

**Óbuda University**

**PhD dissertation**



**Fuel transport system in power plants from a security  
point of view**

*Examinations at power plants utilizing coal, lignite and alternative  
energies*

Balázs Zele

Subject leader:

Dr. Miklós Horváth (ÓU)

Dr. Sándor Kiss (NUPS)

**Doctoral School on Safety and Security Sciences**

Budapest, 2016

My main target with this dissertation was to give useful opportunities to the energy industry for future utilization, and to further strengthen safe energy supply by integrating my new points into the currently working system.

I examined the fuel supply system in my research at different energy generating plants as logistic structures, especially those which run on coal or other alternative energy. One of my other targets was to give development suggestions to the stability of different safety technique systems which support the plant and fire security. Furthermore it was my aim to the research to present the logistic path – from the mine until the plant – of the different coals, the possible risks and hazards, and all the cross-effects and consequences which may occur during or after the process. After ending my research I formed the following new scientific results:

1. I proved that it is essential to optimize transport processes at power plants utilizing coal and alternative energy resources.
2. Based on my previous knowledge I was the first one to research weight loss (moisture reduction) of different lignite types under covered storage units. I proved that between separated lignite types, woody and average type coals show more moisture reduction than the clayey ones per unit of time.
3. I proved by measurements that in case of lignite the weight loss (moisture reduction) process occurs under a shorter period of time. The larger weight loss happens in the first period of the process and also we can see continuance as the different phases cannot be sharply separated.
4. By examining the different fire cases I presented the interaction between the different factors and the system components. These examinations in general lead me to concluding the importance of the human factor and its influence to the whole system besides other elements like the different technical deficiencies or breakdowns.
5. I also presented the management-focused logistic system which was never presented this way before in different energy generating plants as logistic structures, especially those which run on coal or other alternative energy. I created the supply security structure which enables the system stability, too. I also worked out the logistic asset protection system as a visionary protection system. This has to be created and established within power plants, parallel with the appropriate amount of fuel maintained and supplied at all times.
6. During presenting system logistics with security-of-supply focus (interactive, intelligent logistic support) at power plants, I completed the partnership between suppliers and consumers by taking the security-of-supply into the focus role. This I find as a new result in the era of the modern logistic management system. By presenting the logistic aspects I created a new, intelligent logistic system which confirms the new technologies of the 21<sup>st</sup> century.

I strongly recommend teaching these new results at power plants and the energy generation industry, but especially recommend installing them for conscious future utilization.