A REAL OPTIONS VALUATION ANALYSIS OF THE A CHP PLANT WITH STORAGE

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Overview

The paper presents an assessment of the economic efficiency of integration of a Combined Heat and Power (CHP) installation with a battery system, new heat source and a turbine set designed to operate during the peak hours.The first part of the paper presents an example of a technological system for the integration CHP plant with a battery system and a turbine set. In this part the option-to-expand the above system by new heat source using RDF (refuse-derived fuel) is also described. In the following, key assumptions regarding the process, including the capital expenditures and operating costs related to the process are estimated. Consequently for battery system with turbine – based on the method of discounted cash flows – the net present value (NPV) and internal rate of return (IRR) is determined and the results are interpreted. In order to assess the extension of the installation with a new heat source a real options analysis (ROA) is used that allows valuation of such managerial flexibility – understood as the possibility of changing previously taken decisions. The method is based on the formulation of operational capabilities in the form of options, which may – but need not – be executed within the analyzed project. Disposal of such options is therefore possibility to take specific actions in the future and getting additional benefits from them. The final part of the paper are conclusions summarizing the results obtained together with the sensitivity analysis for the main risk factors.

Methods

The methods applied for this research are: discounted cash flow analysis, logarithmic cash flow returns approach (the assessment of present value volatility) and real options valuation – a risk-adjusted binomial lattice option pricing model.

Results

Firstly, the flexibility to expand operational activity of a CHP (by adding RDF heat source) makes a significant contribution to corporate value creation. Secondly, findings of the study deliver project managers consequential arguments for effective decision making, changing its conventional criteria.

Conclusions

Managerial flexibility to expand the CHP integration venture by new RDF heat source has a specific technical and financial dimensions. That flexibility has the specific value that cannot be derived using common valuation techniques such as DCF analysis. The potential of calculation that flexibility offers real options valuation approach. The value obtained by this method substantially exceeds NPV of the project.

The presented evaluating model with the expansion option (option embedded in the CHP technological system) is practical and captures – in the context of project efficiency evaluation – uncertain characteristics of the CHP performance. Hence, the real options approach can be applicable to similar evaluation problems.

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