

POTENTIAL OF SAVINGS FOR DEMAND CONTROLLED VENTILATION (DCV) IN OFFICE BUILDINGS

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ABSTRACT

For energy savings, DCV systems are more and more used in ventilation systems but to estimate their energy savings, variation of occupation in the building (in time and number of person) must be estimated. We have enquired on real occupation on site in 27 offices and 13 meeting room in France. Occupation rates have been monitored either by webcam or by enquiry to the users. Results show very low occupation rates in meeting rooms although most people feel they are very occupied. Yet effective time of meetings and number of occupants are less than expected. Even offices are not occupied all day long considering people move a lot in their job. The conclusion is that DCV systems offer a great potential for energy savings but of course should be characterised and dimensionned properly to achieve good results.

INTRODUCTION

The study was to enquire on real occupation on site for offices and meeting rooms: in 27 offices and 13 meeting rooms, occupation rate have been monitored either by webcam or by enquiry to the users. This occupation gives directly the potential of energy savings of a perfectly controlled system. A previous study run in 1999 had shown very low occupation on two meeting rooms. This increased sample was intended to confirm or not the trend previously noted.

POTENTIAL OF ENERGY SAVINGS

Qualifying the components or even the system is not enough, it is also necessary to assume how much rooms are occupied to estimate the energy savings of DCV. The aim of this part of the study was to determine how much offices and meeting rooms are used by monitoring some of them in 10 different French companies.

For individual offices, an optical sensor was installed and connected to an electronic device reporting detection in order to calculate the time of presence. This was done in 27 different offices and on periods not less than 2 weeks. After the monitoring, the offices occupants were asked to estimate the time they had spent in their office during the period. . Figure 1 shows the results. In average, offices were occupied 40 % of the time. Although the prediction was in average 42%, there are large discrepancies between what people think and their actual occupation.

