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Environmental Health Committee (EHC) Report to ASHRAE Technology Council

Recent Trends in Environmental Health

This report is prepared as a part of ROB 2.406.001 and an MBO assigned to Environmental Health Committee. Based on the feedback from the members of EHC a list of recent trends in the environmental health and its impact on HVAC&R industry is prepared. Additionally, research needs related to these trends are listed.

1. *Implementation Science* This new approach/discipline addresses a major gap in public health efforts: how do leaders and researchers best promote and ensure faithful and sustained compliance with recommended measures to improve the public's health. In the context of ASHRAE, this will include the study of how to, and why, standards and position documents are adhered to by engineers as well as building owners and management. This area is a major interest of the NIEHS and EPA that seek to develop evidence-based strategies to implement and assess the impact of an organization such as ASHRAE.
2. *Pandemic Preparedness* The concern is about another pandemic such as Covid 19 potentially due to an organism engineered to have more dangerous properties such as resilience with respect to humidity, temperature, and resistance to biocidal agents (e.g., UV), This is a nightmare scenario. Engineers are being asked by building owners to put in place constant or variable protective measures. These measures seem increasingly prudent. However, we need to know how to choose among a variety of strategies (increased ventilation with outdoor air; better filtration; UVC and other GUV, TREG). These measures could be constant modifications, or they might be implemented when needed by "flipping a switch". We need to determine what are the relative efficacy, effectiveness, costs, and sociological concerns.
3. *Is CO₂ a Poison?* The possibility that indoor exposures to elevated concentrations of CO₂, above 1,000 ppm, may result in impaired executive function is a serious public health concern. This possibility is supported by a substantial body of human experimental research and literature. More research is needed to clarify the existence and magnitude of this potentially massive public health challenge.
4. *Environmental Justice* The concern is that communities of color and lower SES have greater exposure to air pollutants, both outdoors and consequently indoors. This is a growing area of concern in federally funded air pollution research. It is also gaining stature as a leading concern for air quality researchers. EPA,

NIEHS, and HUD are all concerned with the implications of this aspect of environmental public health.

5. *Indoor to Outdoor Transport of Air Pollutants* The relevance of this inverse of pathways of exposure to particulate matter (PM) and other air pollutants is increasingly recognized as an important consideration in overall exposure of the public to air contaminants. Sources such as commercial cooking and indoor to outdoor transport of the products of indoor chemistry make this actionable through a variety of approaches as outlined in a recent American Thoracic Society publication.
6. *Retrofitting of Existing Building Stock* How to, and at what cost will we retrofit buildings for the purpose of reduced energy consumption as well as improved indoor air quality. These are important issues when it comes to retrofitting or designing HVAC systems. If pandemic preparedness requires changes to the HVAC systems as part of the building readiness plan, how do disadvantaged communities without mechanical ventilation in many residential buildings address health issues of the occupants in these buildings? What are the ethical considerations?
7. *Building Operations Data* Modern construction with smart controls for HVAC systems collect and store vast amounts of operational data regarding temperature, humidity, lighting, noise, occupant satisfaction, etc. What is being done with this information to inform architects and engineers about future improved building design, maintenance and operations? Who should be responsible to collate and curate this data so that all of us can learn from real world experience?