## Accepted Manuscript

Title: Impacts of Cooling Load Calculation Uncertainties on the Design Optimization of Building Cooling Systems

Author: Wenjie Gang Shengwei Wang Kui Shan Diance Gao



Please cite this article as: W. Gang, S. Wang, K. Shan, D. Gao, Impacts of Cooling Load Calculation Uncertainties on the Design Optimization of Building Cooling Systems, *Energy and Buildings* (2015), http://dx.doi.org/10.1016/j.enbuild.2015.02.032

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



## ACCEPTED MANUSCRIPT

1	Impacts of Cooling Load Calculation Uncertainties on the Design Optimization of
2	<b>Building Cooling Systems</b>
3	Wenjie Gang, Shengwei Wang*, Kui Shan and Diance Gao
4 5	Department of Building Service Engineering, the Hong Kong Polytechnic University, Kowloon, Hong Kong
6 7 8	*Correspondence email: beswwang@polyu.edu.hk Phone: +852-2766 5858 Address: Department of Building Services Engineering, the Hong Kong Polytechnic University, Kowloon, Hong Kong
9	Abstract: Cooling load calculation is the basis for the design of building cooling systems. The current
10	design methods are usually based on deterministic cooling loads, which are obtained by using design
11	parameters or information. However, these parameters contain uncertainties and they will be different
12	from that used in the design calculation when the cooling system is put in use. The actual cooling load
13	profile will deviate from that predicted in design. By considering uncertainties of these parameters, the
14	sizing and configuration of the cooling system can be improved. In this study, a design optimization
15	method is proposed by considering uncertainties related to the cooling load calculation. Impacts caused
16	by the uncertainties of nine factors are considered, including the outdoor weather conditions, internal
17	heat sources and indoor set-points. The cooling load distribution is analyzed. The oversize problem is
18	explained from the viewpoint of uncertainties. By presenting the probability distribution of the cooling
19	load and the potential capital cost, the proposed method can determine the cooling system capacity with
20	quantified confidence. Comparison between the cooling systems with different configurations is also
21	conducted. With the distributions of their energy consumption, decision makers can select the optimal
22	configuration based on quantified confidence.

Keywords: Cooling load calculation; uncertainty analysis; design optimization; system capacity;
system configuration

Download English Version:

## https://daneshyari.com/en/article/6731606

Download Persian Version:

https://daneshyari.com/article/6731606

Daneshyari.com