

Heliac Solar Cooker

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The majority of solar cooker designs fall into the categories of panel, parabolic, evacuated tube and box cookers.¹ These cookers increase the solar concentration on a surface by use of reflection. Few cookers use refraction to concentrate light. Until recently the cost of fresnel lenses and the immediate associated risks with burns and eye damage (retinal burns) have not been encouraging for inventors wanting to develop a fresnel lens based solar cooker. Heliac is the first company to offer large fresnel lenses at low cost. The focal point of these lenses has been purposely broadened to diminish the risk of getting skin, retinal as well as unwanted burns of materials in or at the proximity of the cooker. Heliacs most recent design of a fresnel lens based solar cooker is illustrated in Figure 1. It boils 1 liter of water in less than 15 minutes. Sunlight entering at normal incidence to the lens plane is reflected by a mirror and focused at the bottom of a cooking pot. The sides are covered with fabric to avoid glare from concentrated sunlight. The cooker has a dual rotation axis with manual tracking. The construction is made such that the mirror normal is always halfway between the angle tended by the lens normal and direction along mirror axis normal and pot bottom, thus avoiding the need to adjust the mirror, allowing the sun to be tracked quickly and easily every 10 min.



Figure 1: Heliac Solar Cooker vs 4.3

The specifications for construction can be freely accessed from Heliac by anyone who wishes to produce the cooker, thus allowing cookers to be produced by local craftsmen. 6 people in Zambia, Tanzania, Uganda, Sweden, Switzerland and India have begun constructing the cooker according to the Heliac construction manual. The feedback from the builders and users will be used to customize the Heliac Solar Cooker to specific regions.

Keywords

Fresnel lens: An object able to focus or defocus light by use of several refractive elements

Refraction: The deflection of light occurring when light enters an interface at an angle other than 0

¹ A Comprehensive Review on Solar Cookers, Erdem Cuce and Pinar Mert Cuce, 2013