Scientists discover potential sustainable energy technology for the household refrigerator

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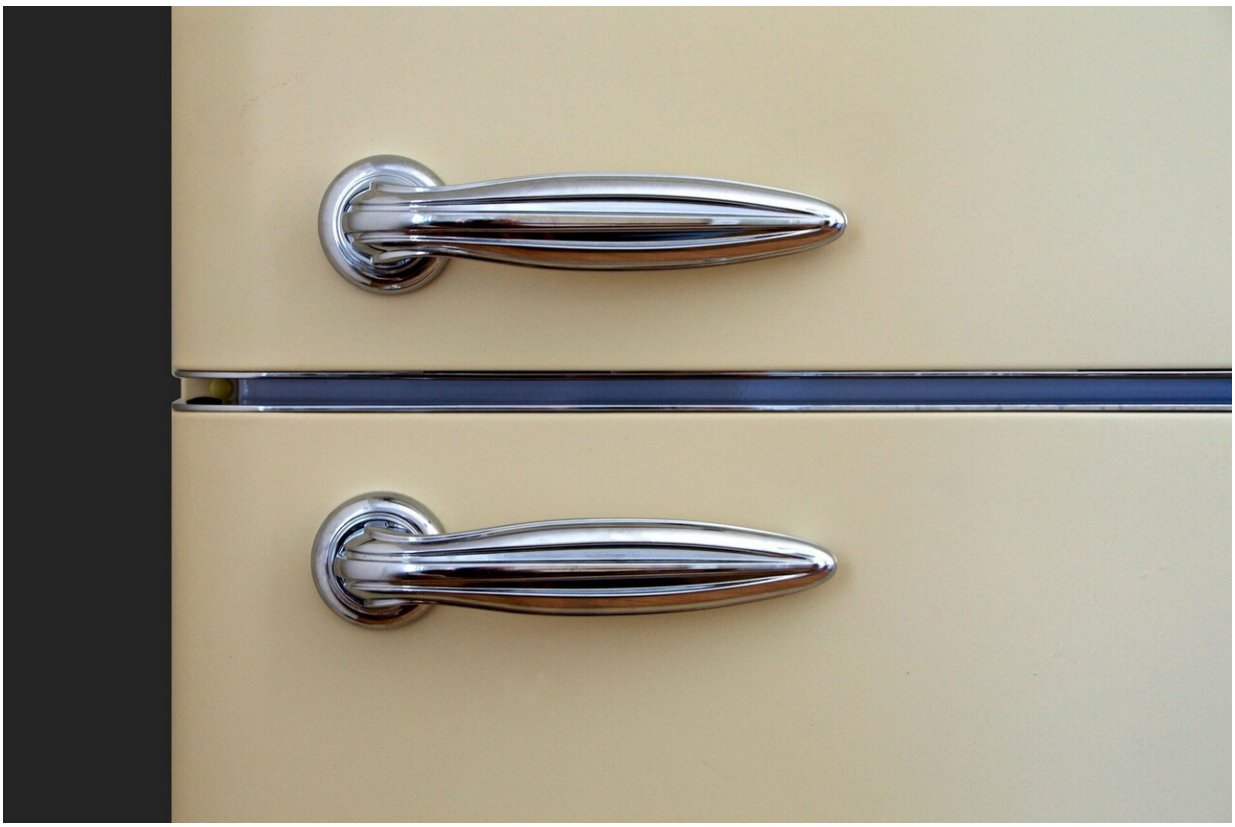

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While many advancements have been in improving its efficiency, the refrigerator still consumes considerable amounts of energy each year.

"Energy efficiency of a normal refrigerator is affected by the heat-insulating property of the thermal barriers of the freezer. This is due to its low inner temperature," explained Jingyu Cao at the University of Science and Technology of China. "There is a significant difference in temperature between the freezer of a traditional refrigerator and ambient air temperature and the normal thermal barrier of the freezer causes considerable cold loss."

Cao and his team hypothesized that using part of the cold loss to cool the fresh food compartment could be a promising solution in improving the efficiency of the refrigerator. They describe their findings in the *Journal of Renewable and Sustainable Energy*.

"The evaporating temperature of the refrigeration cycle depends only on the freezer temperature and appropriate reduction of the evaporator area in the fresh food compartment will not decrease the overall efficiency," explained Cao.

"Most families need one or two refrigerators and they are always on 24 hours a day, 365 days a year. That wastes a lot of energy. Even if we can save a little energy, that helps the human race be more energy-efficient," said Cao.

Cao and his team are not the first scientists to attempt to improve the efficiency of household refrigeration. Extensive experiments by many different scientists have looked at various parts of the refrigerator to improve energy consumption, but a definitive solution has not yet been found. In Cao's study, a novel refrigerator with a loop thermosyphon is put forward to decrease the heat transfer between the freezer and ambient air.

"One of the surprises was how much energy we saved. The energy-saving ratio of the improved walls got close to 30 percent—more than

we had expected. This technology even works in hot climates like the desert."

Although Cao's study is currently based on theoretical calculation, the results are promising. "It has great potential to be popularized as a sustainable energy technology or applied in the renewable energy field, considering its significant energy-saving effect, simple structure and low cost," said Cao.

More information: Jingyu Cao et al, Preliminary evaluation of the energy-saving behavior of a novel household refrigerator, *Journal of Renewable and Sustainable Energy* (2019). DOI: 10.1063/1.5054868

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