Research shows how householders could stay warm for less simply by storing heat better

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Research by the UK Energy Research Centre (UKERC) shows how householders could stay warm for less simply by storing heat better.

"What's great about storage is that heat can be generated off-peak while 'waste' heat can be saved for later use, thus increasing energy efficiency and cutting cost, assuming, of course, we have an appropriate tariff structure that incentivises storage," said Professor Philip Eames, the project's lead researcher.

"The problem is we don't understand the physical properties of the wide range of heat storage materials particularly well, and it's hard to assess the various proposed technologies."

The researchers, who are based at Loughborough University, sought to fill this gap by working out which of the options might work in a 'real-world' situation.

By examining the heat flows in a three bedroom house, and then using these data to model a 'typical' UK home, UKERC's independent analysis found that 'phase change materials' such as paraffin could store heat three times more effectively when combined with heat pumps than existing methods such as storage heaters.

The team envisage householders installing a tank or tanks with a combined volume of around 190 litres – smaller than some domestic hot water storage cylinders. These tanks would be filled with phase change material that will store heat generated using off-peak electricity at night for discharge later in the day when required.

"Our research matters because nearly 50% of the UK's entire energy consumption goes on some form of heating – so there's got to be a win here if we are to get even close to our nationwide targets on cutting energy consumption."

"We need to find more efficient ways of using the heat we generate at high cost, both to our wallets, and to the environment in terms of greenhouse gas emissions," Professor Eames said.

Large inter-seasonal heat stores (equivalent of up to 75,000 cubic meters of water) linked to district heat networks with hundreds of homes have also been demonstrated in parts of Northern Europe. These are charged in the summer – when demand, and tariffs, are low – for discharge in the winter.

"Whilst 75,000 cubic metres sounds large, equivalent to a cube of side just over 42m in length, there would be benefits; energy suppliers and urban planners might give consideration to this approach, and begin thinking about such options now. It's easier to include the networks that transfer the heat between the store and households if they are designed-in from the outset," Professor Eames added.

More information: The full UK Energy Research Centre report "The Future Role of Thermal Energy Storage in the UK Energy System: An Assessment of the Technical Feasibility and Factors Influencing Adoption - Research Report" can be downloaded from the UKERC website: www.ukerc.ac.uk/support/tiki-download_file.php?fileId=3718.

Provided by UK Energy Research Centre