

**Title: Building integrated sub-slab thermal storage system for coupling to a heat pump: modelling, optimization, and thermal performance**

**Abstract:**

The research explores the performance of a sub-slab ground heat exchanger, coupled to a heat pump, and the ability of the system to provide space conditioning and domestic hot water (DHW) for a multi-unit residential building (MURB). The thermal performance of the system is assessed through simulation, for a 12-dwelling unit MURB, in various locations across Canada. The parametric analysis conducted to optimize the design of the building, as well as the sensitivity analysis performed to optimize the configuration of the sub-slab ground heat exchanger are also presented. According to the simulated results, the ground layer can store some of the rejected energy over medium term, without reducing the long-term performance of the heat pump. The system is able also to fully meet the space conditioning and DHW heating needs of the building. The annual electricity consumption of the heat pump is estimated to be between 10.3 GJ and 14.6 GJ per dwelling unit, depending on the location.

**Bio:**

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