CASE STUDY

Bucharest School

Expert support to improve indoor air quality in schools

Daikin recently participated in an extensive study in one of the school in Bucharest area to determine the potential effects of air pollution on school pupils in terms of learning and health. The HVAC specialist was approached by the Technical University of Construction Bucharest, Faculty of Building Services in light of Daikin's recognised expertise and the established relationship with a local public school, in Bucharest area, which caters for pupils from grades one to eight.

Air quality - an invisible problem

Air quality in many schools and kindergartens falls short of national and international standards. Without adequate ventilation, dangerous concentrations of carbon dioxide, dust and radon (a radioactive gas) can accumulate. The Healthy School project was set up with the aim of improving classroom design guidelines and to illustrate the effects of good Indoor Air Quality (IAQ) control, in conjunction with other comfort factors such as temperature, sound and light. The duration of the study was seven months, and it was run in one classroom with approximately thirty students present inside the classroom during the study.

Products in scope

VAM:
Mechanical Ventilation was provided by Daikin's VAM unit with enthalpy heat exchanger, which saves energy and prevents heat losses through ventilation, using indoor heating, cooling and moisture recovery and free cooling when outdoor temperatures drop below indoor temperatures.

Daikin air purifier MCK55W:
Air purification alongside mechanical ventilation was provided by the air purification unit MCK55W, which also comes with humidification feature. The electrostatic HEPA filter is designed to remove 99.97% of fine particles of 0.3µm. Heat recovery through the VAM units maintains the correct temperature and humidity for the required indoor conditions while reducing energy bills and offering the optimum comfort level to the occupants to concentrate even better.

CLEAN AIR QUALITY

Study design

Daikin worked with Professor Tiberiu Catalina to create four distinct test scenarios to understand the issues and determine appropriate equipment solutions.

Scenario 1: Benchmarking

Measuring existing air quality levels with no equipment installed.

Scenario 2: Air purification (APUs)

Air purifiers installed in classrooms, with before and after evaluation of particulate matters (PM levels).

Scenario 3: APUs + ventilation

Heat recovery ventilation unit fitted, supplying fresh air to classrooms. Temperature, CO^2, PM and VOC values measured prior to and after installation.

Scenario 4: APUs + ventilation + added filtration

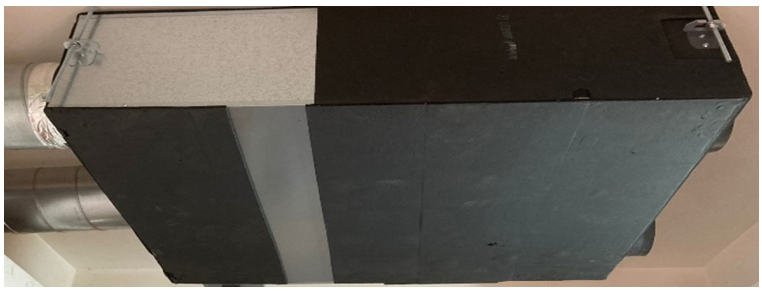
For better air quality, the installed ventilation unit was equipped with the additional filters to remove minute particle pollutants entering from outdoor to indoor.

