



High-Output Germicidal UVC Solutions for Healthcare Facilities



Healthy Buildings.
Healthy Bottom Line.™



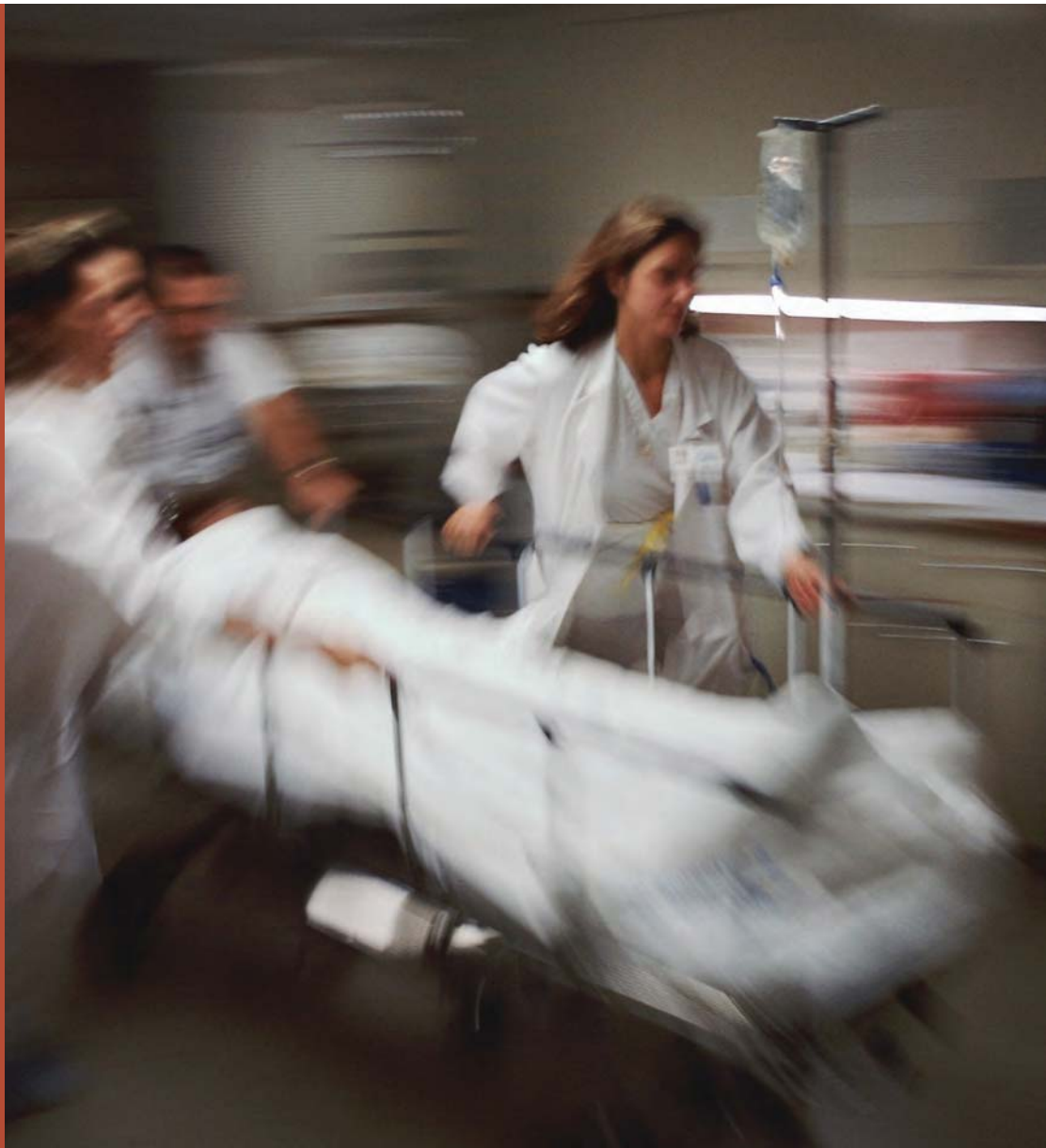
Improve Energy Savings, Improve Infection Control

Imagine an investment that paid measurable, almost immediate benefits across multiple areas of your organization, from controlling energy costs to boosting productivity.

That's exactly what happens when you invest in equipment from Steril-Aire, the global leader in high-output Ultraviolet Germicidal Irradiation solutions (UVGI) for improved indoor air quality and energy efficiency.



