

# MAKING UAE SCHOOLS HEALTHY

In-depth Measurement  
of Indoor Air Quality

*Concise Report*

A close-up photograph of several green, pointed Aloe vera leaves with small water droplets on their surface, set against a light background.

# Executive Summary

Emirates Green Building Council (EmiratesGBC) and Saint-Gobain partnered to evaluate the Indoor Environmental Quality (IEQ) of a representative in the UAE, supporting the Emirates Coalition for Green Schools (ECGS) vision and objectives of ensuring that every child in the UAE learns in a green school within this generation.

The Study focused on measuring the Indoor Air Quality (IAQ) and also included investigation of other IEQ factors such as lighting, acoustics, and thermal comfort in the key areas of the selected school. In this study indoor environmental quality (IEQ) has been extensively researched, showing the significant impact of these parameters on students' health, productivity, performance, physical and mental development.

“ *showing the significant impact of these parameters on students' health, productivity, performance, physical and mental development.* ”

One of the main findings conclude that the limit values set by Dubai Municipality for temperature, humidity, and carbon dioxide (CO<sub>2</sub>) are far from being met in two sample classrooms. This will have significant impact on the children's learning abilities.

Additionally, acetone, benzene, toluene, ethylbenzene xylene (BTEX) and terpenes were the main pollutants identified through air sampling analysis of individual Volatile Organic Compounds (VOC). In one of the rooms, an unexpected compound (1,4 dichlorobenzene) was also identified, and it is suspected to

be carcinogenic. The measurements of illuminance and acoustics have shown that important improvements are needed to ameliorate these comfort parameters and improve the well-being and comfort of all occupants and more importantly, the learning abilities of students.

One of the main findings of this study is that continuous monitoring should not be considered as a standardised method for Total Volatile Organic Compounds (TVOC) concentration measurement. It is recommended to amend local regulations to align with other international green building certifications that consider air sampling and not continuous monitoring devices to determine TVOC concentration.

“ *limit values set by Dubai Municipality for temperature, humidity, and carbon dioxide (CO<sub>2</sub>) are far from being met in two sample classrooms., This will have significant impact on the children's learning abilities.* ”

In order to improve the IEQ of the classrooms, a set of recommendations have been proposed. The proposed recommendations also take the current coronavirus-19 (COVID-19) pandemic situation into account and follow on the recommended guidance published by leading global organisations such as American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA).

# The main recommendations are to:



Increase the outdoor air flow rate as per ASHRAE/REHVA standards.



Maintain the humidity level within an acceptable range, both for thermal comfort as well as to prevent any mould issue.



Change the cleaning products by selecting fragrance-free products and/or with eco-label to reduce terpenes concentration.



Inclusion of acoustic ceilings and reduce the noise from heating, ventilation, and air conditioning (HVAC) ducts to improve the classroom's noise level.



Use low emitting VOC products and active-cleaning materials to reduce the concentration of pollutants.



Use window solar films to concurrently address visual comfort, glaring, daylight autonomy and energy efficiency.



Insulate the external walls to reduce thermal losses. The insulation should be properly arranged to minimise thermal bridging. This will provide energy savings and thermal comfort of the building envelop. This will also improve the maintenance and life expectancy of the ventilation system.



Reduce the percentage of indoor air recirculation and increase the percentage of fresh air to avoid CO2 and pollutant accumulation and cross contamination.



# Call to Action

It is vital to involve all school related stakeholders as their involvement and support is required for the evolution to healthy green schools. This section is divided according to the different stakeholder groups and lists the required actions from these groups. It is expected that these call to actions will drive clear transformative steps towards healthier school environments.

## Government Authorities /Policy Makers



Updating the local green building regulations to use air sampling and not continuous monitoring devices to determine TVOC concentration.



Updating the local regulations to include identification of individual VOC along with stipulated targets.



Set and mandate IEQ (lighting, acoustics, IAQ and thermal comfort) standards and codes in new and existing schools.



Regular inspection of IEQ levels within schools.



Incorporation of IEQ as part of schools' rating/performance.



Provide incentives and/or enact policy enablers to in the IEQ industry.

## Schools and School Facility Management



Lead by example in monitoring/measuring of IEQ in their schools and implement corrective measures to improve and advance these factors.



Set appropriate IEQ targets (for lighting, acoustics, IAQ and thermal comfort) in line with global best practices.



Thorough and regular inspection and maintenance of HVAC systems, lighting, sensors, and controls to maintain the school's IEQ.



Publicly disclose IEQ information.



Advocate towards the role of schools in improving health and wellbeing to parents, students, and parent committees.

## Parents, Students and School staff



Act as an influential and advocacy group on school management to improve IEQ.



Continually question and check the IEQ performance within the school.



Collaborate within their parent-teacher-school or professional/social communities/networks to inform, educate, investigate, advocate and/or address IEQ issues within the school.



Inform authorities on inadequate IEQ environment for learning in schools.



