

Accepted Manuscript

Title: Uncertainty quantification for Energy Savings
Performance Contracting: application to an office building

Author: Ghjuvan Antone Faggianelli Laurent Mora Rania
Merheb



PII: S0378-7788(16)31934-X
DOI: <http://dx.doi.org/doi:10.1016/j.enbuild.2017.07.022>
Reference: ENB 7762

To appear in: *ENB*

Received date: 16-12-2016
Revised date: 7-7-2017
Accepted date: 10-7-2017

Please cite this article as: Ghjuvan Antone Faggianelli, Laurent Mora, Rania Merheb, Uncertainty quantification for Energy Savings Performance Contracting: application to an office building, *Energy & Buildings* (2017), <http://dx.doi.org/10.1016/j.enbuild.2017.07.022>

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.

Uncertainty quantification for Energy Savings Performance Contracting: application to an office building

Ghjuvan Antone Faggianelli^{a,*}, Laurent Mora^a, Rania Merheb^a

^a*I2M, Université de Bordeaux, UMR CNRS 5295, Esplanade des Arts et Métiers, 33400 Talence, France*

Abstract

Building energy models are widely used to estimate or predict the average energy consumption of a building. However, they only provide approximate figures with significant uncertainties. Particular uses such as energy performance guarantee require more reliable results in order to set suitable contracts. For this purpose, uncertainty quantification can be used to support modeling phase and results interpretation. The aim of this paper is to present a comprehensive methodology applied to an office building.

First, sensitivity analysis allows users to identify and prioritize the most influential inputs of their model. Non-influential inputs can then be fixed to their nominal values, without impacting the results. The remaining set of parameters makes it possible to assess quantitative measures such as Sobol' indices which give useful information on the model variance. Different methods are suitable for such calculations but generally rely on specific sample design. Meta-model reduction based on Polynomial Chaos Expansion can be used as a post-processing method and appears to be the best compromise between accuracy and computation time for our case-study. This approach also involves the use of probability density function and cumulative distribution to calculate confidence intervals and probability to exceed a threshold value. At last, the importance of using adjustment variables to take into account time-varying parameters is also discussed.

Keywords:

Sensitivity analysis, Propagation of uncertainty, Polynomial Chaos Expansion, Energy performance guarantee

*Corresponding Author

Email address: anto.faggianelli@gmail.com (Ghjuvan Antone Faggianelli)

Download English Version:

<https://daneshyari.com/en/article/4918895>

Download Persian Version:

<https://daneshyari.com/article/4918895>

[Daneshyari.com](https://daneshyari.com)