

**Thermo-Economic Analysis of Optimized Hybrid Energy Systems for District Heating**

**INTRODUCTION**

The need for energy is increasing rapidly in our homes as there is an increase in energy need in the world. Heating-air conditioning, water heating and appliances use approximately 75% of the energy supplied to houses. Therefore, more sustainable and innovative technologies are being studied to decrease this significant share of energy usage in stated categories and make the residential areas more energy efficient.

This study aims to develop and analyze the appropriate options for households’ energy solutions with thermo-economic analysis. At the end of this research, it is planned to optimize the most promising option to increase thermal efficiency according to the ideal operating conditions.

**RESEARCH QUESTIONS**

1. What is the annual energy need for a residential area with Y households at X location?
2. Which options can be used alone or in hybrid form, with priority to meet the heating need in the specified location?
3. How do the available heating / energy source options operate regarding thermo-economic analysis?
4. How can this heating/ energy source options utilized for maximum thermo-economic benefit?

**OBJECTIVES**

This study seeks to accomplish the following objectives:

1. Calculate the energy need according to the seasons and months and classify the energy consumers in the households (for example, heating, appliances, lighting, media equipment etc.)
2. Develop and model integrated solutions for heating and energy expenditures for the selected region (natural gas boiler, hydrogen solutions, fuel cell, heat pump, solar panel, wind energy etc.)
3. Perform thermo-economic analyses for the selected X solutions
4. Evaluate and optimize the most promising integrated configuration for optimal operating performance

**ROLE OF BEKO**

Beko can provide an external supervisor. This would entail having regular meetings to supervise the research and provide guidance and feedback.

**Your Background**

We are looking for master students with a mechanical engineering or sustainable energy technology background.

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