Opponent Review
Of PhD. Thesis of Mgr. Ing. Radek Šnita, MBA

Topic: „Technically – economic and environmental aspects of using alternatively fuelled vehicles in metallurgical company.“

Actuality of the chosen topic and meeting the stated goal
Dissertation thesis presented by Ing. Mgr. Ing. Radek Šnita, MBA is not only long-lasting and its solution and detailed development in practice is very beneficial, but it is also a topic that is increasingly supported by state authorities and the European Union, which is taking decisive steps to further develop alternative fuels in the European Union.

The use of alternative car drives is the only possible option for further development of car transport due to the depleted oil reserves and the enormous problems of environmental pollution. The key questions that are related to this issue are to resolve issues of performance, durability, range, and costs.

However, the EU's pressure on ecology and energy security, which includes a lesser dependence on oil, makes alternative drives, including CNG propulsion, the main focus of the thesis, more promising than before. And even in the eyes of automotive producers, which correspond to the ever-expanding range of CNG-powered models. Among other things, for example, three years ago, the European Parliament adopted the Directive on the introduction of an alternative fuel infrastructure.

A few years ago CNG cars were of little interest given by a number of factors - both fears of engine safety and reliability, limited supply of cars, hard to sell used cars, a limited supply of filling stations. Today, CNG-powered cars are already part of many corporate car parks.

At this time, however, there is no methodology that would be relatively simple after entering the main parameters, respectively information on the composition of the used means of transport, their total quantity, mileage, availability of fuel and a number of other variables has been able to give a satisfactory answer to the question of what kind of drive for corporate cars to choose. Therefore, the main goal of the submitted thesis, which is the proposal of the methodology together with the modelling of the optimal choice of alternative fuels in the conditions of the selected company, taking into account the availability of fuels and the price forecast, I consider to be highly actual.

Conclusion: The subject of the submitted dissertation thesis therefore highly meets the requirement of topicality. It can be stated that the author of the doctoral thesis has kept the subject and the goals of the dissertation have been fulfilled.

Evaluation of the results of PhD thesis, selected methods of processing, solution process and work benefits

The thesis is elaborated into seven chapters, which by their logical continuity gradually fulfil the defined goal of the work. The first chapter provides a clear overview of the current state and development of the problem describes the various alternative drives and defines three serious reasons for finding new possibilities for propulsion of motor vehicles - dwindling fossil fuel supplies, vehicle economy issues, and environmental issues. Based on the definition of these important reasons, it defines the issues and defines the basic objectives of this work, which can be briefly defined as: definition of technical - economic and ecological prerequisites for the use of alternative fuel of motor vehicles, proposal of evaluation methodology for the use of alternative drives of motor vehicles in transfer and production logistics of metallurgical production and the creation of a model to optimally choose the use
of alternative fuels in the conditions of the selected plant, taking into account the availability of fuels and the price forecast.

This chapter also generally defines methods of scientific approach. In the dissertation thesis is used mainly general methods of scientific knowledge such as analysis, synthesis, induction and deduction, because the issue of alternative fuels is very often solved, from different perspectives, so that there is a great deal of diverse information. Therefore, the basis for achieving the stated goals of this work was the gathering of sufficient relevant information about the solved problems and their statistical evaluation.

The second chapter was mainly about the theoretical background of alternative drives and their species. The third chapter describes the theoretical background of transport means in the Czech industry where transport is dominated by road vehicles. The fourth chapter logically combines the problems of the previous two chapters and deals with the means of transport in the operation of the metallurgical enterprise from the point of view of the possible use of alternative drives and defines the factors to be taken into account when deciding on the use of alternative drives in the conditions of the industrial company. It is mainly: the professional orientation of the company, the size of the company premises and the degree of manipulation with the material or products inside the premises, the need for transportation outside the premises of the company, the volume of transport and the average daily action radius of the means of transport, the composition and number of means of transport, their age and planned investments in the acquisition new vehicles. In the fifth chapter, the author of the work, based on the theoretical basics, the study of professional publications and also on the basis of his own experience in the field, constructed a rating table which, on the basis of technical and economic and ecological criteria, compares alternative fuels. The sixth chapter then fulfils its main aim with its content, which was the creation of a methodology and an evaluation model. The seventh chapter then proposes recommendations. In conclusion, the whole issue is summarized.

**Conclusion:** I find the results of the thesis beneficial in the area both theoretical and practical. The chosen methods and process of the solution are based on a logical arrangement and are an adequate solution to the purpose of the work.

**The importance of thesis for social practice and the development of the field of science**

From the point of view of society's importance, the thesis focuses on the concept of circular economy, a concept which is an integral part of sustainable development and deals with ways to improve the quality of the environment and human life by increasing the efficiency of production. In order to find out how much the production and use of the product is really close to the ideal of the circular economy concept, evaluation is needed. Here is a set of Life Cycle Assessment methods. These methods are crucial for the transition to the circular economy. Life Cycle Assessment methods are not difficult to conclude that continuing with the traditional Cradle to Grave production concept, which is based on a linear production chain, is not a way to achieve a sustainable industry. In this model, waste is produced both at the end of the chain in the form of the product used and during the production process. This may be the result of transport fumes. Therefore, the use of alternative fuels in industrial transport can be of great importance for the concept of the circular economy.

**Conclusion:** I consider the results of doctoral dissertation to be beneficial both in the practical and in the theoretical field. From a practical point of view, I consider it especially important - the way of spreading among the general public.

**Formal layout and language level**
The thesis corresponds to the general requirements for its content and the formal aspect. Graphics and language accuracy are very good.
**Student's publishing activities**
I consider publishing activities to be an adequate subject of the PhD thesis.

**Final evaluation and expression**
Based on the above assessment and evaluation of the benefits of the thesis, I recommend the PhD thesis of Radek Šnita for the vindication and after successful approving his thesis I propose that he be awarded the Ph.D.

In Ostrava on 21.10.2017

[Signature]

**Recommended questions for vindication**
In connection with the importance of this work - how does the author want to extend the results of his doctoral work among the general public?

How do you think that CNG can be decontaminated as a "dangerous" fuel and why is CNG regarded as a dangerous fuel by the general public?

The model includes four types of alternative fuel that can be used by the Advertiser - gasoline, diesel, LPG and CNG. Why should the author choose these four types and can the model be used for more alternative fuels including electricity?