“ According to the World Health Organization, it is estimated that at any given time there will be over 1.4 million people worldwide suffering from infectious complications acquired in hospitals. ”



The Connection Between HAIs, UVGI and HVAC

All these initials spell out important information.

Infection is a serious patient safety concern and the stakes are high. As a healthcare provider, your goal is to deliver the best patient care possible and results are measured first in patient health outcomes. The occurrence of infection can have a major impact on a hospital's financial health and community perception.

“ The combination of Steril-Aire's systems-engineered germicidal UVC and filtration can provide a vital contribution to the reduction of microbial contamination to help you reach your goal of delivering the highest possible quality patient care. ”



So what do building heating, ventilating and air conditioning systems (HVACs) have to do with HAIs? Many microorganisms that grow on air conditioning coils and in the drain pans have been implicated in HAIs. These include *Aspergillus* and *Pseudomonas*.

Air handling systems in healthcare facilities are far more intricate than in standard office buildings because of the large number of air exchanges and complex humidity controls. There is also the need to minimize the risk of transmission of airborne microorganisms and preserve a clean environment for patients and staff.

The proper use of ultraviolet germicidal irradiation in HVAC systems has been proven as an effective inactivation method for mold, bacteria and viruses, reducing the source of HAIs and a reduction of airborne microorganisms.¹

A recent report published by ASHRAE^{2,3}, and supported by ASHE, states that airborne transmission of diseases through HVAC systems is actually much more prevalent than previously thought. ASHRAE cites UVC as one of the control strategies that may help avoid transmission.

Steril-Aire's germicidal UVGI systems are designed to implement the ASHRAE-suggested general strategy for the use of UVC for surface and airstream decontamination. Steril-Aire's high output UVGI is a powerful tool for reducing the spread of contaminants at the source – the HVAC coils and drain pans.

“ A 2-1/2 year peer reviewed study of the effects of installation of Steril-Aire Emitters at the Women and Children's Hospital of Buffalo Neonatal Care Unit showed reduced VAP, reduced antimicrobial use and resistance along with \$800,000 reduction in direct costs. ”

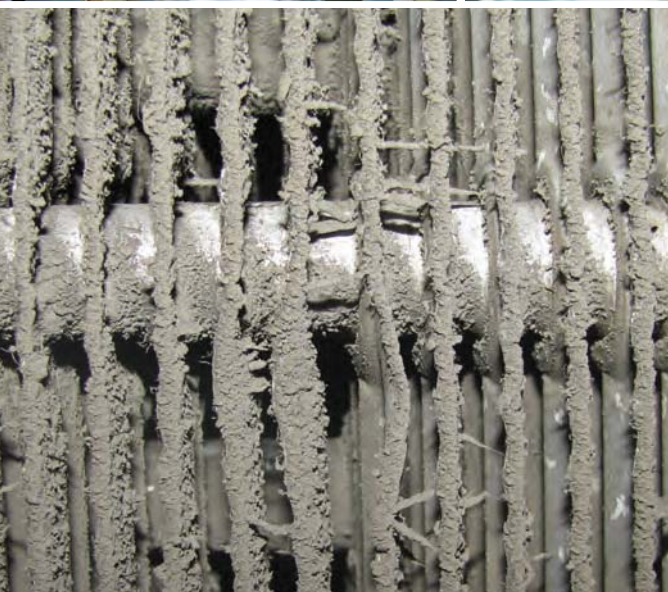
1. P Brickner, et. al., "The Application of Ultraviolet Germicidal Irradiation to Control Transmission of Airborne Disease: Bioterrorism Countermeasure," Public Health Report, 2003 Mar-Apr;118(2):99-114.

2. ASHRAE, "Airborne Infectious Diseases," ASHRAE, Atlanta June 24, 2009.

3. ASHRAE, "Ultraviolet Lamp Systems," ASHRAE Handbook: Heating and Air-Conditioning Systems Equipment.

How UVC Clears the Air

Airborne contamination comes from a variety of sources and circulates through the HVAC system. HVAC coils and drain pans present a viable environment for growth of bacteria and mold. The EPA and World Health Organization (WHO) have identified a building's mechanical system as a source of pollutants and microbial contamination. And according to the WHO, approximately 30% of all commercial buildings have significant IAQ problems with ventilation systems being implicated in the spread of infection and pollutants.



