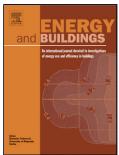
### Accepted Manuscript

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## ACCEPTED MANUSCRIPT

#### Impact of occupancy rates on the building electricity consumption in commercial buildings

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#### Highlights

- Electricity consumption has a significant correlation with the occupancy rates
- Plug-loads have an even stronger correlation with the occupancy rates
- Occupants' impact on the electricity consumption depends on the building function
- We calculated a value of kW/person for a building with its area usage type and size
- kW/person correlation allowed to predict electricity consumption in a test building

#### Abstract

Approximately 10% to 40% of the energy can be saved, if the occupants' presence/absence is factored into the building operation based on a dozen different case studies conducted in commercial buildings. Two campus buildings, CB1 with 0.3 kW/person and CB2 with 0.2 kW/person, as well as one additional office building, OB1 with 1.0 kW/person, served as data collection sites for occupancy rates and electricity consumption. The analysis results showed that both the total electricity consumption (R<sup>2</sup> = 50%-80%) and plug loads (R<sup>2</sup> = 70%-80%) are significantly correlated with the occupancy rates in the studied buildings. This study also found that the impact of occupants on the building enabled development of a linear equation to estimate the normalized occupants' impact on the electricity consumption in kW/person. For a third campus building, CB3, used as a demonstration building, the electricity consumption calculated with the previously calibrated linear equation predicted the kW/person to within 7% of the actual measured 0.53 kW/person. The electricity consumption per

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