



Italian National Agency for New Technologies,
Energy and Sustainable Economic Development

Actions to boost Energy Efficiency and Indoor Air Quality

Case studies in Italian schools

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P. Aversa, M. Diana, A. Amato, G. Settimo



ENEA' goals

ENEA: Italian National Agency for New Technologies, Energy and Sustainable Economic Development

An integral part of ENEA is the **Agency for Energy Efficiency**, established by the Italian legislative decree no. 115 of 30th May 2008, as transposition of directive 2006/32/EC on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC

- ENEA carries out a series of actions in order to promote both energy savings and to achieve ever higher levels of air quality in indoor environments

A multidisciplinary approach

Interdisciplinary research team aiming at developing research on human behaviour in relation to technological tools

- **Anna Amato** and **Mario Diana**, ENEA, Energy Efficiency Unit Department, Lab of EE communication tools
- **Patrizia Aversa**, ENEA, Sustainability of Productive and Territorial Systems Department, non destructive testing and indoor monitoring Lab
- **Gaetano Settimo**, ISS, Istituto Superiore di Sanità, Department Environment and Health

The experiments in schools

WHY SCHOOLS?

Since 2013 ENEA has been developing methodologies for evaluating thermo-hygrometric comfort and indoor air quality, through experimental campaigns in schools

- Good example to study satisfactory levels of comfort and air quality in a confined environment
- Indoor air pollution in schools is a combined effect of physical, chemical and biological factors
- Sick building syndrome

Methodology and instruments

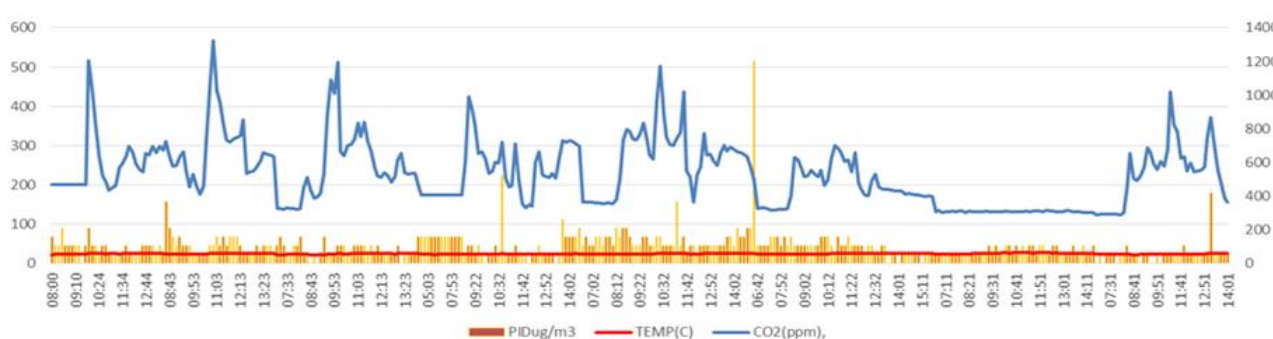
- **Training** and **awareness raising** on indoor pollution and Energy Efficiency
- Students' active involvement:
 - compilation of **daily diaries** reporting their behaviours in classrooms and information synchronized with the data recorded by the sensors
 - reports of trend of internal temperatures and air quality values within the classrooms during class hours, in relation to natural ventilation, type of window opening.



Methodology and instruments

RELEVANCE OF BEHAVIOUR – validation of strategies effectiveness

- Through matching students' diaries with final measurements → Correct and regular air changes can make a difference.
- Aware management of **ventilation** keeps CO₂ levels below the acceptable values, and to keep adequate and constant temperature
- *NOW* – more proofs of correlation between strategic drivers and project outcomes – intervention and control groups compared



Vocs and CO₂ trend

Behaviour change

CONCEPTUAL FRAMEWORKS

HUMAN MIMESIS (*Girard R., 1978*)

SOCIAL LEARNING THEORY (*Bandura A., 1971*)

THEORY OF PRACTICE (*Bourdieu P., 1972*)

VIRALITY

STUDENTS AS VECTORS AND MULTIPLIERS

Community able to learn and “embody” new ways of acting, (e.g. in households)



Behaviour change

FOLLOW UP:

- in order to boost the successful actions tested during the design phase, periods of monitoring and strategic reinforcements, following the end of the projects can be very useful

FEEDBACKS:

- Their role as strategic drivers implemented in the projects

Mario Diana
Mario.diana@enea.it



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