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FOR TEA PROCESSING IN SRI LANKA

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by

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ABSTRACT

Solar Assisted Hot Air Generating Systems (SAHAGS) for Tea Processing in Sri Lanka

This study is an assessment of the potential of solar assisted hot air generating systems in tea processing in Sri Lanka.

The tea growing area is divided to six regions in view of the significant seasonal variations in the tea production, the tea manufacturing schedules and the solar radiation, all of which contribute to determine the performance of solar energy systems. Considering the different process temperatures (warm air at 5°C above the ambient for withering of the green tea leaf and hot air at 90°C for drying of the fermented tea) and tea processing schedules, two types of solar energy systems are selected for withering and drying operations. Solar air pre-heating systems using flat plate air collectors are considered for drying. Solar hot water systems using flat plate collectors and large storages are selected for withering.

Computer simulation models are developed to obtain the average thermal performance of the two types of systems. Using tea manufacturing data and energy consumption data from a typical factory in the region and using the meteorological data for the region, the thermal performance of a solar system is obtained.



It is shown that the thermal performance vary substantially among the six regions. In four regions air pre-heating systems operating at 50% efficiency could supply more than 30% of the drying heat load. In the other two regions the thermal performance is poor. Solar hot water systems with 200kg/m² storage capacities, operating at 50% efficiencies could supply more than 80% of the withering heat load in all the regions. Therefore solar withering systems have a higher potential to save conventional energy than air pre-heating systems.

An assessment of the economics of the two types of solar systems shows, subject to the economic factors assumed, that solar air pre-heating systems perform better than the solar withering systems due to high cost of solar hot water storage systems.

1. INTRODUCTION

The findings show that the previous studies (LAING Design and Development Center, 1983) have over estimated the solar energy potential in tea processing in Sri Lanka.

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