Before Steril-Aire UVC



After Steril-Aire UVC



The source of this contamination is a sticky biofilm that adheres to the coils and drain pans of the HVAC system. The biofilms not only give off microbial volatile organic compounds which cause complaints such as headaches, allergy and asthma responses, they also contain opportunistic organisms that can cause infection. The EPA and WHO have identified Ultraviolet Germicidal Irradiation as a sterilization method that utilizes ultraviolet energy to break down microorganisms or inactive viral, bacterial, and fungal species. Recirculating air in HVAC systems creates redundancy in exposing microorganisms to UV ensuring multiple passes so that the light energy is effective against large quantities of pathogens.



HVAC coil Petri dish samples demonstrate high concentrations of microorganisms. After exposure to a UVC Emitter these microbes are eliminated.

The list below identifies some of the many microorganisms found in HVAC biofilm within mechanical systems.

GRAM NEGATIVE BACTERIA

Enteric Organisms	Pseudomonas-related Organisms
<i>Serratia marcescens</i>	<i>Pseudomonas aeruginosa</i>
<i>Klebsiella pneumoniae</i>	<i>Pseudomonas sp.</i>
<i>Klebsiella sp.</i>	<i>Flavobacterium sp.</i>
<i>Enterobacter aerogenes</i>	<i>Aeromonas</i>
<i>Enterobacter sp.</i>	<i>Acinetobacter</i>
<i>Salmonella typhimurium</i>	<i>Achromobacter sp.</i>

GRAM POSITIVE BACTERIA

<i>Staphylococcus</i>
<i>Bacillus</i>
<i>Streptococcus</i>

FUNGI

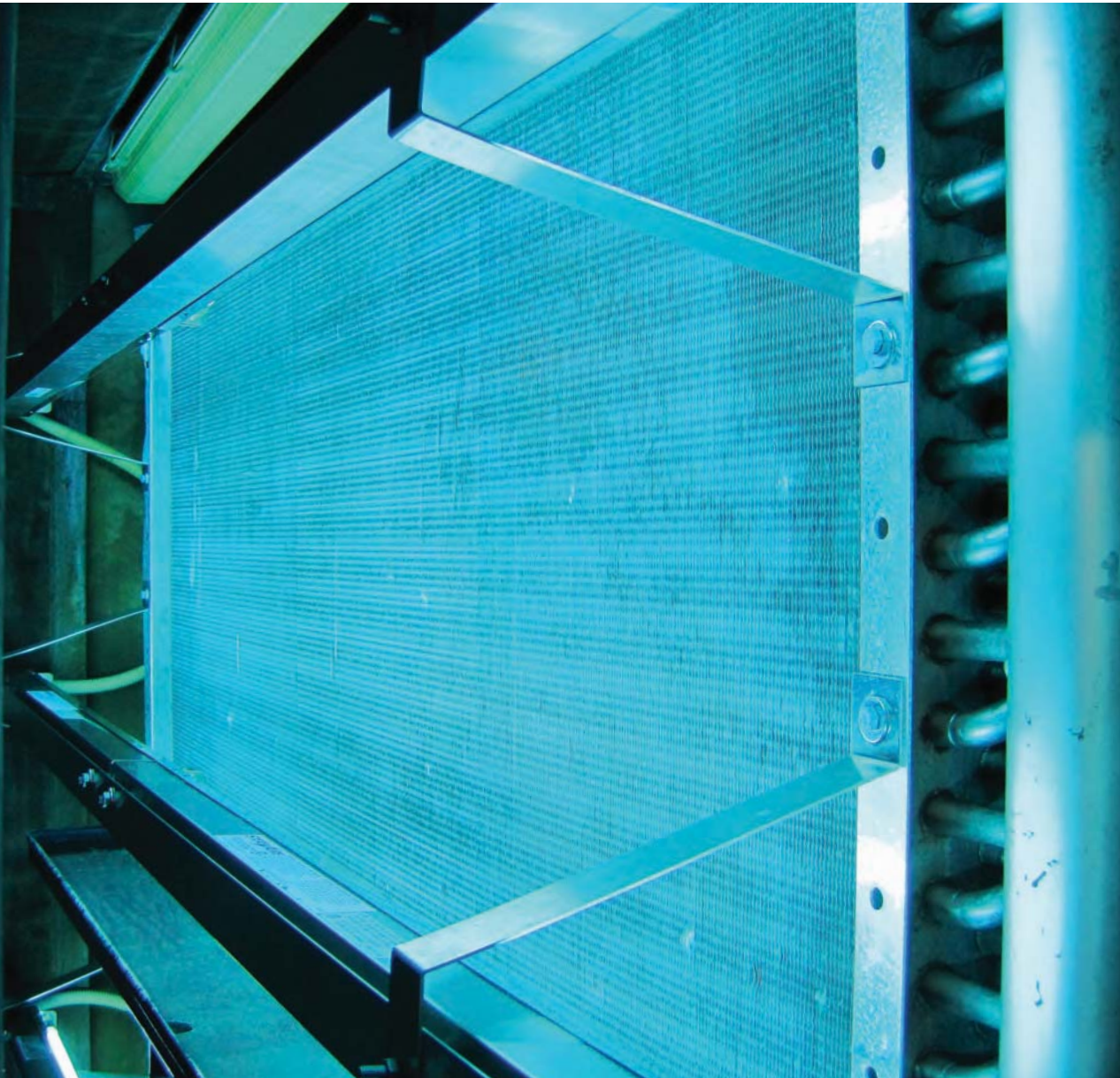
<i>Aspergillus</i>
<i>Alternaria</i>
<i>Chaetomium</i>
<i>Cladosporium</i>
<i>Fusarium</i>
<i>Gliocladium</i>
<i>Memnoniella</i>
<i>Penicillium</i>

