions. A combination of computational fluid dynamics and multi-objective optimisation was used to interrogate combinations of external wind mitigation measures for robust, wind resistant ACC operation. The study yielded general guidelines for the effective application of these mitigation measures, thus contributing towards a more sustainable energy future.