SOLAR POWERED VENTILATOR FOR TOFU MAKERS IN GONDANGLEGI MALANG

Ali Mustofa¹, Gaguk Asmungi ²
¹,² Electrical Engineering, Universitas Brawijaya
Jl. Veteran Malang – Indonesia.

ABSTRACT
A considerable amount of tofu production whether small or medium scale industry level has been easily found both in villages and cities. Tofu can be produced via traditional or modern process. The modern tofu processing consequently requires large investment but relatively environmentally friendly. Traditional tofu processing exploits firewood hence emits smoke and generates excessive heat in a confined space. This community service designed to assist tofu makers in Gondanglegi in reducing internal smoke and heat on production processes by building economic solar ventilator.

KEYWORDS
ventilator, pollution, smoke, solar energy

INTRODUCTION
Tofu considers as a popular food both in urban and rural areas. This soy-based food has been existed for a long time even in Japan. Tofu could be consumed as snack or side dish as it is nourished with vegetable protein act as substitute of animal protein.

Favored both in cities and rural areas, tofu manufacturers in any scale traditional or modern wise is easily found in Indonesia. Entrepreneurs with big capital will mostly choose tofu modem processing..

Tofu home industry are easily found in Krajan, Putat Lor village, RT 09 RW 03, Gondanglegi District, Malang, as the village common small scale business. Since 1997, the village has processed roughly 80-90 Kilograms soybeans as raw materials into tofu in daily basis. Raw tofu then fried before directly sent to wholesellers in the market, delivered to home consumers or sold personally in the market. Four people are hired: one employee fries the tofu in confined space with minimum ventilation above the frying pan. They use high temperature traditional burner in a sultry space.

Another tofu maker is found in Lumpang Street, Putat Kidul village, Gondanglegi. The passed-for-generations traditional home industry provided up to 100 kilograms soybean. The processed tofu, as the previous home industry stated, then fried using local firewood to be directly marketed afterwards. The tofu is fried in the afternoon to be sold the next day around 2 AM in Kebalen market, Malang. The home industry has 5 employees with one female employee specifically hired to fry the tofu.

The utilization of firewood in tofu production would cause air pollution leading to various diseases [1]. Solving the problem by using farm residues, animal waste such as cow, and coals seems equally impractical because the materials are more suitable for home consumption and...
Solar Powered Ventilator For Tofu Makers In Gondanglegi Malang
dan Putat Kidul village, Gondanglegi, this community service was a civitas akademika respons for ensuring public health for the home industry employees.

Figure 1. Tofu Frying Room.

MATERIALS AND METHODS
Implementation method to provide solution for tofu makers involved several phases: (1) survey to tofu makers in Putat Lor village, Gondanglegi district, Malang in order to identify their problems such as the level of air pollution or heat temperature during tofu production, (2) plan and design the ventilator and install it with solar panel, (3) promotion and training to make tofu makers understand about the prototype and its working principles. Visiting the workplace and directing the employees on how to operate and maintaining the tools were how the promotion and training conducted. In this period, input from the partner or tofu maker employees were collected.

RESULT AND DISCUSSION
After conducting field survey on partner condition, exhaust setting and installation system were planned in production room. The team installed the solar panel system on 12 July 2016 at Mr. Surani’s and Mr. Jiono’s tofu production places at 09.00 AM Indonesian Eastern Time for Mr. Surani and 12.30 AM Indonesian Eastern Time for Mr. Jiono.
Solar panel and ventilator installed in Mr. Surani’s narrow 7m x 5m x 4m room by 3 people. While in Mr. Jiono comparably wider space 12m x 6m x 5m, there were 8 people were involved. There were no significant problems in the installation process. The solar panels were directly placed on the rooftop.

After solar panel installation finished, cable controller connected to the battery box was placed.

Once controller with LED connected to the battery cables, the LED supervises battery charging by solar panel and its readiness to channel DC current to the ventilator or the load. The load or the exhaust fan needs inverter to convert DC current into AC[2] [3].

CONCLUSIONS and SUGGESTION
It is concluded that; (a) it is useful to collaborate solar panel technology with exhaust fan to help reducing air pollution inside the tofu production room (b) The least benefit is decreasing polluted air and excessive heat in production room, the bigger the size, the more room needs exhaust fans (c) introducing environmentally friendly solar powered electricity to the locals (d) The solar energy could also be used for other load such as lamp or cellphone.

ACKNOWLEDGEMENT
Gratitude are said to some parties, among others:

a. Direktorat Penelitian dan Pengabdian kepada Masyarakat Direktorat Jenderal Pendidikan Tinggi Kementrian Riset, Teknologi dan Pendidikan Tinggi tahun 2016.

b. Lembaga Penelitian dan Pengabdian Kepada Masyarakat Universitas Brawijaya corporations during this IbM.

c. Mr. Surani and Mr Jiono as tofu production owners in Putat Lor and Putat Kidul, Gondanglegi as active partner in this IbM.
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