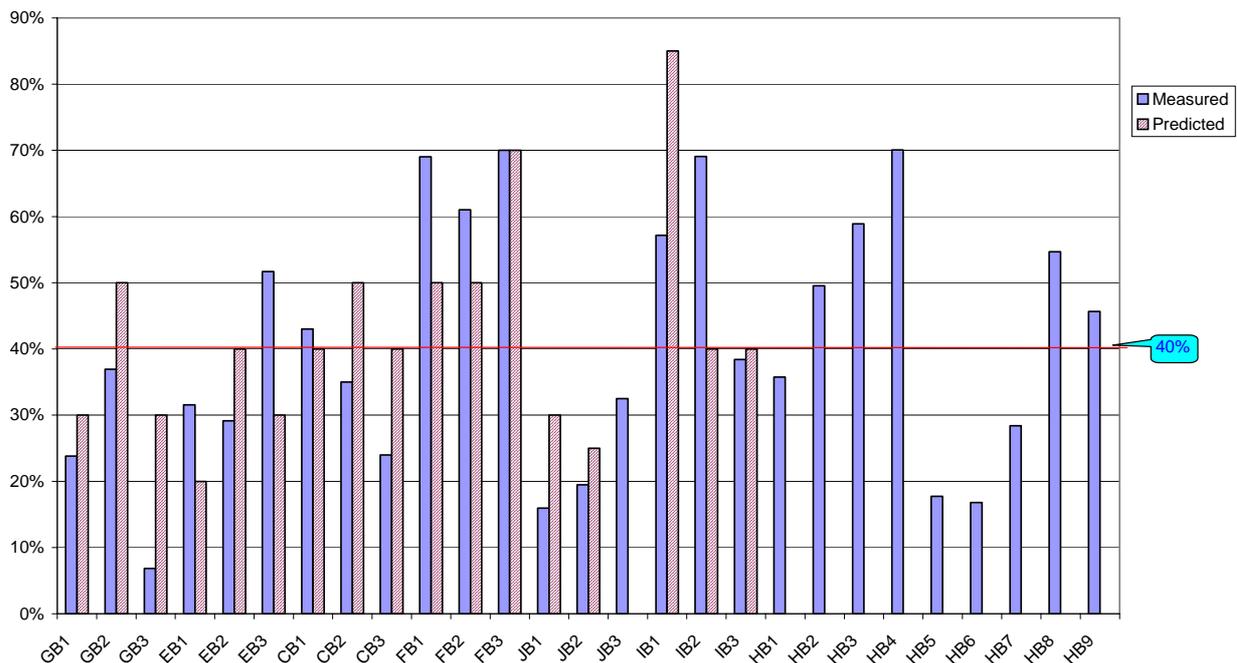


Figure 1 : measured and estimated values of occupation in 27 offices.

For meeting rooms, we have monitored 13 of different sizes by an enquiry filled by visitors and the booking planning. Some rooms (4) had been equipped with webcam to control the number of occupants and the time of occupation.

We consider three informations ;

- Ratio of time effectively used defined as the real number of hours occupied divided per the maximum number (considered of 10 hours a day for offices)
- The number of occupants compared to the maximum number defined from the room size,
- The occupation ratio : multiplication of the two previous ones .

Results (figure 2) show a low level of overall occupation of 8 % (less than 50 % of occupants during 16 % of time in average).

