

Energy Retrofit of a Housing Estate



This Bachelor thesis presents an energy ret-rofit analysis by considering various heating energy systems with an energy efficient, cost effective and with the least environmental impact. This is performed with a housing estate in Edlibach, which consists of 12 single family houses. All the houses are connected to a central oil-fired boiler.

At present, the heating system consists of a conventional boiler which is soon reaching its end life. As a first step, brainstorming and market research were executed to analyse the different energy systems. From there, these energy systems were narrowed down to five solutions which are: a condensing boiler, photovoltaic systems with and without battery, solar thermal systems with ice storage or a surface water tank and connection to the district heating grid.

The current situation of the housing estate regarding its building envelope, energy demand and cost encountered were studied. Afterwards, energy system models were developed to understand the system performances and energy flows within the system. Subsequently, the total cost of ownership was calculated to see when the system pays off. One of the final tasks was to calculate the system's environmental emissions during its operational phase.

The results show that systems consisting of photovoltaic modules, heat pump and a battery storage is the most attractive solution.

Atul Mundakattu

Project coach:
Dr. Matthias Berger

Project expert:
Dr. Kai Lieball

Industrial partner:
MEG Kreuzrain

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