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Efficient Building DESIGN

MATERIAL & HVAC EQUIPMENT TECHNOLOGIES

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SAFE OR SAVE? CITIES SMART RESILIENCY TO AIRBORNE EPIDEMIC AND ITS ENVIRONMENTAL COSTS

by

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Bio

MS is a PhD engineer, associate professor of Building Physics and Thermodynamics at the Politecnico di Torino (Italy), with ›20 years of experience as an academic and as a HVAC project engineer and construction supervisor. His research and teaching activities have been focused on innovative and sustainable design of buildings, through the study of human comfort, the application of low-exergy technologies and the exploitation of renewable energy sources. MS co-authored more than 50 publications in peer-reviewed journals and conferences, and co-invented 6 patents (4 granted and 2 pending). He is the cofounder of 3 start-ups and academic spin-off companies.

He had been involved in several international projects and activities, including EU projects and IEA Annexes. Recently, in the framework of a collaboration agreement between Politecnico di Torino and WHO (World Health Organization)-Technè, MS team is studying, testing, and delivering innovative design of natural/hybrid ventilation of building, optimized for the control of air vector of COVID and other airborne diseases in hospitals, tertiary and residential buildings. He is a member of the WHO SARI (Severe Acute Respiratory Infection) Technical Working group in charge of updating WHO SARI manual.

He also collaborates with UNOPS agency, reviewing projects often related to COVID response programs. He visits regularly and collaborate with colleagues at the Andlinger Center for Energy and Environment at Princeton University, US

Abstract

Buildings in our cities are connected to roughly one third of the global CO2 emissions. Cities is also where the epidemics mostly spreads. COVID 19 outbreaks and “super-spreading” events have been reported in poorly ventilated buildings. Even in buildings where ventilation has been correctly implemented, we understood that current international ventilation standards are insufficient to mitigate airborne contagion in long-occupancy area. A 2x, up to 6x, increase is necessary. This requirement implies enormous consequences on the current standards, in terms of design, construction and management costs. Moreover, it put into risks what the motto “keep it tight, ventilate right” summarizes, the tradeoff between energy savings and indoor air quality we have been following since the “sick building syndrome” and “energy crises” (the original) era, and we are nowadays pushing further to reduce emissions and mitigate the global warming.

On a strategic level, there is a huge urbanization trend in the global south that must be targeted to avoid a strong increase of emissions. What IEA calls the “cooling crunch”, the foreseen ramp-up of air conditioning in response to global warming, enabled by wealthier economic status and that feedbacks the warming itself, is adding further difficulties.

In this presentation we will recall some fundamental knowledge about airborne infection and new findings from the pandemics, we will share some experiences taken from buildings project reviewing for UN agencies related to COVID, and we will try to highlight possible paths to solve the conundrum of pursuing infection control and reduction of global emissions.