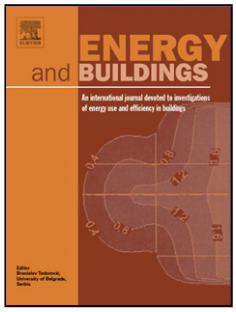

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PII: S0378-7788(16)31951-X
DOI: http://dx.doi.org/doi:10.1016/j.enbuild.2017.08.062
Reference: ENB 7891

To appear in: *ENB*

Received date: 18-12-2016
Revised date: 5-7-2017
Accepted date: 22-8-2017

Please cite this article as: B. Xu, S. Zhou, W. Hu, An intermittent heating strategy by predicting warm-up time for office buildings in Beijing, *Energy and Buildings* (2017), http://dx.doi.org/10.1016/j.enbuild.2017.08.062

An intermittent heating strategy by predicting warm-up time for office buildings in Beijing

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Abstract

In order to achieve building energy efficiency and keep the indoor temperature within a defined comfort range during working hours, a predictive control strategy is proposed for intermittent heating of office buildings by predicting the warm-up time on each working day. A physical model for simulating and forecasting thermal behavior of the building is developed using the state space method. Furthermore, a modeling analysis case is given based on a typical office building in Beijing with different types of building insulation and terminal forms. The increasing capacities of heating equipment, transition time, room temperature variation and energy saving rate are simulated and analyzed. Results indicate that when applying an intermittent heating strategy, the required heating capacity for each room is 1.1-1.3 times to that of a traditional continuous heating system. The warm-up time ranges from several minutes to several hours depending on conditions, while cooling down time is much shorter than warm-up time. In addition, we found that heating systems in ordinary buildings with fan coils as terminal devices have faster temperature responses than those in energy efficient buildings with radiators. It is necessary to consider standby