

SUMMARY

OPTIMIZING THE ENERGY SOURCES OF DISTRICT HEATING

PhD thesis

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In this PhD thesis, based on domestic and European (EC countries) measures, I analyzed the current status and the expected future trends of the national district heating and energy industry.

I considered the renewable energy sources those are available in Hungary, examined their advantages and disadvantages, their equipments, economical properties and last, but not least their possible integration into existing or yet to be built district heating systems.

I examined generally and then specified to a city (namely Dunaújváros) the possibilities of local energy production. I made a priority rank regarding the possible local energy sources based on technical, economical and environmental factors.

I summarized the available energy sources, determined the amounts available and the energy content that can be utilized in the district heating. The amount of municipal waste, sewage and foresting residue of a settlement has also been surveyed and their energy content has been calculated.

For the calculation of the above mentioned factors, the well-known Knapsack-model has been altered and the *Modified Knapsack Problem (MKP)* has been constructed. I proved that the MKP can be solved in polynomial time and the solution is optimal and I provided solution for the energy supply of a given settlement.

Using the model I determined the energy supply sources of all Hungarian settlement using district heating, the amount of municipal waste and sewage that can be eliminated, the decrease of primary fossil fuel usage as well as the decrease of emission and the dependency on imported natural gas.