

Life cycle cost analysis of a sustainable solar water distillation technique

ABSTRACT

This paper presents a detailed estimation of the fabrication cost, water production cost (WC), and cost payback period (CPP) using annualized life cycle costing for a tubular solar still (TSS). The operation and maintenance cost (OM) and the number of sunny days in a year (d) have a significant effect on the WC. The WC is raised from 3.1 to 4.4¥/L, if the OM increases from 5 to 18% of the capital cost, respectively. The WC is dropped by 35% (in average) when the d increases from 230 to 350 days. In addition, the CPP is greatly affected by the water selling prices and d . The CPP is dropped from 68 to 45 days due to the increase of d from 230 to 350 days (in average), respectively. The fabrication cost of the TSS (\$5) and the WC (\$31/m³) are affordable and much lower than the single-sloped passive solar still. Finally, it is revealed that the solar radiation is the most influential parameter on the productivity of TSS and a linear proportional relationship is found between them.

Keyword: Tubular solar still (TSS); Water cost; Life cycle cost; Payback period; Production; Solar radiation