12

Trends Shaping The Future of Life Sciences Facility Management

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Table of Contents

Executive Summary

According to the ISS Group, a provider of integrated facility services, the worldwide facility management market is expected to grow from $959.2 billion in 2012 to $1.314 trillion by 2018. Considering people spend on average 90 percent of their time indoors (EPA, March 2016), this prediction is not surprising. While today's facility managers face demands for energy reduction and increased productivity, they additionally shoulder the responsibility of creating and maintaining healthier indoor environments. This is particularly true for those working in the life sciences fields, which includes hospitals and medical facilities, along with pharmaceutical laboratories. Although air quality management is a primary concern in all buildings, it is critical in hospitals and laboratory settings where transmission of disease can lead to unexpected downtime, lost revenue and even serious illness or death for patients.

In an increasingly competitive market, life science facility managers can't afford to make costly mistakes. Yet, too often they continue to choose traditional designs and equipment supply channels when better options are readily available. For this reason, staying ahead of the curve requires staying up-to-date on the latest technologies. Most importantly, for today's life science facility managers, keeping up with current industry trends provides the key to developing and maintaining the cleaner, uncontaminated spaces expected and vital to the health and well-being of staff and patients alike.

Evolution of the Industry

From the time the first modern electrical air conditioning unit was invented by Willis Carrier in 1902, the heating, ventilation and air conditioning (HVAC) market has experienced steady growth. Advancements in technology have led to a greater understanding of air flow, while evolving building designs have prompted the need for greater HVAC performance. A prime example is the trend for airtight construction, first popularized in the 1970s, and persists today.

With people spending more time inside than ever before, the demand for heathier indoor environments is prompting further changes in building design. In turn, facility managers are expected to monitor air quality and ensure occupant comfort. But this is just the tip of the iceberg. Increased compliance regulations, along with understanding integrated technologies and computerized systems, require continuous education, all leading to facility manager overload. Those in the life sciences industry face additional hygiene challenges. Lowering healthcare associated infections (HAIs) and reducing incident reports due to poor indoor air quality and unacceptable relative humidity (RH) levels are critical to providing quality patient care. Failure to do so can lead to such consequences as delayed Medicare payments and facility closures.


4

12 Trends in Facility Management

While today's facility managers continue to shoulder increased responsibility, more building regulations are adding to already full plates. Consider the Energy Independence and Security Act of 2007 (EISA). EISA 2007 requires that all new facilities are constructed to achieve net zero energy use by January 1, 2030, and owners of existing commercial buildings to upgrade in 20 years.

Achieving these energy saving goals in the time allotted will be challenging, especially for life science buildings such as hospitals, which generally stay open 24/7 and are occupied by thousands of employees and visitors. Regardless of the industry, for facility managers, addressing future issues today is essential. In order to accomplish those goals, here are 12 industry trends that are shaping internal environments in the healthcare and life sciences industry.

1

HYGIENE & FDA COMPLIANCE

#1 Hygiene & FDA Compliance

> “ASHRAE Standard 188-2015, Legionellosis: Risk Management for Building Water Systems, is a must read for facility managers.”

Traditionally, hygiene is considered care of oneself, including activities such as hand washing and bathing. In reality, however, the practice of hygiene extends beyond the individual and applies to the upkeep of buildings and equipment in which people frequent and work. For example, disinfecting and maintaining sterile surfaces are a commonly accepted practice in the healthcare and pharmaceutical industry, but what about the operation of mechanical and ventilation equipment? Failing to maintain a high level of cleanliness in these systems can result in contaminants to the building or become a source of infections. That’s why recent outbreaks of legionella in major cities highlight the importance of maintaining clean cooling towers and have been the impetus for a broader movement to improve the cleanliness of building water systems as whole. The American Society of Heating, Refrigeration and Air Conditioning Engineers Inc (ASHRAE) Standard 188-2015, Legionellosis: Risk Management for Building Water Systems, is a must read for facility managers and provides a Hazard and Critical Control Point (HACCP) approach to identifying and managing risk within water systems.

In addition to the disinfection and risk management methods discussed in Standard 188, facility managers may find benefits in upgrading older equipment to more modern designs. Modern humidification systems have introduced a variety of new features to help ensure clean and hygienic operation, regardless whether they are steam systems or evaporative type. These features include flushing cycles, drying cycles, and anti-stagnation drains. Many systems now also include sterilization features such as ultraviolet (UV) water treatment and silver ion dosing.

