

PORTABLE SOLAR STOVE

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INTRODUCTION.

Solar energy has been used for different purposes starting from electrical energy generation to cooking from the middle of the twentieth century. One of the most straightforward applications of the solar energy is for cooking. UN efforts targeted to introduce that technology to developing countries of Africa did not succeed due to several reasons, such as design complexity and high cost or they were not culturally suited to the users' life style [1]. However there are a number of designs of solar ovens available in the market and DIY base [2].

MATERIALS AND METHODS.

The project uses Fresnel lens to concentrate the sunlight as it has more light and is more compact than reflectors. Fresnel solar cookers can heat foodstuff up to oil boiling temperatures, so it can cook more kind of foods. The lens concentrates light at the bottom of the cooking vessel, and the light path lies within the frame of the cooker. This makes it safer than parabolic concentrators. The last advantage is the modular and compact design which makes the whole device easy to transport where it may be necessary – outdoor trips, camping, or remote working fields.

RESULTS AND DISCUSSION.

Time required to heat 250 ml of water from 0 °C to 100 °C considering no heat losses when using 50 x 50 cm and 100 x 100 cm Fresnel lenses were estimated to be 12 and 3 minutes correspondingly.

The first prototype was assembled in NURIS, Astana using 50 x 50 cm Fresnel lens. Its tests showed that at air temperature of -6 °C and moderate wind, 250 ml water was melted from snow and boiled in 17 minutes. The prototype of the device was prepared by the Newplan company, China.

CONCLUSION.

A working prototype of the portable solar cooker was designed and assembled. Tests were performed on device prototypes, and the idea feasibility was verified. The patent application was filed and submitted to Eurasian Patent Organization. The next step will focus on improving the design to reduce weight, reduce time, and improve ease of usage and safety before commercialization.

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