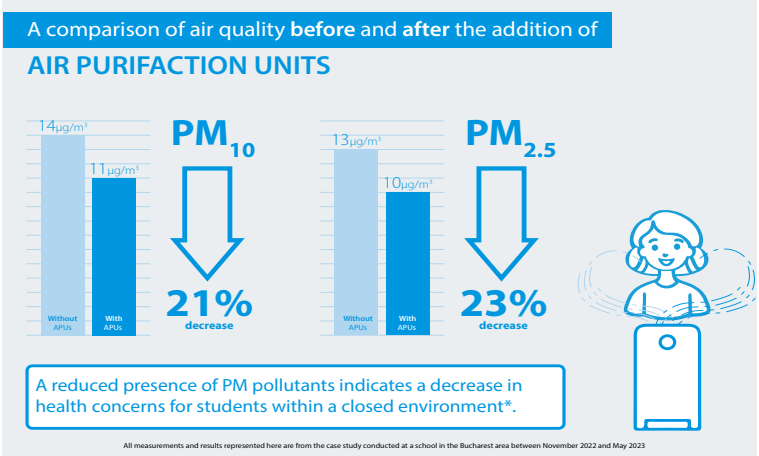
Study conclusions

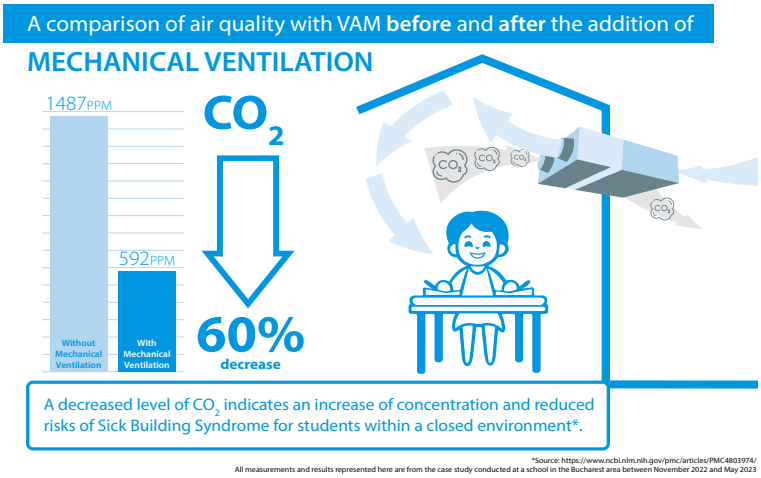
Where no equipment was installed (Scenario one), high levels of PM2.5 and PM10 particulates were recorded, with a high probability of illness arising. With the installation of air purifiers (Scenario two), a lower risk of the PM levels by 23% was observed, but the greatest improvement was achieved by the installation of mechanical ventilation VAM units in conjunction with air purifiers (Scenario three). CO^2 levels dropped significantly, up to 60%. Where VAM+G3 filters were equipped (Scenario three), a noticeable reduction in PM levels was observed. A further decrease was noted after the integration of highly efficient F7 filters (Scenario four), suggesting that the infiltration of outdoor PMs into classrooms can be drastically reduced.

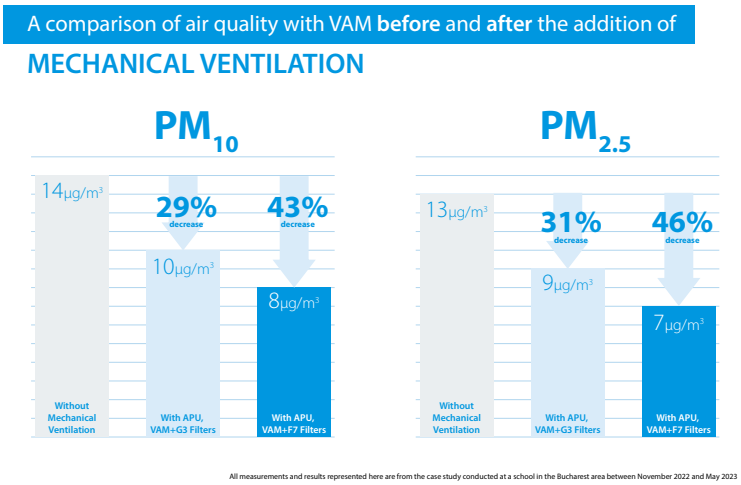
"Clear improvements were observed with CO_2 levels remaining largely below the recommended national value and a reduction in dust concentration on average of over 30%. We note also that educational performance has been improved, with scientific studies in other countries showing a clear link between good IAQ control and grades. The feedback from pupils and teachers at the school was positive, with increased feelings of safety and wellbeing."

Professor Tiberiu Cataline
Technical University of Construction Bucharest









Find out more:

Daikin Air Purification

Daikin Ventilation

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