



INTEGRATION AND OPTIMIZATION OF RENEWABLE ENERGY SOURCES IN A LOW ENERGY HOUSE

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ABSTRACT

This article describes a method for an integration and optimization of renewable energy resources in a low energy house at the conceptual design stage. A multi-energy system, which uses a combination of renewable and non-renewable energy sources to cover the thermal and electric loads of the low energy house, is introduced. The method suggested in the paper is based on the energy hub concept. This approach allows the coupling between the energy demand and the energy supply in the building to be modelled in a synthetic way.

First, the energy demand side parameters are analyzed. A model of the low energy house has been created in TRNSYS and validated using measured data. Using this model, a database of different multi-energy system configurations has been selected and used to train and validate the chosen Building Energy Hub method. This method allows to analyze building energy demand and supply sequentially, which helps to understand the relationship between the energy inputs and outputs more clearly. Finally, this paper presents a case study on the optimal configuration of multi-energy system that minimises the use of non-renewable sources.

Keywords: low energy house, renewable energy resources, multi-energy system, integration, optimization, building energy hub