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Hygiene & FDA Compliance - *continued*

Combined with regular water system maintenance and flushing, these new systems are safer to operate than ever before.

For more than 100 years, isothermal humidification has been traditionally applied in these facilities. Boiled water kills off bacteria and produces hygienically safe, humidified air. However, evaporative humidification, also known as “adiabatic” humidification, a process by which a very fine mist of water and the resulting droplets rob heat from the air and changes it from liquid to a gas, has advanced considerably and now provides an equally safe option. Today adiabatic systems offer a dual benefit of humidity control and cooling, which can help reduce mechanic cooling needs in many climates.

Yet, facility managers who oversee life science facilities are often hesitant to embrace this emerging technology. Part of the reason stems from the fact that there are no regulations regarding the quality of water used in evaporation. Yet, a growing number of states, counties, cities, etc., now mandate that HVAC engineers follow water safety guidelines issued by the ASHRAE. In addition, FDA regulations come into play during pharmaceutical processing. For example, in developing a pharmaceutical drug, FDA regulations may require a certain temperature or humidity range during the manufacturing process as well as documented proof the procedures were followed to specifications.

#2 BACTERIA AND MICROORGANISM CONTROL

#2 Bacteria and Microorganism Control

> "HVAC systems are an essential component in the control of bacteria."

Today's healthcare facilities face an in-house epidemic with healthcare acquired infections (HAIs) as the sixth leading cause of death in the U.S. alone. HAIs cost the United States healthcare industry upwards of $30 billion dollars annually. For life science facility managers, these numbers are a wake-up call.

Through the years, life science organizations, such as hospitals and pharmaceutical labs have developed protocol checklists in an attempt to eliminate contamination. Yet, these procedures, such as frequent hand-washing, focus primarily on the behaviors of the clinicians and healthcare workers and cannot be easily controlled. Part of the reason bacteria and other disease causing microorganisms proliferate is due to their ability to become airborne, allowing them to spread quickly through a building. For this reason, HVAC systems are an essential component in the control of bacteria.

With close monitoring and consistent cleaning of HVAC systems, including all air handlers and ductwork, facility managers can help reduce dangerous bacterial growth. Scheduled testing of surface samples to determine the presence, type and amount of microorganisms is equally important, followed by immediate disinfection when issues arise. It is important for facility managers to be aware of and also regularly inspect potential common problem areas in ventilation systems. These include areas around cooling coils, the outside air, return air mixing box, blocked drains, and standing water in drain pans. Additionally, it is crucial to avoid standing water within ventilation systems because this can promote mold and bacterial growth. Regular audits of these areas can help identify problems early before a major overhaul is required.

Maintaining cleanliness of water used in HVAC systems is also imperative. In addition to ASHRAE Standard 188, the Center for Disease Control (CDC), offers a Water Management Program Toolkit on their website (www.cdc.gov), which provides useful information and checklists for facility managers to follow.

