

THE FUTURE KITCHEN

A HEAT RECOVERY SYSTEM ON GREYWATER

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Design for a sustainable future

In 2021, the International Energy Agency (IEA) highlights that approximately three-quarters of today's greenhouse gas emissions originate from the energy sector (IEA, 2021). Therefore, there is a pressing need for a significant shift in energy supply and conversion to achieve global net-zero CO₂ emissions by 2050. Consequently, addressing this issue is a shared responsibility that extends to governments, municipalities, companies, and individuals, each with their own stake in the matter.

According to Tohidi et al. (2022), energy demand is predicted to increase. An opportunity to improve energy efficiency involves exploring heat recovery systems in households. Currently, existing solutions for wastewater in households, such as showers, are mainly focused on the bathroom context. However, there is a lack of solutions tailored to the kitchen context.

The final concept

The working principle of the final concept is a copper tube with the diameter of the drain pipe that can transfer heat from drain water to fresh water. The heat recovery system is capable of handling greywater and potentially other contaminated liquids.

Optimal performance is achieved when there is a non-simultaneous flow between the two liquids involved in the heat transfer. Therefore, a delay between water requests, such as after draining, is advantageous. Multiple devices can be interconnected to facilitate heat recovery from one device to another.

The concept is tested in a scenario where three pans of boiling water were drained, after which the dishwasher was used at high-intensity programme

The findings of this research highlight that implementing a heat recovery solution in the kitchen could have significant benefits. To be more specific, it could save **678 kWh**, and therefore reduce costs by **€258**, and decrease carbon footprint emissions by **348 kg** after 10 years of daily use. All, whilst the projected retail price for this system is estimated at **€500**.



Julia van Slogteren
The design of a heat recovery system on grey water in the kitchen context
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Integrated Product Design

Committee Eui Young Kim (Chair)
Martin Verwaal (Mentor)
Sergio Fazzi (Company mentor)
Company Quooker International B.V.

TU Delft