Pump Speed Optimisation for Solar Thermal System

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***Abstract*—Photovoltaic as well as solar thermal systems have been particularly useful for harvesting the inexhaustible energy from the sun and to reduce the carbon emissions normally produced by burning fossil fuels. In either of these cases, reaching a higher efficiency obviously brings substantial benefits, and while much research has been performed on PV efficiency, most research has focused on the solar thermal collectors themselves, while our approach considers the system's perspective by optimizing the pump speed based on the performance of the various heat exchangers within the full system. In order to test the theory, a prototype solar thermal system was built, in which the pump speed was adjusted by considering: the water demand, the input and output temperatures of the solar panel and the output temperature of the produced hot water. By combining the solar thermal system with an existing gas boiler and continuously adjusting the pump speed, a reduction of between 10 to 30% in gas consumption and 5 to 10% in electricity consumption was observed.**