



How to Capitalize on HVAC/R Trends to Drive Business Growth

Environmental Responsibility, New Materials and Technologies, and the Internet of Things Creates Business Opportunities For Contractors and Distributors



ENGINEERING YOUR SUCCESS.

Introduction

What's changing in HVAC? It might be simpler to ask what isn't changing.

According to Steve Yurek, the president and CEO of the Air-Conditioning, Heating, and Refrigeration Institute (AHRI), the industry is facing change on all fronts. There's trade uncertainty due to the imposition of tariffs. A federal government unwilling to deal with environmental and energy issues. And rapidly rising temperatures tied to increasing greenhouse gas emissions affecting urban building codes. And that's just for starters.

Now add in the level of change contractors and distributors are facing on the job - with new refrigerants, growing automation, complex sensing and monitoring technologies, the advent of smart controls, predictive residential diagnostics, the ongoing push for green buildings, even how contractors are communicating with customers - and perhaps it's understandable why HVAC professionals seem to be a vanishing breed. In fact, the Bureau of Labor Statistics (BLS) estimates the current HVAC technician shortage at 70,000, with an additional 115,000 new HVAC/R professionals are needed to meet the demand within the next four years.

Yet despite all the uncertainty and challenges brought by changing times, HVAC/R business for 2019 is looking better than good, according to

the ASHRAE Journal Annual Economic Outlook Survey. For example:

- More than 87% of respondents are expecting steady growth in residential, light commercial and heavy commercial segments, including schools, non-school institutional buildings, office buildings, lodging, manufacturing/industrial, data/telecom centers, hospitals/healthcare, restaurants/hospitality and laboratories/cleanrooms
- 44% are reporting sales increases over 10%
- 64% are debuting new products
- 36% see retrofit and renovations as potential market drivers

Clay Stevens, manager of the AHR Expo, believes the survey data confirms the continued growth of the industry. "It is further indication that the changing market has potential to grow in unexpected ways," Stevens said. "Industry professionals need to stay abreast of the latest technologies and equipment available to them."

What are the latest trends in global/environmental responsibility? What new materials and technologies are on the horizon? And when

and how will IoT, the rise of connected buildings and increasingly smart homes affect contractors' day-to-day?

This paper addresses the answers to these and other pertinent industry questions.



For over 80 years, Parker Sporlan has remained committed to strengthening the industry through education. We are excited to continue our tradition of providing educational opportunities to the industry.

Green Building & Becoming a GreenSTAR

Buildings, and the construction process that creates them, have a substantial impact on the health and wellbeing of people and the planet. They're costly to maintain and operate, generate waste that can have a significant impact on local environments and nature, and use global resources to construct and operate. In fact, it has been estimated that the daily operation of buildings accounts for 40% of total energy usage worldwide².

No surprise then, that green building is on the rise.

Green building is the practice of designing, constructing and operating buildings to maximize occupant health and productivity, use fewer resources, reduce waste and negative environmental impacts, and decrease life cycle costs.

How big is the movement? It's big. In the World Green Building Trends 2018 SmartMarket Report, almost half of the total respondents said they expect to build more than 60 percent of their projects as green buildings by 2021. Decreased operating costs, short payback periods and asset value increases were strong drivers of green building, but creating healthier indoor environments was also a major motivator³.

In addition, two-thirds of those surveyed believed using a rating system such as LEED allowed them to create a better-performing building. LEED, or Leadership

in Energy and Environmental Design, is the most widely used green building rating system in the world¹⁴. It's a system that's now broadening its focus on construction to include maintenance and the long-term sustainment of energy efficiency.

Under previous standards, new LEED-certified buildings required recertification every five years; now LEED 4.1 requires LEED buildings be recertified annually. The reason? It's becoming clear that operations and ongoing maintenance are key to making sure a building lives up to the energy efficiency standards promised.

Kevin Fay, executive director of the Alliance for Responsible Atmospheric Policy (ARAP) reports that lowering a building's initial energy consumption is critical to meeting greenhouse gas targets. "On the maintenance side, we see reports that energy savings alone from properly maintained building systems could be 2 to 5 percent or more. From a greenhouse gas standpoint, consumption is 95 percent of impacts from an air conditioning/heating operation. Properly maintained systems perform much better. You prevent the (refrigerant) leakage but also prevent the consumption."

With LEED recertification programs now focused on upkeep, maintenance professionals have an opportunity to play a bigger role with facilities managers and/or building owners. One way to take advantage of that

opportunity is by becoming a GreenSTAR.

The Mechanical Service Contractors of America, or MSCA, created the GreenSTAR program in response to the demand for LEED certification in commercial buildings. Taking a "whole building" approach like LEED, GreenSTAR contractors view buildings as an ecosystem – people, air, water, equipment, and systems all operating together to maximize environmental quality and return on investment while minimizing resource use.

Obtaining GreenSTAR certification is a tangible way to demonstrate to clients expertise in environmental stewardship. It⁴:

- Provides an opportunity to stand out and be a leader
- Illustrates commitment to ongoing green building training and education
- Demonstrates proven LEED experience
- Highlights an understanding of equipment upgrade and energy efficiency issues

Clients working with GreenSTAR companies benefit from reduced energy costs, improved air quality and water efficiency, greater employee productivity and satisfaction, and assurance that all federal and local environmental regulations are met.