Showcase and highlight the findings of this report to their respective schools for further investigation and remedial actions.

## Designers & Green Building Consultants



Specify adequate IEQ factors (for lighting, acoustics, IAQ and thermal comfort) when designing schools as per global best practices.



Specify low VOC building materials/products that are specific for schools.



Ensure that any deviation from the design and specifications during the construction phase does not compromise IEQ in the completed school.



Actively engage clients to consider improvements to IEQ throughout the lifecycle of the school.

## Manufacturers and Suppliers



Understand and disclose the health implications/impacts of their products through material safety data sheets (MSDS), Health Product Declarations (HPD), Declare Label or any other acceptable health-related material/product declaration.



Ensure their products do not use any dangerous/toxic chemicals, or are biodegradable, or have obtained a respective eco-label as per their specific product/industry.



Showcase local case studies for IEQ using their safe/healthy products/materials.



Develop product/material catalogue/range/line that promote health and wellbeing using their Research and Development (R&D) or manufacturing/product development teams.



Advocate for the betterment of health and wellbeing through superior IEQ products/materials to schools, supply chains, and the governmental authorities.

## NGOs & Research Institutes



Provide further research, proof of concepts, and case studies to support improving IEQ in schools.



Increase the number of studies showing the significance of IEQ on student performance in the UAE.



Actively engage and collaborate with the government to influence policy towards healthier schools.



Engage and collaborate with schools to develop solutions towards better IEQ performance.



Advocate and build awareness of better IEQ across their entire network groups.

Copyright © Emirates Green Building Council, 2021

All rights reserved.

Emirates Green Building Council

P.O. Box 121838

Tel: +971 4 346 8244

Website: [www.emiratesgbc.org](http://www.emiratesgbc.org)

#### **Authors (Emirates Green Building Council)**

Majd Fayyad, Technical Manager

Jason John, Technical Engineer

#### **Authors (Saint-Gobain)**

Nada Chami, Head of Product & Innovation, Saint-Gobain UAE

Valérie Goletto, Senior R&D Project Leader, SGR Paris, France

Vincent Gignoux, Analytical Chemistry Lab Manager & R&D Portfolio Manager, Insulation R&D centre, France

#### **Reviewers**

Dr. Waleed Yagoub, Director, Emirates Green Building Council

Jerome Gilles, R&D Product Portfolio Manager, Saint-Gobain Service & Expertise

Jean-Marie Thouvenin, Building Science Director, SGR Paris

#### **Disclaimer**

The Making UAE Schools Healthy: In-depth Measurement of Indoor Air Quality results, findings and conclusions are based on literature reviews, research, and measurement analysis. EmiratesGBC and Saint-Gobain do not assume any liability or responsibility to the user for accuracy, completeness, or reliance of information contained in these reports.

#### **Acknowledgments**

EmiratesGBC and Saint-Gobain would like to acknowledge the contribution of the representative school for use of their facilities and openness in sharing the data obtained from the measurements. Due to confidentiality guaranteed to those who participated in this study, the names of the participating individuals and organisations cannot be disclosed.

#### **About Emirates Green Building Council**

Emirates Green Building Council (EmiratesGBC) is a business forum based in the United Arab Emirates formed in 2006 with the goal of advancing green building principles. The Council gathers member companies and partners representing a diverse range of stakeholders from within the building industry, government, and academia. EmiratesGBC functions as a common platform for all stakeholders to meet, discuss, interact, and exchange ground-breaking ideas which helps to promote a sustainable built environment in the UAE and the surrounding region.

Since its formation, EmiratesGBC has initiated several programs and events related to improving the operational efficiency of existing buildings. Membership is open to all stakeholders willing to influence a positive change in the country's-built environment.

#### **About Saint-Gobain**

Saint-Gobain designs, manufactures and distributes materials and solutions for the construction, mobility, healthcare and other industrial application markets. Developed through a continuous innovation process, they can be found everywhere in our living places and daily life, providing wellbeing, performance and safety, while addressing the challenges of sustainable construction, resource efficiency and the fight against climate change.

This strategy of responsible growth is guided by the Saint-Gobain purpose, "MAKING THE WORLD A BETTER HOME", which responds to the shared ambition of all the women and men in the Group to act every day to make the world a more beautiful and sustainable place to live in.

*€42.6 billion in sales in 2019*

*More than 170,000 employees, located in 70 countries*

*Committed to achieving Carbon Neutrality by 2050*

For more details on Saint-Gobain,

visit [www.saint-gobain-emme.com](http://www.saint-gobain-emme.com) and follow us on LinkedIn <https://www.linkedin.com/company/saint-gobain-uae>

#### **Contacts**

EmiratesGBC: [office@emiratesgbc.org](mailto:office@emiratesgbc.org)

Saint-Gobain UAE: [Sana.Pervez@saint-gobain.com](mailto:Sana.Pervez@saint-gobain.com)