A. Giretti, A.Carbonari, M.Vaccarini. ***Energy saving through adaptive control of ventilation systems.*** *Gerontechnology 2012;11(2):167;* doi:10.4017/gt.2012.11.02.347.00 **Purpose** Embedded sensors coupled with intelligent control logics may be able to provide adaptive control of conditioning systems in buildings. Current building systems are inefficient in their energy usage in maintaining occupant comfort because they operate according to fixed schedules and maximum design occupancy assumptions[1]. In this paper we present first models of ventilation systems in subways, targeted at estimating the savings attainable from the application of an intelligent adaptive control and to design an object-based model. This model will be implemented to control in real-time the operation of the ventilation systems. The models referred to are those of the test-case of Passeig de Gracia (PdG) subway station in Barcelona. **Method** This research is part of a EU FP7 currently funded project, entitled SEAM4US[2], aimed at defining a technological and methodological framework for optimized energy management in public underground spaces and at developing a fully featured pilot system for the dynamic control of the energy performances in PdG subway station in Barcelona. This paper deals with specifically energy savings from adaptive predictive control of fans and investigates how models can be developed. This particular station is served by axial fans with a ducted outlet[3]. Performances were simulated through a Response Factors Method software programme. Adaptive and predictive control was designed, relaying predictions of user behavior in the station and receiving real-time context data from pervasive monitoring and actuator networks. Energy savings derived from the use of such an adaptive control were estimated, and a first lumped parameters model for the implementation of the predictive and adaptive control was developed in the Dymola™ environment. **Results & Discussion** We found that replacing the old-fashioned fixed schedule ventilation with the new adaptive approach, conditioning may be differentiated according to space and time (*Figure 1*). Theory suggests this may result in non-traction energy savings well above 10%.

References

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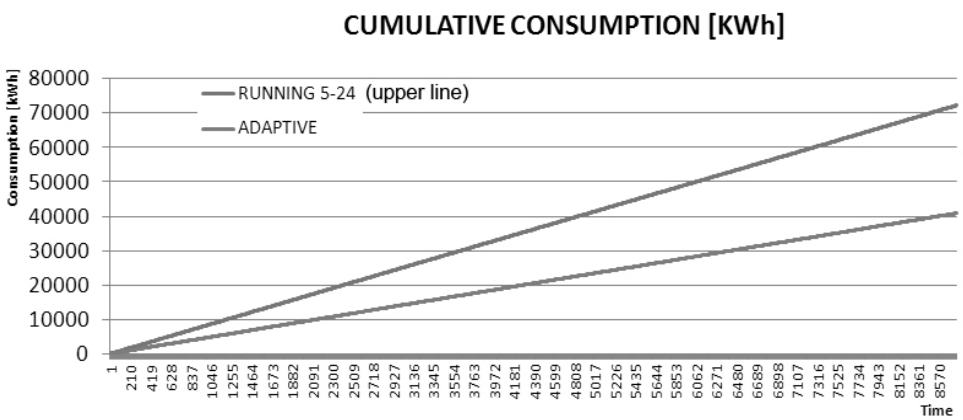

Figure 1. Cumulative plot of the theoretical energy saving attainable over a whole year of dynamic control