#3

AIR QUALITY MANAGEMENT

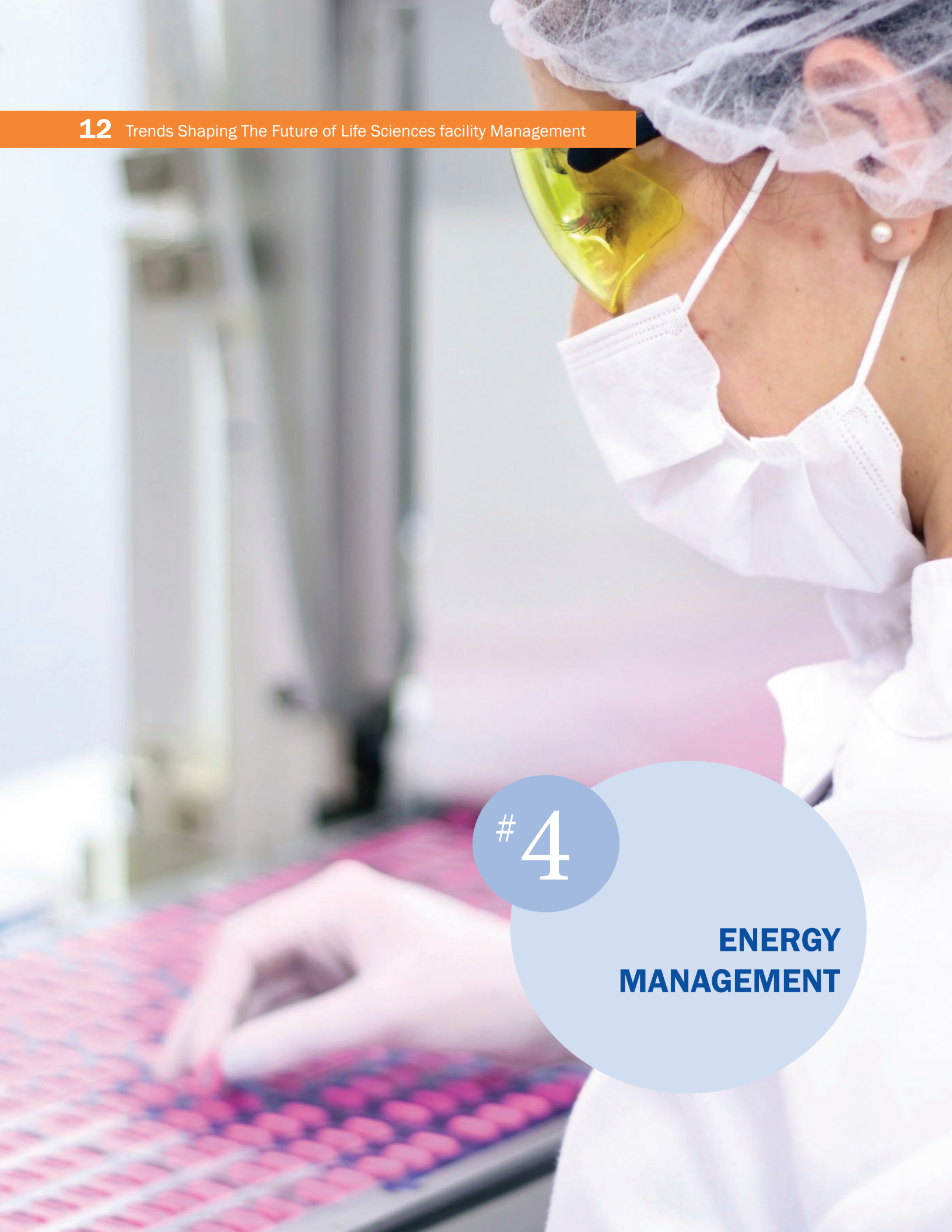
#3 Air Quality Management

> “Approximately 85 percent of chronic diseases, such as asthma, and autoimmune diseases, such as myelodysplastic syndrome and lupus are assumed to be either initiated or worsened by indoor air.”

For the last several decades, hand washing has been encouraged and enforced in most commercial facilities. Yet, sick buildings still make the news today. Why? Research indicates a strong correlation between air quality and disease transmission, from the common cold to more serious illnesses such as bronchitis and pneumonia. Similarly, there appears to be a connection between air quality and chronic illness. Knowledge obtained from the completed sequencing of the entire human genetic code has allowed scientists to identify which chronic diseases have genetic basis and which are more impacted by environment. Approximately 85 percent of chronic diseases, such as asthma, and autoimmune diseases, such as myelodysplastic syndrome and lupus are assumed to be either initiated or worsened by indoor air. Overall, studies continue to show that transmission of disease-causing microorganisms increases when air quality is not given top priority in facility management.

Along with the increased disease potential, poor air quality impacts employee performance. Dehydration as little as one percent of total body weight affects concentration. People feel fatigued, perform more slowly and make more mistakes. Chronic dehydration worsens many diseases. Indoor air that is not properly humidified diminishes the body’s ability to fight infections. In facilities involved in non-human primate research, such as with gorillas and chimpanzees, the RH is kept between 30 and 60 percent, otherwise the animals suffer from respiratory infections and skin diseases.

As the result of limited or cut budgets, facility managers may be hesitant to upgrade or replace HVAC systems. At the same time, the process can be time-consuming. For example, it may require increasing insulation along thermal channels to reduce moisture accumulation where pipes that lead out of the building allow warm and cold air to mix. However, with people spending more and more time indoors, there really isn’t any excuse for not providing quality air management.



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ENERGY MANAGEMENT

#4 Energy Management

> “Understanding the need for high performing HVAC systems begins with recognizing how individual components interact.”

Energy management plays a significant role in maintaining a cost efficient building. Achieving this goal requires a commitment to invest in best practices facility management. Yet, in committing to important issues such as energy savings, too often facility managers under-estimate the impact of the HVAC system. Citing budget constraints or lack of available skilled staff, they ignore product updates, and as a result, miss out on energy saving opportunities.

