Residential Waste Heat Recovery System

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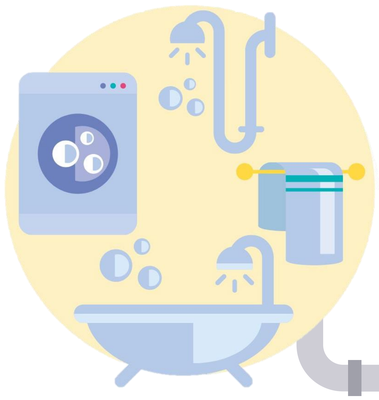
Project Background

Project Sponsor

John McMurray, Division 5,
Rocky View County



This project aims to reduce emissions and energy usage related to space heating and domestic hot water provision in a residential house. As natural gas, the primary energy source for these purposes, can lead to considerable emissions, the project intends to investigate sustainable alternatives such as waste heat recovery from grey water and septic systems.

Location

1650 sq.ft. residential house in Rocky View County

Temperature

Successfully heats well water to 65° C

Emissions

Minimize carbon footprint and decrease energy costs

Alternative Solutions

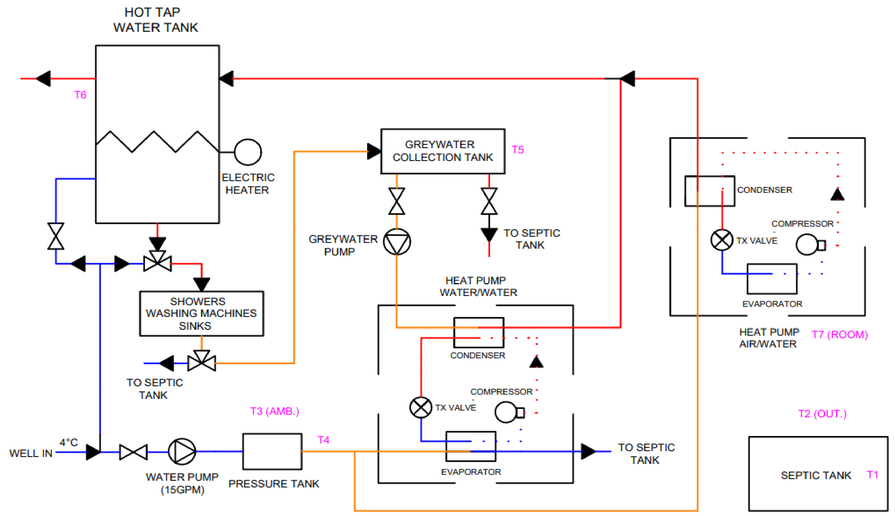
Geothermal Loops

Hard to justify upfront cost and potential maintenance.

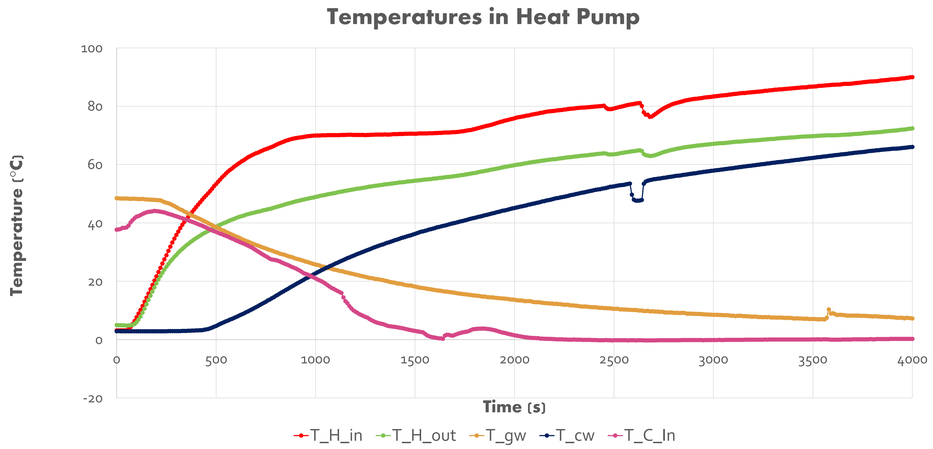
Drain Water Heat Recovery

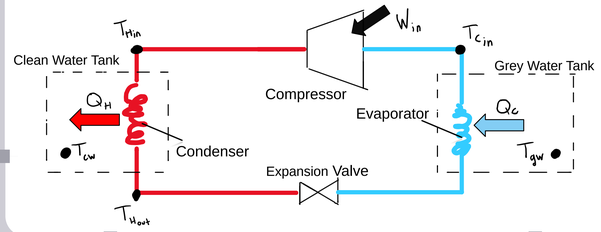
Does not allow for heat recovery from intermittent water usage.

Design Concept



Engineering Analysis





COEFFICENT OF PERFORMANCE:

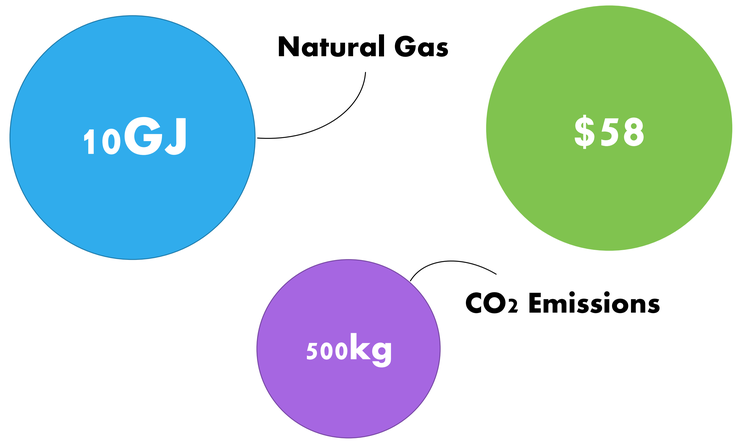
$$COP = \frac{Heat\ out}{Work\ in}$$

Ideal (reversible) COP: $COP_{rev} = \frac{T_H}{T_H - T_C}$

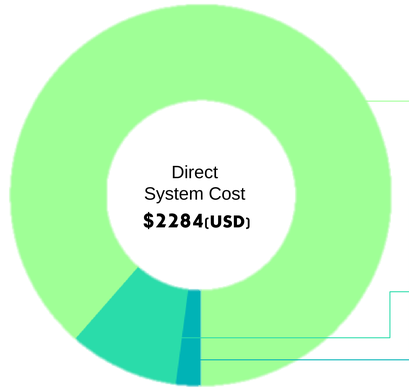
Actual COP: $COP = \frac{Q_H}{W_{in}}$

How does the reversible COP vary over time?
When do you expect the compressor to do more work?

Annual Projected Savings



Economic Analysis



Total Revenue	Est. System Life	Payback Period
$58	12 Years	21 Years

Acknowledgements

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