Heating with PV Façade in a Passive House

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Abstract

A new building with 14 small flats is designed according to Passive House standard in Innsbruck, Austria. Heating and domestic hot water (DHW) supply are planned to be covered using direct electricity. Electric heaters are used for space heating, and electric boilers for DHW (one per flat). The whole south façade is covered with a Photovoltaic (PV) system of 27.3 kWp, aiming to cover as much as possible of the electricity needs. The idea was to keep the investments costs low, minimize the installation effort, eliminate the distribution losses, and increase the share of on-site renewable energy production using the available space in the façade.

Passive House Planning Package (PHPP) is used to compare the final and primary energy between the proposed system and a reference central heating system i.e. an air-source and groundwater-source heat pump. In addition, the annual and monthly electricity grid balance are calculated.

The simulation results are weighted using monthly primary energy factors with respect to the impact on the energy use and the de-carbonization of the energy system. Additionally, the primary energy consumption is calculated with and without a large renewable part in the electricity mix.