

Carbon heat pumps smart option for hotels in cold climates

May 25 2021, by Maren Agdestein



Research suggests that the hotel industry could save energy by installing CO2 heat pumps. Credit: Colourbox

Energy consumption in the hotel industry is high and contributes to global warming.

Researchers have been studying [energy consumption](#), available energy sources and [heating systems](#) in the hotel sector over a five-year period.

They have come up with two important findings from a new study:

- Hotels with heat pumps use 20 percent less electricity for heating per square meter.
- CO₂ heat pumps in hotels can reduce the need for heating and cooling by up to 60 percent.

Greener energy systems

In the last five years, almost 20 percent more hotels have had access to district heating to replace electric or oil heat. This is a positive step in terms of reducing greenhouse gas emissions.

"However, we still have a way to go on when it comes to energy consumption inside hotels," says Silje Marie Smitt, a Ph.D. candidate in NTNU's Department of Energy and Process Engineering at NTNU. She is working with research colleagues at NTNU, SINTEF and the Technical University of Denmark (DTU).

"Studies show that hotels that use [district heating](#) as their primary heat source consume significantly more energy than hotels that use heat pumps. This is because heat pumps don't produce heat—instead, they upgrade the heat from a low temperature to a higher one," she says.

All-in-one system provides high efficiency

As part of this study, the researchers investigated two hotels equipped with integrated CO₂ [heat pumps](#) with heat storage. These systems supply all the hotels' thermal heating and cooling of the building, including heating and cooling of the rooms and hot water.

"The potential of 'all-in-one' systems like this is huge, because you can

recover heat from parts of the hotel where cooling is needed, and then upgrade or raise the temperature with the heat pump into useful energy. This is how we can achieve [high efficiency](#) and reduced energy consumption. The systems with all-in-one CO₂ solutions show a large reduction in energy consumption and related greenhouse gas emissions," says Smitt.

More information: S. Smitt et al, Energy use and retrofitting potential of heat pumps in cold climate hotels, *Journal of Cleaner Production* (2021). [DOI: 10.1016/j.jclepro.2021.126799](https://doi.org/10.1016/j.jclepro.2021.126799)

Provided by Norwegian University of Science and Technology

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