

Influence of Environmental Conditions on a Solar Assisted Mashing Process

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Abstract : In this paper, the influence of several scenarios on a model of solar assisted mashing process in a brewery, while applying the model to different locations and therefore changing the environmental conditions, was analyzed. Assorted beer producer locations in different countries around the globe with contrasting climatic zones such as Guayaquil (Ecuador), Bangkok (Thailand), Mumbai (India), Veracruz (Mexico) and Brisbane (Australia) were evaluated and compared with a base case study Oldenburg (Germany), and results were drawn. The evaluation was restricted to the results obtained using TRNSYS 16 as simulating tool. On the base case, an annual Solar Fraction (SF) of 0.50 was encountered, results showed highly affection when modifying the pump control of the primary circuit and when increasing the area of collectors. A sensitivity analysis of the system for the selected locations was performed, resulting in Guayaquil the highest annual SF with a ratio of 2.5 times the expected value as compared with the base case. In contrast, Brisbane presented the lowest ratio, resulting in half of the expected one due to its lower irradiance. In conclusion, cities in Sunbelt countries have the technical potential to apply solar heat for their low-temperature industrial processes, in this case implementing a green brewery in Guayaquil.

Keywords : evacuated tubular solar collector, irradiance, mashing process, solar fraction, solar thermal

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