

Making the most of Solar Energy in Antarctica (Solar Potential for Australian Antarctic Bases)

a poster paper by

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Abstract:

The application of renewable power systems is particularly relevant to remote locations such as Antarctica, where traditional fossil fuel based systems incur relatively high costs of fuel transportation in conjunction with an increased risk of environmental damage. Recent projects carried out by the Australian Antarctic Division have examined the potential for solar power generation at Australian National Antarctic Research Expedition (A.N.A.R.E.) stations in the Antarctic and Sub-Antarctic, combining numerical modelling techniques with the on-site application and testing of photovoltaic and solar hot water systems.

A pilot solar hot water system, incorporating 12 m² of solar panelling mounted on a frame with fixed orientation, has been operated and monitored at Davis Station (68° 34' S, 77° 58' E) since the 1998-99 season. A solar energy model, SEMAS (Solar Energy Modelling for Antarctic Stations) has been developed by Latitude Technologies Pty. Ltd., in collaboration with the Australian Antarctic Division, to utilise the data collected from the pilot system and to assess the potential for variety of solar power system configurations.

The paper presents the annual global solar energy incident upon a horizontal surface at each of the ANARE stations, as determined by SEMAS. Subsequent analysis of a variety of different collection strategies are discussed, with the conclusion drawn that despite the greater collection potential offered by tracking systems, an annually optimised fixed system is the best overall design option when operational costs are assessed on a per area basis. The potential annual power output from photovoltaic and solar hot water systems are presented for each of the ANARE stations, corresponding to a number of different design scenarios.