21st July, 2011

# Thermal Integration Ltd. Patent Application

## Twin heat exchanger thermal store for improved central boiler efficiency

Unique Principle: The use of two heat exchangers (2,8) in combination with a thermal store (1), to store heat energy provided by a boiler (4), for the provision of domestic hot water (12) at varying loads, while ensuring that return temperatures to the boiler system (5) remain low throughout operation. In turn this maximises the efficiency of central boiler and CHP operation.

Operation: Heat is delivered from a boiler system via pipe (4) into heat exchanger (2), where the heat is transferred into stored water before returning to the boiler via pipe (5). The cold stored water (16) is delivered to the heat exchanger (2) by pump (3) via pipe (6) and returns fully heated to target temperature into the top of the store (15) via pipe (7). The flow rate of stored water through the heat exchanger (2) is set to ensure target temperature is achieved in one pass. As the stored water is heated the seperation layer between the hot and cold stored water (17) moves down the store until a sufficient volume of stored water is heated. When a hot water tap fed from pipe (12) is opened, the flow of water to taps is detected by flow sensor (10), which in turn turns on the pump (9) to deliver hot stored water (15) via pipe (13) into the heat exchanger (8). The heat is exchanged into the incoming cold water (11) through the heat exchanger to provide the heated domestic water (12). The flow rate of stored water through the heat exchanger (8) is modulated (either by the use of a control valve or through pump speed controls) to ensure that the temperature of water delivered to taps (12) is at target temperature, and that stored water returning to the base of the thermal store (1) via pipe (14) is cooled enough to ensure the colder stored water (16) remains low enough in temperature to ensure return temperatures to the boiler (5) are likewise kept low.

