

EXAMINER'S RECORD OF THE DOCTORAL THESIS

Doctorand: Ing. ALMABROK ABDOALHADE ALMABROK

Title: THE ANALYSIS OF THE POSSIBILITIES OF USING HEAT ENERGY FOR WATER HEATING, SPACE HEATING AND AIR CONDITIONING IN THE DOMESTIC SECTOR

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This thesis is oriented to an analysis of the possibilities of using cogeneration and trigeneration for improving energy efficiency in countries where these systems are not commonly used (especially in Libya).

The theses are divided into three parts. In the first part there is a general summary of energy chain from source to the consumption. The second part deals with explanation of cogeneration and trigeneration principles in context.

The third part deals with an analysis of the energy situation in Libya and uses these results for preparation of case studies which should show and evaluate properties of using central heating system for covering of basic energy needs - heating, cooling, and hot water. Chapter Eleven contains a field study of three major Libyan cities (Tripoli, Benghazi, and Sabha) to identify the pattern of consumption in the domestic sector, which is one of the largest sectors of energy consumption in the country. The next step was the proposal of three typical houses (small, medium and large) in Libya; for these houses the heat losses were calculated and the heating and cooling system were simply proposed. From the results of calculations and comparisons, it is clear that to use of thermal energy associated with the generation of electric power for the purposes of heating and domestic hot water, for air conditioning in the domestic sector as well in industrial processes when needed is more economical than using electricity. By comparing prices for all cases, it was found that the use of heat energy is the lowest prices (except in one case). The results of this thesis also document that for the final decision about the type of heating/cooling system it is necessary to prepare a case study for a definite place and conditions and also give the summary of aspects which it is necessary to take into consideration.

It would be useful to supplement all the three analysis with an investment cost analysis.

In general, the third part of the doctoral thesis can be considered to be an original contribution made by Ing. ALMABROK ABDOALHADE ALMABROK.

Notes and comments:

p. 49 and 50 - Why there was an increase in the demand in the years from 2008 to 2010? Was it because of an implementation of the Mega Project? What kind of an influence on the predictions had a current political situation?

p. 60 – It is possible to draw an economical comparison between cogeneration and trigeneration?

p. 78 – It is possible to draw an economical comparison of various types of the Thermal Energy Storage?

p. 91 - Why there was a considerable increase of the fuel prices in the years 2008 – 2009?

p. 92 – Why is the supply unit price for the domestic sector rising depending on the consumption range?

As mentioned above, I consider the subject of the thesis to be topical, especially the third part concerning technical and economic analysis of the possibilities of using heat energy for water heating, space heating and air conditioning in the domestic sector. This part I consider to be original contribution by Ing. ALMABROK ABDOALHADE ALMABROK

The thesis was supplemented by the list of 7 published papers of the author. I can claim that the core of the thesis was sufficiently published (in most cases in the foreign country).

The submitted thesis supports the evidence that Ing. ALMABROK ABDOALHADE ALMABROK demonstrated theoretical knowledge, that he is able to actively use scientific methods of work as far as concrete solution of topical technical relevant questions is concerned.

I claim that the thesis by Ing. ALMABROK ABDOALHADE ALMABROK fulfils the requirements of doctorate thesis and that is why

I recommend

it to be submitted for a viva.

Ostrava, 25. 9. 2014


Prof. Ing. Pavel SANTARIUS, CSc.