

## Studies on Lucrative Design of a Waste Heat Recovery System for Air Conditioners

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**Abstract :** In this paper, studies have been carried out for an in-house design of a waste heat recovery system for effectively utilizing the domestic air conditioner heat energy for producing hot water. Theoretical studies have been carried to optimizing the flow rate for getting maximum output with a minimum size of the heater. Critical diameter, wall thickness, and total length of the water pipeline have been estimated from the conventional heat transfer model. Several combinations of pipeline shapes viz., spiral, coil, zigzag wound through the radiator has been attempted and accordingly shape has been optimized using heat transfer analyses. The initial condition is declared based on the water flow rate and temperature. Through the parametric analytical studies we have conjectured that water flow rate, temperature difference between incoming water and radiator skin temperature, pipe material, radiator material, geometry of the water pipe viz., length, diameter, and wall thickness are having bearing on the lucrative design of a waste heat recovery system for air conditioners. Results generated through the numerical studies have been validated using an in-house waste heat recovery system for air conditioners.

**Keywords :** air conditioner design, energy conversion system, radiator design for energy recovery systems, waste heat recovery system

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