Understanding the need for high-performing HVAC systems begins with recognizing how individual components interact. For instance, updating ventilation equipment to provide increased air flow falls short if existing sheet metal duct work cannot accommodate the increased pressure. Similarly, replacing something as simple as air filters will do more harm than good by releasing particles and contaminants throughout the building if existing ductwork is not cleaned beforehand.

Consistent follow through is the key to getting the most out of any HVAC system. According to a report by the Institute for Building Efficiency (IBE), regular maintenance of HVAC systems can reduce energy 10 to 20 percent, regardless of the climate zone (September 2011). For instance, failure to accurately document replacement parts on work orders makes it difficult to identify problem areas when issues arise, order parts, and install them correctly. Overall, effective energy management requires checks and balances, the right people overseeing the system, and monitoring energy savings to make sure expected goals are met.

#5 LONG-TERM SUSTAINABILITY

#5 Long-term Sustainability

> “The global green building sector continues to double every three years, with survey respondents from 70 countries reporting 60 percent of their projects will be green by 2018.”

Increased public demand for greener workplaces, better hygiene and improved air quality challenge designers and engineers to focus on more sustainable builds. Surveys show sustainable buildings attract and retain more employees. This is particularly true of millennials. Research published in “The 2020 Workplace,” conducted by Cone Millennial Cause, found that 80 percent preferred to work for a company that cares about its impact on society.

For facility managers, long-term sustainability is a two-fold concern. From a financial standpoint, creating and maintaining a sustainable facility are costly. Updated equipment and the required operating software consume a substantial portion of any budget. For example, installing a more efficient $10 million HVAC unit may require an additional $40 million in operating costs over the life of the building.

Maintaining sustainable environments is also a time management issue, especially with the push for LEED certification. According to Dodge Data & Analytics, a leading provider of data, analytics, news and intelligence serving the North American construction industry, “the global green building sector continues to double every three years, with survey respondents from 70 countries reporting 60 percent of their projects will be green by 2018” (World Green Building Trends 2016 SmartMarket Report). Responsibility for measuring and recording the results of the energy savings falls on the shoulders of facility managers, adding to an already lengthy list of job responsibilities.

#6

INTERNET OF THINGS (IoT)

#6 Internet of Things (IoT)

> “By allowing individual components of the same system to “talk” to each other, the efficiency of the system as a whole can be increased.”

The Cisco Internet Business Solutions Group (IBSG) defines the IoT as the point in time when more “things or objects” are connected to the internet than people. Gartner, Inc., the world’s leading information technology research and advisory company, forecasts 25 billion connected things by 2020, up 30 percent from 2014.

Why is this important to facility managers? Today, many HVAC technologies are reaching their “peak” physical limits of performance and efficiency. This state creates several opportunities for improving performance in the future. Intelligent maintenance and diagnostics along with better interactivity between the individual products that make up a system will have a positive impact on internal environments.

The IoT opens up new opportunities to achieve both of these goals. By allowing individual components of the same system to “talk” to each other, the efficiency of the system as a whole can be increased by enabling individual components to operate longer at their peak level. Utilizing IoT technology increases the ability to operate and run buildings more effectively by ensuring less conflict between devices, such as simultaneous heating and cooling or operating humidification when the cooling system is drawing moisture out of the air. Further, the IoT goes hand-in-hand with building automation, permitting facility managers to oversee multiple automated buildings simultaneously. IoT enabled devices provide facility managers and building owners with the ability to

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#6 Internet of Things (IoT) - *continued*

interact on a higher level with equipment and systems and troubleshoot more effectively. Their increased internal intelligence allows the devices to signal maintenance schedules, indicate issues, and suggest fixes. This can contribute to an increase in overall system reliability and the ability to remediate small problems before they become major failures.

With the integration complexity of the IoT, the skills and IT training required are typically beyond that of the traditional controls contractor. The result is that new smart device connectivity blurs the lines between building controls and IT. That's why ensuring a mix of the right skills is essential to a smooth integration of IoT enabled devices.

Security can also be an issue that needs to be addressed with competent IT staff during the planning stage. For instance, a hacker shutting down the heating or cooling system of a hospital could render the facility unusable until the system is restored, affecting the health of patients, impacting the hospital's reputation and ultimately the bottom line of the organization.

#7

CONTRACT OUTSOURCING

#7 Contract Outsourcing

> “Contract outsourcing is a viable alternative to onsite facility management for customers and/or end-users who want a more hands-off approach to monitoring systems.”

