Big data and DCV: smart ventilation?

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SUMMARY
Demand controlled ventilation (DCV) has acquired a large share of the residential ventilation market in Europe. Recent developments in data management, internet of things (IoT) connectivity and machine learning have enabled ventilation manufacturers to push DCV towards genuinely 'smart' ventilation. In this paper we show the results from the first implementation of ventilation systems with integrated and fully automated centralized IAQ monitoring for the high volume market in Belgium.

KEYWORDS
Smart ventilation, IAQ, DCV, monitoring, big data

1 INTRODUCTION

DCV systems have been on the market for decades and, over the last 10 years, been able to conquer a large share of the residential ventilation markets in France, Belgium and The Netherlands (approximately 50-70% of the market in new construction).

Despite this high market penetration, the control is not actually 'smart', in that it employs a fixed control algorithm to set the ventilation flow rate as a response to a sensed pollution. Neither are they 'connected'. On the other hand, a large number of 'smart IAQ monitors' have been launched recently. These are 'smart' in the sense that they are connected to the Internet of Things, but they generally only consist of IAQ sensors and do not provide any information about the ventilation in the space.

Predictive control is less useful for ventilation systems than for heating and cooling systems due to the small time constants involved. Smartness for ventilation systems and IAQ monitors should therefore be derived from the potential that these systems provide to learn about IAQ and ventilation needs of the particular house the system sits in and adapt its control strategy to best fit the particular needs

2 METHODS

This paper presents a case study of simultaneous data collected with smart IAQ monitors and a smart ventilation system in 5 dwellings in Belgium over a course of 3 weeks.

The data is gathered on an open cloud platform, processed and compared to that of simulation studies on the performance of that particular DCV system.

3 RESULTS

The real time performance of the DCV system, on average, closely follows the predicted performance. Nevertheless, the variability of the ventilation demand as measured by the sensors shows that an adaptive control strategy is indeed needed to maximise IAQ in dwellings.

Actual measurement data can not be included in the extended abstract due to intellectual property and privacy regulations, but will be demonstrated during the presentation.

5 CONCLUSIONS

By implementing a cloud based data collection and processing platform, DCV and IAQ monitoring devices can become a driver for real ‘smart’ ventilation.