PRELIMINARY TECHNOLOGY ASSESSMENT – NOVEMBER 2023

Germicidal Ultraviolet

Technology Overview

The connection between airborne diseases and indoor air quality (IAQ) is well established.[1] Common approaches to enhance IAQ involve increasing outdoor air intake and flushing the system before and after occupancy, both of which increase energy consumption. In addition, heating, ventilation, and air conditioning (HVAC) systems can themselves become sources of pollutants if microbial growth on filters, drain pans, and other surfaces is not mitigated.[2]

LED-based Germicidal Ultraviolet (GUV) technologies offer a solution to improve indoor air quality and comply with new standards set by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) without increasing ventilation and energy consumption. Whole-room GUV employs far-UV light to directly disinfect the air in occupied spaces, while upper-room GUV targets the air above people's heads. GUV coil disinfection helps prevent the growth of mold and bacteria in air handling units.

Why is GSA Interested?

The Biden-Harris Administration has prioritized improved IAQ as an effective tool for reducing the spread of viruses and other airborne diseases.[3] GUV technologies can improve IAQ while reducing energy consumption, improving operating efficiency, and promoting healthy workplaces.

Replacing traditional mercury vapor lamps with LED lamps results in a 50% reduction in energy consumption. Additionally, LED lamps have a lifespan twice as long as mercury vapor lamps, are less expensive, and eliminate the biohazard concerns associated with lamp disposal.

Deployment Potential

GUV technology is applicable across the GSA portfolio. It will have the most significant impact on facilities situated in climates where there are substantial costs linked to conditioning outside air.

[1]U.S. Environmental Protection Agency (EPA). Indoor Air Quality in Offices and Other Large Buildings, https://www.epa.gov/indoor-air-quality-iaq/indoor-air-quality-offices-and-other-large-buildings, accessed 06-2023.
[2] Center for Disease Control and Prevention (CDC).The National Institute for Occupational Safety and Health (NIOSH), Indoor Environment Quality, https://www.cdc.gov/niosh/topics/indoorenv/hvac.html, accessed 06-2023.
[2]WhiteHouse.gov. Fact Sheet: Departments and Agencies Commit to Cleaner Indoor Air Across the Nation, https://www.whitehouse.gov/ostp/news-updates/2022/12/08/fact-sheet-departments-and-agencies-commit-to-cleaner-indoor-air-across-the-nation/, accessed 06-2023.

Green Proving Ground (GPG), in collaboration with the U.S. Department of Energy, is evaluating the real-world performance of germicidal ultraviolet technologies in federally owned buildings within GSA's inventory. The technologies will be provided by Far UV Technologies, R-Zero Systems, and PURO with Academy Energy Group, and coordinated with other ongoing evaluations of this technology.