Obtain a Clean Bill of Health and a Lower Energy Bill

Running 24/7, healthcare facility HVAC systems consume an enormous amount of energy. With HVAC operational costs representing nearly 45 percent of energy costs and utility bills up almost 20% over the last 2 years, making these systems more energy efficient can positively impact the bottom line.



A typical
Steril-Aire UVC
installation.
The germicidal
UVC fixtures
are mounted
downstream
of the coil.

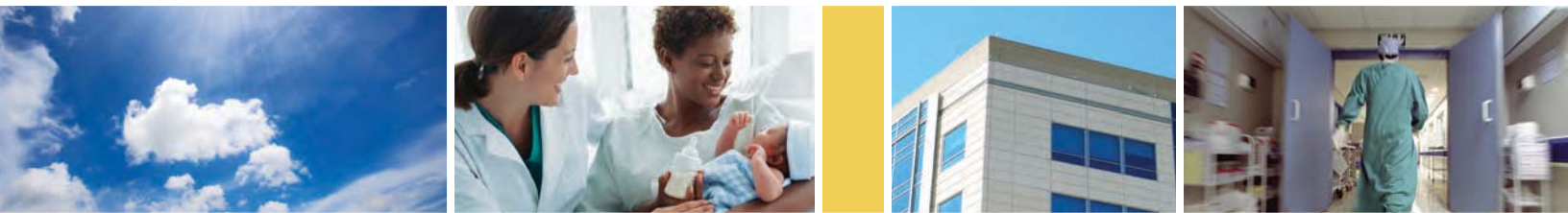


By continuously cleaning the HVAC coils and drain pan, Steril-Aire's germicidal UVC removes the biofilm growth which serves to reduce heat exchange and impede airflow.

The results are improved:

- Cooling efficiency
- Airflow
- Chiller efficiency
- Chill water temperature
- Thermal comfort

Healthy, comfortable and cost-effective healing environments can contribute significantly to the bottom line and long-term health of your organization.



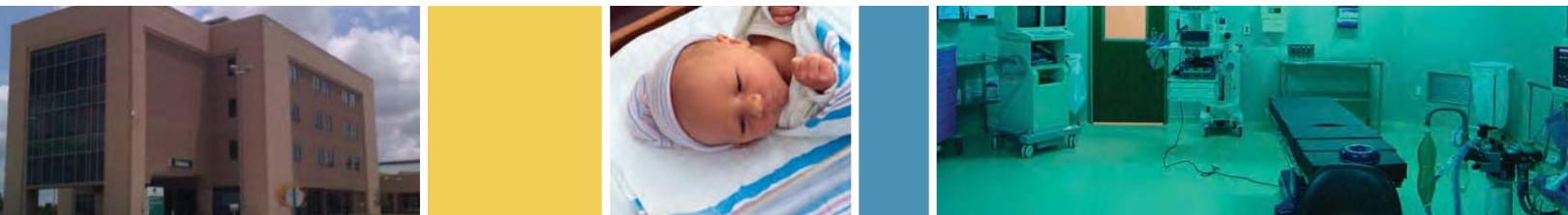
“ With HVAC operational costs representing nearly 45 percent of a healthcare provider's expenses, there is real opportunity to improve your bottom line while supporting your core focus: patient care. ”

Proof Positive.

