

Review by opponent of the Diploma thesis

Topic: **Decentralized electricity supplies of village**

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Opponent: **Jan Gerstberger**

Thesis is covering problems of combination of the PV plant and diesel powered plant for electricity supply for small village behind the polar circle. The main aim of the thesis is to find out whether diesel fuel saved by combining PV plant with diesel power plant makes economic sense. In the first part of the thesis Author described power supply requirements, current diesel power plant and sun irradiation conditions. In the second part there has been described PV plant including optimal inclination and number of modules. In the third part there has been described electrical energy accumulation system based on lead-acid batteries. In the fourth part there have been calculated and put together main technical and economical characteristics of combined power plant. The last part is dedicated to sensitivity analysis with description of its outputs.

In my opinion, instructions present in thesis specification sheet (Zadání diplomové práce) have been met.

The appearance of the thesis is good the frequency of typos is low.

The theoretical calculations concerning optimal inclination of panels, calculation of theoretical panels' irradiation have been done very well. What I miss is calculation of efficiency of PPT, batteries charge/discharge cycle and inverters into electricity production at the level of 220V grid, although the efficiencies have been mentioned in the text.

Choice of monocrystalline panels is not justified enough. The reasons should be explained more. The price of PV modules considered in the thesis is really high it is double price usual in Czech Republic.

Although there are some assumptions that are not correct the overall concept of the thesis is correct and conclusions are correct as well.

I don't think that the thesis itself is 100 % practically useful, but author showed that he can think about the things connected with economical evaluation of PV plant construction and operation. With access to proper information the author will be able to extend the model and properly evaluate PV plant investment opportunities.

I recommend grade this thesis

B – very good

using the ECTS grading scale and I recommend work for defense.

I have several questions:

- 1) On the page 18 there is mentioned reflected solar radiation – is reflected radiation from snow really the only one possible reflected radiation (not considering reflection from human built structures)?
- 2) On the page 24 there are technical characteristic of considered solar module. Could you calculate efficiency of the module from these characteristics? What is the difference between solar cell and solar module efficiency of the mono- and multi-crystalline modules?
- 3) Assuming very low land price what in PV power plant is affected by solar module efficiency? For example what difference is between 2 PV power plants with the same installed capacity built from modules with efficiency 10 % and 16 %?
- 4) How low has to be Solar PV CAPEX per 1 kW to achieve “fuel cost parity” with diesel generator?

Prague, June 6, 2018

Jan Gerstberger