Facing increased demands for energy savings, along with public awareness of indoor air quality, today’s facility managers often struggle to keep their heads above water. Cutting edge HVAC systems provide the solution to both problems, especially considering a significant portion of the cost of upgrading equipment may be covered by cost effective incentives programs, such as utility company rebates.

So why isn’t every facility manager making these system changes? In some cases, unfamiliarity with product availability or local incentives is to blame. Other times, it is the lack of necessary skills to operate and maintain today’s more sophisticated HVAC systems. As a result, facility managers continue to invest in traditional equipment. It’s not until something breaks down or hygiene problems arise that they begin to question their choices. By then, it could be too late.

For this reason, contract outsourcing is a viable alternative to onsite facility management for customers and/or end-users who want a more hands-off approach to monitoring systems. Reliable outsourcing provides bumper-to-bumper insurance, ensuring the system is not only hygienically safe, but also working optimally at all times and available when needed. Outsourced contractors bring experience and expertise to the table. Able to see the bigger picture, they can suggest the best solutions, offer a wide variety of technologies to fit the needs of the facility, and recognize issues early, limiting down time. A well-defined facility management contract takes the guesswork out of system management by clearly communicating the type of work included, along with the expectations for both parties.

#8

REMOTE MONITORING

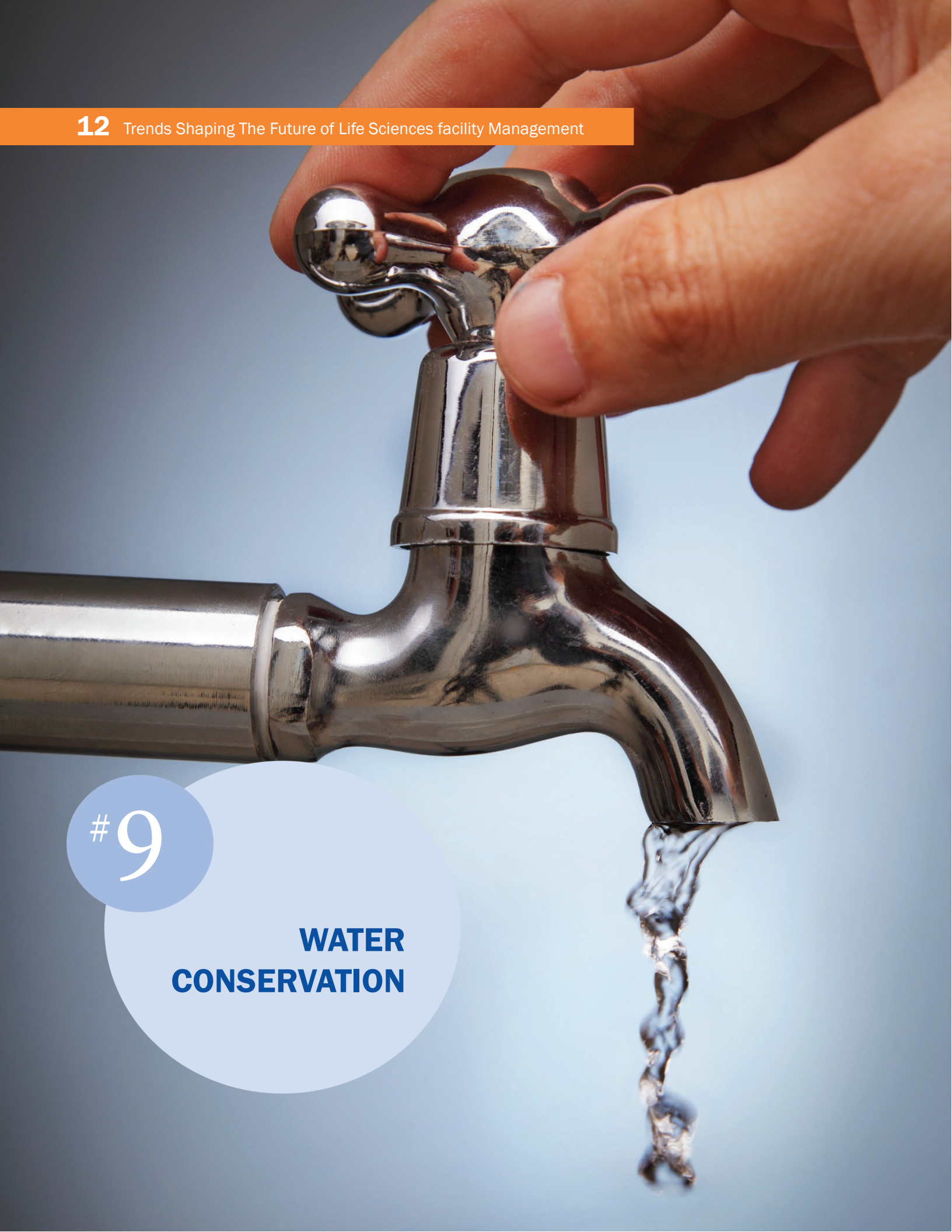
#8 Remote Monitoring

> “Remote monitoring technology can reduce the number of non-essential and expensive service visits.”

With advanced technology, such as smart devices and building automation, today’s building owners and operators can monitor facilities from a central control room. This cost-cutting technology reduces the amount of staff and effort needed for on-site monitoring of individual buildings. At the same time, remote monitoring allows manufacturers to provide new levels of service previously unavailable. For instance, when issues arise with a device or piece of equipment, a call to the manufacturer’s support hotline allows expert factory service technicians to remotely access the device, understand the complexity of the situation, diagnose the problem, and determine the appropriate fix.

In addition, remote monitoring technology can reduce the number of non-essential and expensive service visits, such as problems resulting from incorrectly configured controls or questions concerning equipment operations or general maintenance. Simple changes to HVAC systems can be made remotely, enabling the system to resume operations without having to send someone to the site. Remote monitoring allows technicians to simultaneously identify and order the spare parts or replacements necessary to resolve the problem, thereby further reducing costs by eliminating the need for replacement visits.

Remote technology is a win-win for the manufacturer and the end-user alike. Yet, because it involves the installation of additional IT equipment and requires extra operational training, some facility managers hesitate to take advantage of this technology.



#9

WATER CONSERVATION

#9 Water Conservation

> “Many products that utilize water allow users to configure drainage, flushing, and automatic cleaning cycles, but these are seldom adjusted from factory default parameters.”