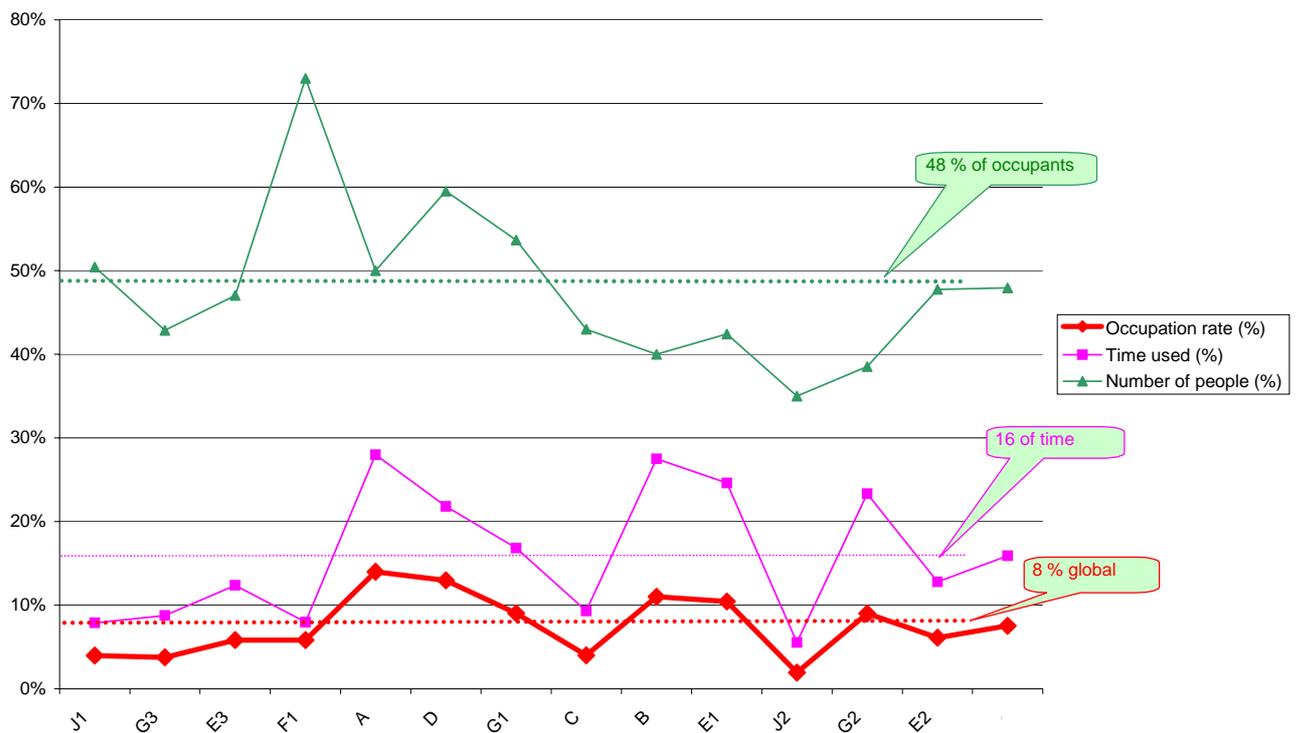


Figure 2 : occupation of 13 meeting rooms of different size

We also thought than the use of the room could be dependent on their size. It seemed from the previous study in 1999 that the large room was occupied for longer meeting but less often than the small rooms. Figure 3 shows the occupation rates of the meeting rooms according to their size. We can note that the overall occupation rate was not correlated to the room size.

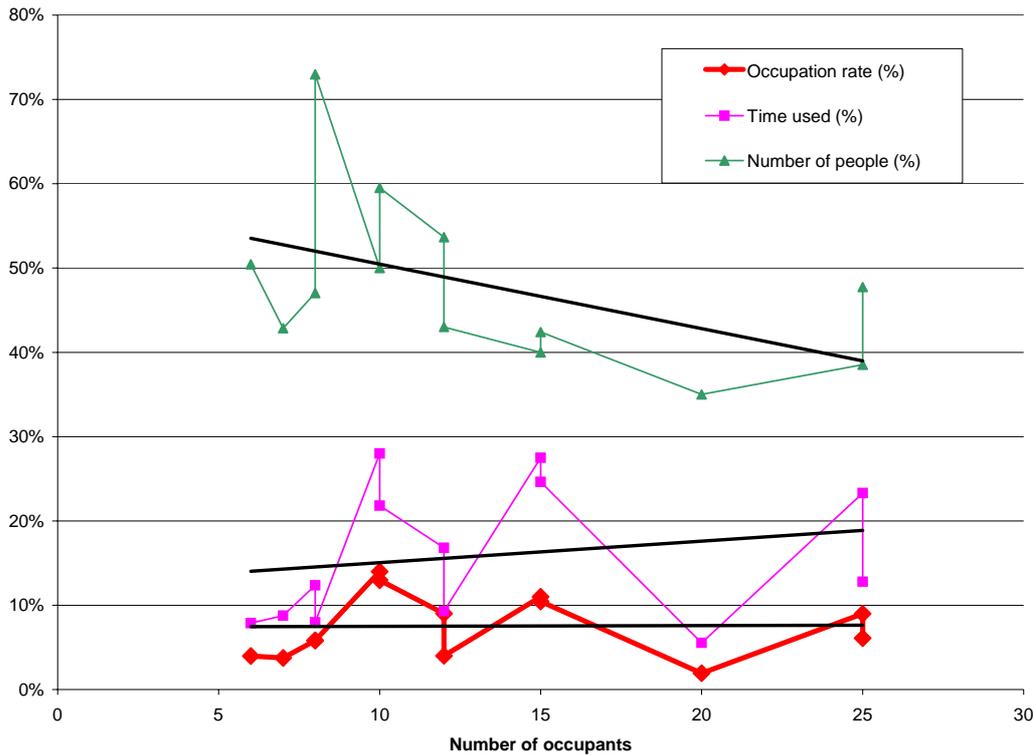


Figure 3 : occupation the meeting rooms according to their size (number of occupants)

CONCLUSIONS

The conclusions of this enquiry are that occupation rates in offices and meeting rooms are very low. People move very often out of their office and the period of the day where they may come to work is larger due to flexibility. Therefore the potential of savings of a DCV is much larger than expected. For meeting rooms, pre-booking often implies that the room is considered full even while meetings are short. In addition, rooms that seemed very occupied to the company's staff appeared to be in fact used morning and afternoon for two hours each and with only half of the maximum occupation in average. From these enquiries, we can note that DCV systems are interesting for energy savings and offering a wide potential but they should be characterized properly and installed correctly to achieve these results.

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