ASIA-PACIFIC SOLAR RESEARCH CONFERENCE

# Static Wind Loading on Ground-Mounted East-West Solar Farms

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To compete with conventional power generation methods, solar photovoltaic (PV) farm developers have been under pressure to reduce costs. As the cost of PV modules begins to plateau, developers are looking to other sources of cost reductions such as economies of scale. As such, solar farms have been steadily increasing in size, thereby increasing the consequences of structural failure. To reduce the risk of structural failure and the cost associated with it, it is important to accurately determine the design load capacities of the farm (Roedel and Uphill-Brown, 2014). The critical load that drives solar PV racking design is wind loading (AS1170.2). The two types of wind load to consider are static loads and dynamic loads. Static loading occurs due to the direct force applied by the wind hitting the panels and is often largest on the outer rows (Jubayer and Hangan, 2016). Dynamic loading is commonly associated with vortex shedding off upwind rows buffeting downwind rows periodically and has been a significant concern for utility scale developers (Cain, 2015). This article aims to investigate static wind loads on high ground coverage, East-West solar PV arrays, shown in Figure 1. The effects of dynamic loading will be a topic for future research.

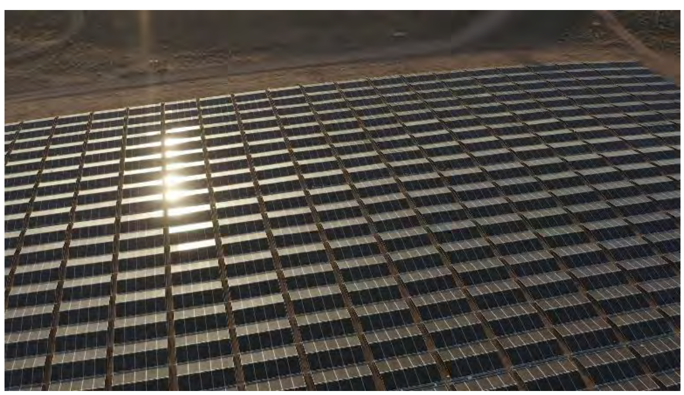

**Figure 1: East-West high ground coverage ratio solar farm**

Several aspects of solar PV farm design affect wind loads. For example, it is well known from research of common racking systems, such as single-axis trackers, that wind load distribution varies with farm layout (Jubayer and Hangan, 2016). This article examines the wind load distribution on East-West racking systems by atmospheric boundary layer wind tunnel testing conducted by CPP Wind Engineering on 5B's flagship MAVERICK (MAV) product, shown in Figure 2. The testing focuses on the effects of ground clearance, row spacing and aspect ratios and is repeated for a 0° - 360° orientation for both standalone MAVs and MAVs in a farm. This article will also provide a review of the Australian Standards (AS) for determining static wind loads on East-West solar PV farms. AS guidelines will be used to obtain and compare required design loads on arrays equivalent to those tested in the wind tunnel.

**Figure 2: 5B's MAVERICK product**

**References**

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