With recent high profile water shortages in the United States, the push for more environmentally friendly workplaces, and the desire for increased energy savings, water conservation is gaining a new importance in the area of facility management. Because copious amounts of water are required to operate commercial HVAC systems, this can be challenging. In the healthcare and pharmaceutical industry, facility managers face tougher challenges. In addition to the heating boilers, cooling towers, and chilled water systems that are common in many buildings, central steam systems, laundry and washing facilities, increased cleaning and disinfection, and humidity control systems add to increased water usage.

In particular, humidifiers contribute to the overall building water usage. Determining the amount of water necessary to humidify a facility begins by calculating the load, which is based upon the size of the facility and the number of spaces that require humidified air. Heating the air causes a significant decrease in RH even though the actual mass of moisture in the air has not changed. This means that ventilating with outside air cooler than the building set point tends to dry the building, an effect that is especially pronounced in cold climates. Overall, stabilizing the humidity requires adding water to the air, which increases overall water usage. In this example, the humidity added to the air represents only part of the water required for continual operation.

All natural water contains minerals. While these minerals are beneficial in drinking water, they contribute to scale

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Water Conservation - *continued*

formation within HVAC and plumbing systems. Regardless of the process, whether utilizing boiled, evaporated or filtered water, keeping an HVAC system clean and running efficiently requires flushing out minerals. Depending upon the amount of minerals present, the waste water used in the process can be considerable.

Many products that utilize water allow users to configure drainage, flushing, and automatic cleaning cycles, but these are seldom adjusted from factory default parameters. Taking the time to understand and optimize these parameters can result in significant water savings and, at the same time, sustain the benefits the equipment offers to the building. Newer equipment may offer other benefits. That is because efficiency levels of water treatment systems have increased in recent years, and many new devices can tolerate broader water quality ranges resulting in less water treatment. In areas where water treatment is required to remove hardness and minerals from the water, consider using blended streams of treated and municipal water directly to reduce the loads on the treatment system. The tradeoff will involve an increase in descaling of equipment, but will often reduce overall water losses at the treatment system.

#10

EVAPORATIVE COOLING

#10 Evaporative Cooling

> “Unfortunately, facility managers & building owners make the mistake of associating evaporative cooling with dampness, biological issues and odors.”

Evaporative cooling is a process that introduces liquid water directly into the air without the need for adding thermal energy (heat) to the water. As the water evaporates, it draws heat from the air to drive the phase change from liquid to vapor. Evaporative or adiabatic systems used directly in a ventilation airstream result in both increased humidity and cooling of the air. Reducing mechanical cooling requirements offers significant energy savings.

