

# How CO<sub>2</sub>-intensive is the German electricity mix for heat pumps? A critical assessment of electricity consumption for heating systems.

## Motivation

Heat pumps are an important part of decarbonizing the building sector. However, considerable amounts of electrical energy are needed to operate them. Heat pumps draw electricity particularly in the cold season. During this time, the electricity mix can deviate significantly from the average annual electricity mix. When evaluating heat pumps, this seasonal effect is regularly ignored, which may lead to wrong conclusions.

## Task

Within the scope of the work, the actual electricity mix for heat pumps is to be determined. For this purpose, a model is to be derived and instantiated. Real consumption data will be made available and must be incorporated into the model together with weather data.

## Expected results

Students are expected to hand in substantiated report and a well-documented simulation study. A stretch goal would be an additional short paper for a conference.

## Title German

- Wie CO<sub>2</sub>-intensiv ist der deutsche Strommix für Wärmepumpen? Eine kritische Bewertung des Stromverbrauchs für Heizungsanlagen.

## Level (Ambition: medium to high)

- Master thesis
- Bachelor thesis with minor modifications

## Methodology

- Literature research & simulation study

## Special prerequisites

- Analytical skills, ideally with the ability to set up a small simulation model

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