Solar Thermal Supplementation of a Coal Fired Plant

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Stanwell Corporation Limited (SCL) is pursuing the development of a large solar thermal power generation plant to be integrated with SCL's coal-fired Stanwell Power Station near Rockhampton in Central Queensland. Stanwell Solar Power, which will cost about $7 million, is expected to produce electricity at a rate of about three Megawatts. SCL's existing portfolio consists of a 1400 megawatt (MW) coal-fired power station, two hydroelectric power stations (one with a 60 MW capacity and the other 72MW), and a 34 MW gas turbine peaking plant. A new wind farm is currently under construction in Far North Queensland which will be Australias largest wind farm..

Stanwell Solar Power will use the compact Linear Fresnel Reflector (CLFR) technology which has been recently developed at the University of Sydney in association with Solsearch Pty Ltd. This new type of solar array can be used to produce steam for generators which use conventional steam turbines. By using this solar technology, the consumption of coal is decreased and, therefore, less greenhouse gas is produced. The resulting product will be marketed as "green electricity" for sale in Australia under commercial contracts. The full plant is expected to be in place in 2001.

The solar energy will be collected by a large array of glass reflectors which will occupy a total land area of about 2 Hectares and have a total reflecting area of about 17,000 square metres consisting of some 1 280 reflectors, each about 9 metres by 1.5 metres. When complete, it is expected that this solar thermal project will be the largest in the Southern Hemisphere.The initial array is being packed at a density of 150-200MW(e) per km2, a land use efficiency more than twice that of previous technology. High array ground coverage can lead to maximum system output where there is limited available ground area.

The CLFR concept is intended to reduce costs in all elements of the solar thermal array and includes many additional features that enhance system cost and performance. The avoidance of large reflector spacings and tower heights is an important cost issue when the ground preparation, tower structure, steam line thermal losses and steam line costs are considered. The reflector array component cost is less than half of existing trough plan reflectors. The absorber component uses a low cost selective surface absorber.

The potential commercialisation of Stanwell Solar Power was given more impetus in December 1998 when the Commonwealth Government announced that the project would offered a $2 million Renewable Energy Showcase grant. Successful energy projects were expected to demonstrate a strong commercial potential; long-term technical and commercial viability of large scale renewable energy applications; a reduction in greenhouse emissions; and a high level of strategic importance and leading edge character.

The authors will discuss the current and future development of the technology in technical and market terms.