There are already numerous healthcare facilities using Steril-Aire UVC to help keep their patients and staff healthier and their costs lower.

Muskogee Community Hospital

This is the first hospital in the country to use UVC in 100% of their HVAC systems, as well as operating and procedure rooms. Within 21 months of installation, the facility achieved a “zero” HAI rating. Mark Roberts, president, had a goal when developing this state-of-the-art hospital – make it the cleanest hospital in the world. So far, he’s meeting that mark.



Rio Grande Regional Hospital

In 2005, Rio Grande began retrofitting Air Handling Units with Steril-Aire UVC. Within one year, electrical usage had declined 20.64%. As of 2008, they expected their annual energy savings to be in the \$500,000+ range.

ISPESL Occupational Hygiene Department of Italy

A recent study published by the laboratory of biological Agents, Laboratory of Physical Agents outlined the efficacy of UVC Emitters in inactivating the spore of *Aspergillus fumigatus* in an experimental setting. This test indicated a 90% kill rate of this potentially harmful mold (occupational risk group 2, DLgs 626/94; European directive 2000/S4/CE).



Florida Hospital

The Florida Hospital system of Orlando, FL eliminated more than 200 coil cleanings per year with incredible labor and chemical costs savings. They calculated that with the increase in air-flow capacity, in 1998 they saved a total of \$4,867 in energy costs, in one unit alone. In addition, mold was eliminated downstream of the HEPA filters. After UVC installation, worker complaints of coughing, sneezing and watery eyes abated.

Lehigh Valley Hospital and Health Network

A 7-1/2 year study conducted in the In Vitro Fertilization Cleanroom Laboratory found that the use of UVC installed in the HVAC system had a clinically significant impact on clinical pregnancy rates (CPR). In presenting the findings at the annual meeting of the American Society for Reproductive Medicine, Kathryn C. WorriLOW, Ph.C. reported that the + beta and CPR increased by an average of 17.8% and 18.2% respectively, following 10 of the 13 change-outs of the Steril-Aire UVC Emitters over the test period.

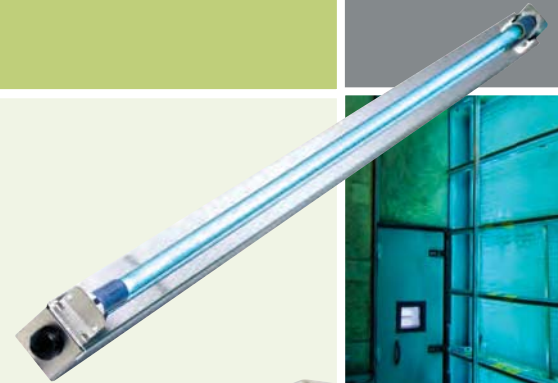


Steril-Aire UVC: The science behind healthier, more profitable buildings

Steril-Aire DE Series

High-output UVC fixtures mount downstream of the coil and drain pan; upstream of the HEPA filters.

Delivers up to 6 times the output of competitive UVC products at HVAC operating temperature.



Steril-Zone Room Air Purifier

Steril-Zone combines three scientifically proven technologies – germicidal UVC, activated carbon and a HEPA-style filter – designed to meet airborne infection control and particulate decontamination challenges in critical healthcare environments.



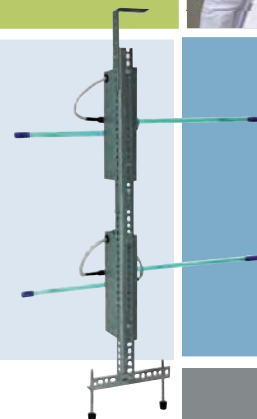
SterilWand

This portable, hand-held device packages Steril-Aire multi-patented UVC technology for surface decontamination.



Steril-Aire Fast Install Tower

Designed for easy and cost-effective installation, this pre-wired UVC system is ideal for AHUs with staggered banks, installations with space constraints and critical downtime concerns.





Sustainable solutions for healthier buildings

Founded in 1994 after a decade of intensive research and development, Steril-Aire launched an industry with its multi-patented devices that are systems-engineered specifically for the cold, moving air of an HVAC system.

