## Ph.D. thesis: **Optimizing multi-carrier plant networks to enhance the security of electrical power management in a selected industrial plant**

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## Summary:

The security of energy supply, resulting from the reliability of the power supply system and the balance of demand, is a concept that combines both organizational, technical and economic aspects. This translates primarily to the magnitude of potential losses at the recipient due to the occurrence of power interruptions.

The work deals with the problem of the functioning of multi-functional networks enabling the realization of production within an industrial plant. Continuity of production processes requires uninterruptible power supply, which can be achieved by increasing investment expenditures to improve the quality of power feeds or local energy production or by using energy transformations and expanding the collection of used energy media. The justification of these activities should be sought on an economic basis by valuing energy security when energy balances are met. As a result, the problem can be formulated and solved by scientifically based optimization, which is the subject of the dissertation in the proof of the thesis and the fulfillment of the purpose of the work.

Valuing of energy security through the prism of needs and determinants related to the processes of production processes requires identifying key technologies, processes and accompanying conditions, related to the supply of energy, from the point of view of the plant's strategy. By perceiving an industrial plant as a multi-carrier media infrastructure, it is possible to propose a way of supplying energy, which in terms of both location and quantitative selection will be the optimal solution. The proposed form of the objective function is to take into account in the search for solutions the aspects of maintaining the continuity of industrial production and achieving the economic efficiency of current use. The work has a practical cover of the presented considerations related to the situation of a selected plant in the manufacture of metal products. The research made it possible to prepare procedures for rationalizing investment decisions against the background of increasing the continuity of the operation of industrial plant. The work is an interesting example of considerations about wide range of applications in the industry, as well as part of the wide research into the use of energy media for the development of local energy centers.