Assessment of different air movement systems for cooling in energy efficient Hospitals.

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ABSTRACT

This paper will asses different air movement systems in order to determine what are the possible savings in energy used to cool down a ward room during the hotter half of the year, while keeping the comfort in a high-end zone (Class 1 of EN 16798). Needs in heating during this period will not be treated.

KEYWORDS

Fan – Passive – Building – Personal fan – Ceiling Fan – AC – Ward Room – Hospital – energy savings

PROBLEM

Passive buildings are subject to overheating during summer, and an energy efficient way of cooling people down is using air movement.

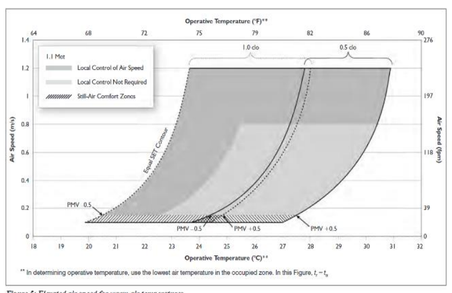


Figure 5: Elevated air speed for warm air temperatures.

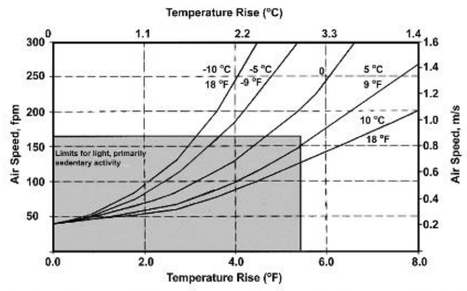


Fig. 4. Air speed required offsetting increased temperature, reproduced from [24].

OBJECTIVE

We want to show that using air movement systems will save energy while providing the same thermal comfort.

AUDIENCE

Researchers, architects and users of passive hospitals and passive buildings will find the study useful.

RESEARCH QUESTION

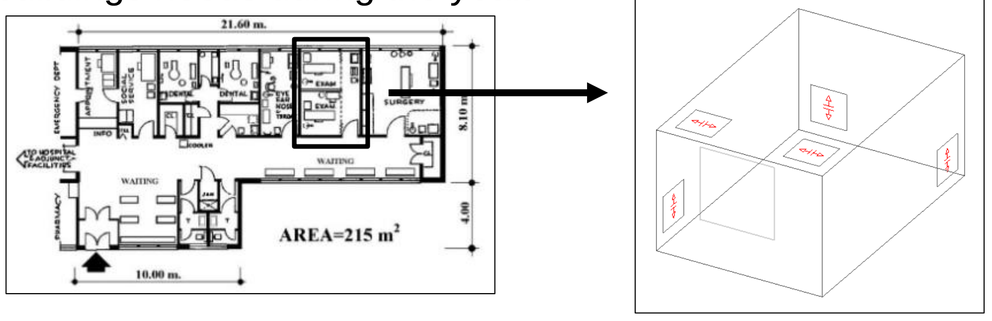
How can we save energy effectively while providing an EN 16798 class 1 thermal comfort ?

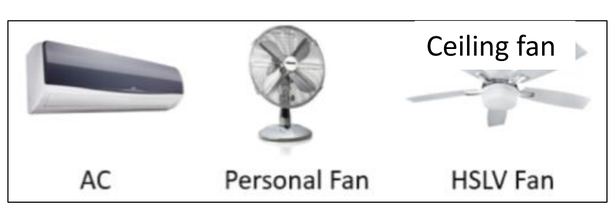
ORIGINALITY

Using air movement in hospital wards is often suggested yet no study has been done on the subject. Moreover, passive building tends to overheat, and while more and more buildings will aim for this standard, this is a problem many architects will face.

METHODOLOGY

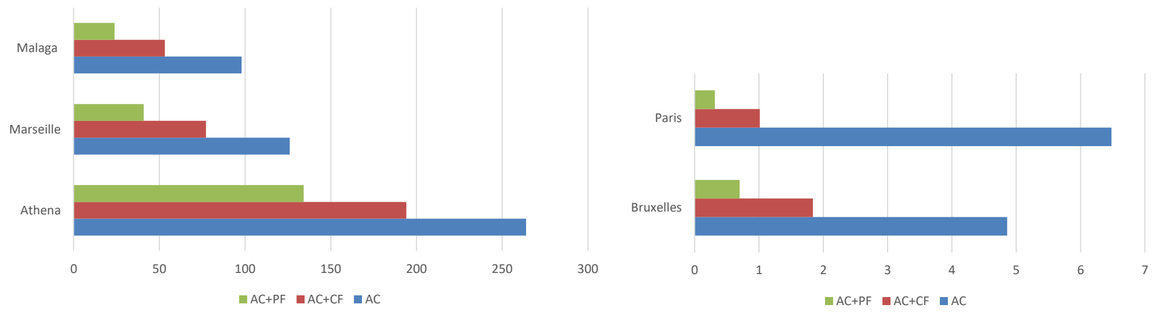
We will use a simulation of a two person ward room, moving the cooling set point to asses the potential energy gains. The comfort model will be EN 16798, but only using class 1 as the case is an hospital ward room. For the two European climate zones (hot and temperate) a different U value for the external wall will be chosen to represent the difference in passive buildings needs during the year.



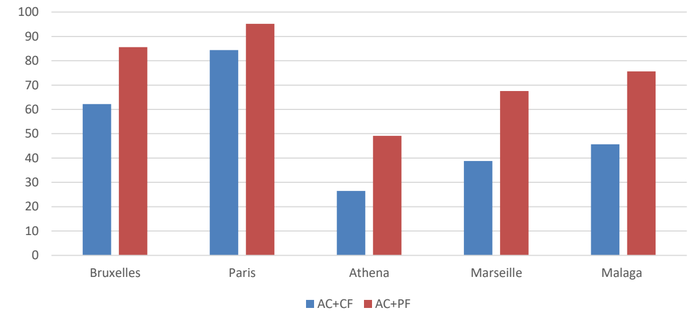


Exemple of systems

RESULTS



Energy used depending on the chosen system (kWh)



Energy saved depending on the chosen system, comparing to only using AC (%)

CONCLUSION

As the graphs in the result part shows, major electricity save can be achieved by adding an air moment system in rooms already using AC to cool down during summer. An other find of this study was that, in some cases (here Paris), using efficient air movement system (a DC personal fan), not using an AC is possible while keeping a predicted mean vote under 0.2.

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