Today, Steril-Aire remains the unrivaled leader in IAQ improvement in residential and commercial heating, ventilating, air conditioning and refrigeration systems. All products are manufactured in an ISO 9001:2008 facility.

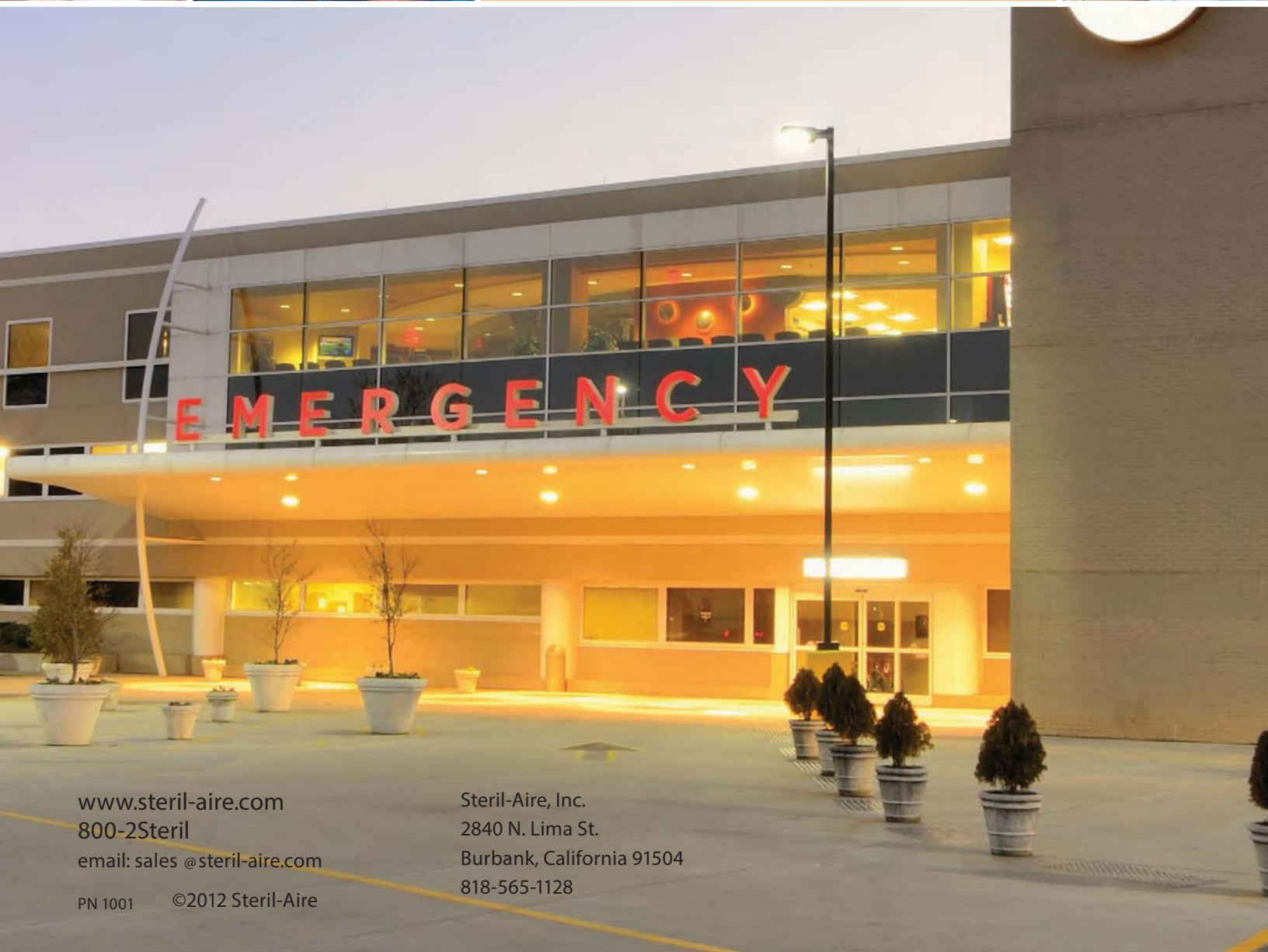
From reducing energy consumption and controlling costs, to optimizing both human and mechanical productivity, UVC solutions from Steril-Aire pay measurable dividends to your bottom line.



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