In climates where direct evaporative cooling in the ventilation air stream is not practical due to warm and humid outdoor conditions, a different approach called indirect evaporative cooling can be employed. Indirect evaporative cooling involves placing an evaporative cooler into the exhaust airstream. This air is then cooled as much as possible and directed through an air-air heat exchanger where it pre-cools incoming supply air. The moist air is then exhausted from the building. The result is a reduction in mechanical cooling requirements without adding moisture to the building.

Unfortunately, facility managers and building owners make the mistake of associating evaporative cooling with dampness, biological issues and odors. As a result, they miss out on the energy reducing opportunities of this process. Modern evaporative cooling systems address many of these issues with intelligent controls, drying and washing cycles, and sterilization systems. Control accuracy has improved greatly over the years as well, which facilitates better tracking of set points and part load operation in the shoulder seasons.

#11 HUMIDIFICATION

#11 Humidification

> “Studies have shown that dry air actually promotes the spread of disease-causing microorganisms, which include viruses, bacteria, funguses and parasites.”

The word humidity often conjures up negative connotations, from muggy summers to dangerous mold growth. So it’s no surprise that many facility managers assume humid indoor air is a problem. However, it is not that simple. With buildings designed by engineers and managed by facility managers, both typically lacking a medical background, understandably, the primary focus is on building codes rather than occupant health.

Studies have shown that dry air actually promotes the spread of disease-causing microorganisms, which include viruses, bacteria, funguses and parasites. Cough and sneeze droplets released into air with mid-range relative humidity (RH), ranging from 40 to 60 percent, remain larger and heavier, and tend to settle out of the breathing zone within three feet of the individual responsible. In extremely dry air, under 30 percent RH, these same droplets dry out and shrink, becoming considerably lighter. This allows them to float greater distances, travel through ventilation systems and remain suspended in the breathing zone.

Equally important, the human immune system functions less efficiently in dry air. On average, an individual requires a body composition of 60 percent water to thrive. This allows the body to breathe effectively, facilitate food digestion, produce energy and build tissues, and keep the structure and integrity of the skin intact. Most importantly, sufficient water intake allows the immune system to successfully fight off allergies and prevent against infection. This explains why people who move to overly dry environments and fail to hydrate adequately often develop dry eyes, asthma, or skin conditions, such as dermatitis and eczema. Colds, flus, sore

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Humidification - *continued*

throats, dry eyes, and itchy and cracked skin are all symptoms that are usually prevalent in the cold dry months of the winter when the indoor RH is at its lowest. Literature shows that in the Meningitis Belt in West Africa, dry blowing air precipitates the meningitis outbreaks. But when the RH is 40 percent and above, the epidemics are largely eradicated.

Many healthcare and pharmaceutical facilities are already equipped with humidification equipment; however it is not always used or maintained to the fullest capacity. Tracking moisture levels in the building over the course of the season can help facility managers identify dryness issues and maintain appropriate levels. In most North American climates regions additional moisture needs to be added during the cooler months. Evaluating the state of humidification equipment, ensuring it is correctly installed and commissioned, and regular inspections all contribute to efficient and trouble free operation when moisture is required.

#12

DIRECT ROOM SYSTEMS

#12 Direct Room Systems (DRS)

> "The cooling effect of water evaporation can provide cooling directly to the room, reducing mechanical cooling requirements."

Indoor air humidification is typically associated with in-duct humidifiers. Humidity introduced through the HVAC equipment is distributed by means of the ventilation ductwork. Direct room high-pressure humidification systems change this equation. Utilizing a high pressure pump system, these systems deliver an ultrafine mist directly into a space, providing humidity control exactly where it is needed.

Additionally, energy-saving opportunities and ease of operation of the high pressure direct room systems set them apart. Without the need for an air handler and ductwork, these systems can operate autonomously or in locations where ducted systems are impractical. They can also simplify retrofit costs, by reducing the need to install additional ventilation systems to resolve humidity issues. Strictly a humidification process, high pressure systems can respond very quickly to changes in space conditions, regardless of the temperature settings. In addition, they are able to track set points with a high level of precision, which can be crucial in pharmaceutical manufacturing. Pumps and water treatment systems can be located in a separate mechanical room from the spray nozzles so that business operations are not disrupted during servicing. This results in less down time and lost revenue. As an additional bonus, the cooling effect of water evaporation can provide cooling directly to the room, reducing mechanical cooling requirements,
The system lessens the HVAC workload, which is particularly important for organizations with spaces that require year-around cooling.

