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DYSCYPLINA: INŻYNIERIA ŚRODOWISKA, GÓRNICTWO I ENERGETYKA

PRACA DOKTORSKA

Ogrzewanie i chłodzenie z centralnego źródła ciepła w sieci
ze zdalnymi węzłami cieplnymi

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Temat: Heating and cooling from a central heat source in a network with remote substations

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SUMMARY

The energy and heating industry in Poland is currently undergoing restructuring and modernization, which is caused by the requirements of the European Union's climate policy, as well as aging production installations. As a result, the operation of ineffective heat sources and energy systems becomes unprofitable, which is directly influenced by e.g. high costs of purchasing carbon dioxide emission allowances, as well as high financial penalties for exceeding the emission of harmful substances into the atmosphere.

Along with the development of industry, there is an increasing demand for refrigeration systems. In the municipal sector, the popularity of air conditioning systems is growing, which are increasingly installed in residential premises. This is the result of the increasing availability of air conditioning systems, their affordability, and an increase in living standards.

The aim of the research work is to analyze the possibility of implementing an installation supplying district heat and cold from a central heat source to recipients powered by remote heat nodes - hybrid heating technology. The possibilities of using system heat and cooling supplies to customers from a central heat source have been presented in this dissertation on the basis of three calculation models, different in terms of the network span and the applied technologies of thermal network construction.

As part of the theoretical part of the thesis, the current situation of the heating industry in Poland was assessed in terms of the current costs of heat generation, applicable legal regulations, and in particular the climate policy of the European Union and its impact on the operation of thermal energy companies. The development of heating systems in the world was reviewed and selected innovative technologies were presented.

The substantive part included the preparation of three calculation models, which were presented in different technological configurations and related to different climatic data. The models broadly analyzed the conditions, possibilities and effects of implementing heating installations, supplying large-scale heating mains, as well as small local heat networks, supplying small groups of recipients.

The computational analysis carried out allowed to obtain a broad picture of the effects of the implementation of the hybrid heating system. Factors influencing the positive financial result of the project were determined. Additionally, the areas of cooperation of the heat network with heat recovery installations as well as renewable energy sources were indicated. This doctoral thesis may be a universal source of information for most thermal energy companies located in Poland, to carry out a technical and economic analysis of the implementation of a hybrid heating installation.