DIRECT CONVERSATION OF WASTE HEAT FROM A SOLID-FUEL STOVE INTO ELECTRIC ENERGY USING A HIGH TEMPERATURE THERMOELECTRIC GENERATOR IN RELATION TO Bi_2Te_3 THERMOELECTRIC GENERATOR

Momir Tabakovic, Michal Masaryk

Slovak University of Technology in Bratislava, Faculty of Mechanical Engineering,

Goal

An experimental validation of integration a thermoelectric generators into a solid-fueled stove to produce electricity from waste heat.

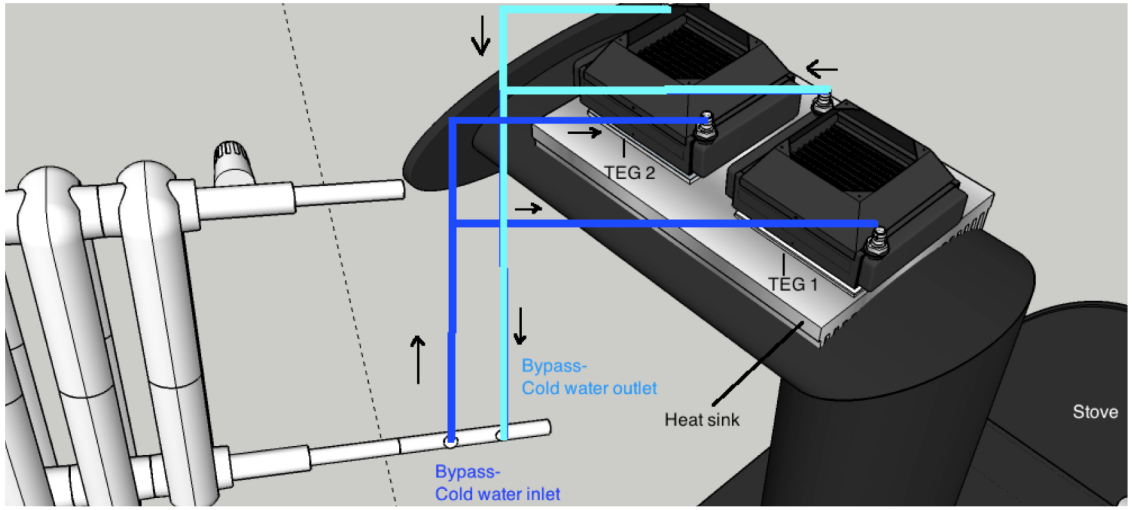
An experimental set-up was built to optimize the common (Bi_2Te_3) modules and test new developed half-Heusler modules in an entire system point of view with an economical assessment.

Experiment set-up

STU
SLOVENSKÁ TECHNICKÁ UNIVERZITA V BRATISLAVE

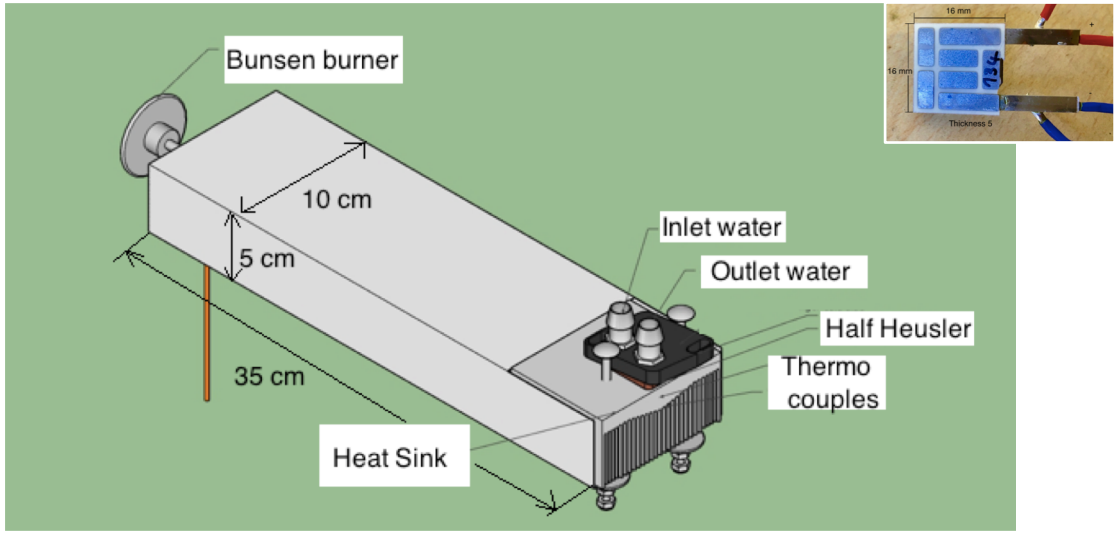
Low termperature modules (Bi_2Te_3)

Experiment set-up for **Bi_2Te_3 thermoelectric modules** under real environmental conditions.



High termperature modules (half-Heusler)

Half-Heusler prototype with a heat sink for the cold side, a heat exchanger for the hot side and two half-Heusler thermoelectric modules.



Results

A common water circulation pump for heating systems households needs power between 4 W - 20 W (e.g. Yonos Pico 25). This demand of the pump must be covered.

	HH modules dimension (16x16 mm)	Bi_2Te_3 module dimension (50x50 mm)
Temperature difference between the hot and the cold side	ΔT 510°C	ΔT 160°C
Max. power output per module	2.8 W	8.5 W
Number of needed TE modules	9	3
Needed area	2304 mm^2	75000 mm^2
Total power produced by the TE modules	25.2 W	25.5 W
Demand for water circulation pump	**20 W**	

Results

The price for 10,000 samples of the Bi_2Te_3 is 1.8 €/W and 1.6 €/W for the half-Heusler module.

The price of 0.55 €/W for the half-Heusler module is possible if the thermoelectric elements are produced with a dimension of 1x1.4x1.54 mm.

Components [Price per Unit]	Bi_2Te_3 module 50x50 mm	Half-Heusler module 16x16 mm
Electronic part	30 €	30 €
Thermal part incl. Heat sink and heat exchanger	32 €	32 €
TE module	111 €	135 €
Bi_2Te_3 module 37€; 1 HH module 15 €	3 TE modules	9 TE modules
System cost for production of 25 W	173 €	197 €
TE generator system €/W	**6.9 €/W**	**7.8 €/W**

Not included are the cost for the DC/AC converter and the batteries.

For more information visit my poster

Mail: momir.tabakovic@technikum-wien.at

supported by