Facility managers may assume that the fine mist can lead to water issues. As a result, some are hesitant to invest in this humidification process. However, this resistance is unfounded. Benefits of a direct room high pressure system and ease of operation make this system ideal for many facilities.

Challenges and Solutions

On any given day, about one in 25 hospital patients acquires a HAI, according to the CDC (March 2016). Equally concerning are pharmaceutical recalls, such as the one by PharmaTech due to the potential risk for Burkholderia cepacia (B. cepacia) contamination in all liquid products over a particular production time line (August 9, 2016). Concluding all contamination issues are directly related to air quality management is unjust. Situations vary from facility to facility, and chances are that numerous factors are involved. For facility managers and building owners, the relationship between humidification levels and disease is important when choosing to invest in HVAC systems and/or replace components.

Humidification levels also play a critical role when it comes to reduction of static in the air. Depending on the type of machinery, friction caused by static can reduce speed and efficiency. Static can impact the success of chemical reactions and also be highly detrimental for electronics, where friction has been shown to short out circuit boards. Finally, from a safety standpoint, such as working with flammable liquids, high levels of static can lead to explosions.

With the main goal of life science facility managers and building owners to meet the needs of their facilities and occupants, providing exceptional air quality is an essential part of this puzzle.

Eight Environmental Tips for Facility Managers

The following tips can help facility managers stay on top of the rapid changes in the industry and produce better internal environemnts:

1. Utilize effective, efficient, cutting edge HVAC equipment. Seek out advances in hygiene, energy and sustainability that are changing the marketplace.

2. Monitor building conditions consistently. Have a systematic process for review and maintenance. Be willing to adapt to changing conditions.

3. Set the bar high. Request hygiene tests on equipment as part of any maintenance contract. Onsite FDA approved bacteria testing measures are available that provide immediate results. Any concerns can be remedied immediately to prevent larger issues.

4. Inhibit bacterial growth throughout the HVAC system by paying close attention to primary water sources. For instance, use black plastic storage tanks and monitor the water temperature.

5. Avoid turning off the water storage system. Instead, purge nozzles, pipes, etc., on a regular basis. Most newer systems have safety measures in place to eliminate standing water and prevent contamination issues.

6. Maintain RH levels between 40 and 60 percent. Invest in reliable humidity indicators. Recent studies have confirmed that bacteria are significantly reduced and mostly ineffective above 40 percent RH.

7. Outsource facility management to companies that employ knowledgeable, skilled and certified staff. Be willing to share in the responsibility of keeping the facility functioning at top levels.

8. Stay current on evolving trends. Continuously look to industry leaders for products, procedures and technologies that can improve facility efficiency.

Conclusion

Today, regardless of the industry, a clean, uncontaminated, indoor environment is expected. However, when it comes to life sciences, where lives are at stake, this statement takes on a whole new importance. For this reason, choosing a HVAC system that meets the needs of a facility and also provides a healthy environment for the occupants is essential.

Overall, an increasingly competitive market demands cutting edge technology, progressive thinking, and the ability to embrace changes coming down the pipeline. Facility managers and building owners who see the bigger picture, demonstrate leadership by challenging the status quo, and seek new technologies and solutions are confidently moving their companies forward today and into the future.

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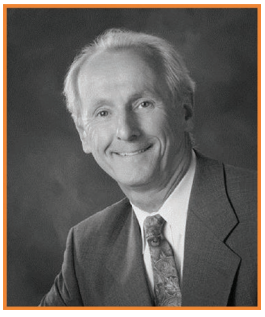

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About Nortec

Nortec (Member of the Condair Group) is the leading manufacturer and provider of complete solutions in the areas of humidification and evaporative cooling, with a comprehensive portfolio including products, services, experience and know-how. This enables us to create the ideal indoor climate while keeping energy consumption low and reducing impact on the environment. The company also offers humidifier design, manufacturing, supply, installation, and maintenance, as well as solutions for bacteria control, bacteria testing and energy efficiencies to significantly improve facilities and production. Today, with approximately 600 employees, Nortec operates production sites in Europe, North America and China, are represented in 15 counties by its own sales and service organizations and is supported by distribution partners in more than 50 locations worldwide.

For more information or to contact your local Nortec representative visit www.humidity.com or call 1.866.667.8321.