But green building isn't just a commercial phenomenon. It's penetrating the residential world as well.

The Greening of American Homes

Whether for indoor climate control or preventive maintenance, smart home HVAC technologies sales are up due to increasing customer demand. Globally, the market is predicted to grow 29.5 percent by 2024⁵.

For many homeowners, the way into the market has been with smart thermostats, which allow air conditioner and heater control from a smartphone app. But there are newer and more intelligent devices available that can offer expanded mobile access, text alerts, pre-scheduled diagnostics and real-time updates. Some can even adjust home lighting based on when the sun rises and sets.

Another green home change that will impact contractors is the new standard for furnace fan efficiency ratings, effective in July of this year. For residential furnaces, that means an industry-wide transition from PSC (permanent split capacitor) motors to more efficient EC (electrically commutated) motors. The U.S. Department of Energy believes the new standard will save about “3.99 quads of energy, reduce harmful carbon pollution by up to 34 million metric tons – equivalent to the annual electricity use of 4.7 million homes – and save Americans more than \$9 billion in home electricity bills through 2030⁶”. Some experts predict the transition will remove about a million PSCs from the market in the first year.

And then there’s the mandated phase out of R22, the standard HVAC refrigerant used for decades. R22 will become illegal to manufacture or import to

the U.S. at the end of 2019¹⁴. In the meantime, supply is dwindling and prices are rising dramatically. While the ban clearly affects commercial buildings most, there are some implications for residential HVAC systems as well. For instance, as stockpiles of R22 begin to be eroded, the opportunity for counterfeit or fake refrigerants rises. The EPA has already reported such cases. The cooling performance of these products was actually acceptable, and they are generally compatible with the lubricant and other materials in R22 systems. However, they present a serious safety hazard. Because they are hydrocarbons, they are highly flammable. To put these in a system that was designed for a non-flammable refrigerant like R22 is very dangerous. EPA addressed this issue in SNAP Rule 21 by formally prohibiting their use in retrofits of unitary air conditioning and heat pump systems. Homeowners need

to make sure they’re getting their replacement refrigerant from a trusted HVAC service supplier that’s EPA 608 certified.¹⁵

Contractors working with homeowners who have an AC system with multiple leaks or a dead compressor – repairs that involve many hours of labor and a high expense – have an opportunity to steer the homeowner to a replacement system that offers higher efficiency, more environmentally friendly refrigerant, and a more sustainable solution moving forward¹⁴.

Clearly green building – both residentially and commercially – holds sustainability options and opportunities for both HVACR contractors and distributors. But the kind of environmental stewardship needed to offset the potential consequences of climate change require a whole new set of material and technology innovations.

What Contractors & Distributors Can Do Now to Capitalize on Environmental Responsibility Trends:

1. Make sure you understand the implications of the equipment that you’re selling, the efficiency ratings, and the payback to your customer. The more you understand the sustainable value of what you’re selling, the greater your ability to help your customer choose the upgrades you’re offering.
2. Become familiar with the recertification steps of LEED 4.1. Are there LEED certified buildings in your area that will need to be recertified?
3. Consider becoming GreenSTAR certified. Not only is it an easy way to stay up-to-date on the latest green building education, it provides an excellent way to differentiate your business.
4. Consider becoming a Well Building accredited professional. The Well Building Standard is a performance-based system for measuring, certifying, and monitoring features of the built environment that impact human health and wellbeing.
5. Download the [Well Certification and Performance Verification Guidebook](#)

New Materials & Technologies

From the use of ultra violet light near the evaporator coil to eliminate many types of pathogens ... to passive solar and radiant heating in buildings ... new material innovations and technologies are shaping the worlds of HVACR contractors and distributors. A quick search of the internet reveals numerous innovations, many of which are also green. Here's a quick rundown of the most notable ones⁸ mentioned in an article on architizer.com:

- Solar-Powered Air Conditioning: Compact, rooftop panels with special mirrored lenses automatically follow the sun's path, capturing and concentrating solar energy that is then utilized by the building's HVAC system
- Ice-Powered Air Conditioning: A thermal battery that turns existing air conditioners into cost-effective cooling machines, filling with water at night and freezing it into a block of ice. During the day the ice is used for the A/C, eliminating the use of the compressor and cutting energy use during the hottest hours of the day by 95%
- Desiccant-Enhanced Air Conditioning: a new technology that combines the cooling power of evaporation with the dehumidification of liquefied desiccants to create an air conditioner that creates cold, dry air with up to a 90% reduction in energy use⁹
- A new retrofit technology that installs directly into existing rooftop units, updating them with economizers, variable fan speeds, demand-response ventilation, smart controls and automated capabilities, all with a 25 to 50% reduction in energy use
- Digital Ceilings: equipped with adaptive sensors that learn the daily habits of occupants and merge the building's lighting, security and HVAC systems into a single, easy to manage network
- Smart Glasses: Especially designed for field technicians, the glasses transmit video in real time, allowing multiple techs to inspect and diagnose a system remotely while automatically generating a detailed service report
- Recyclable Ductwork: Fire-resistant and waterproof-coated cardboard that takes the place of ordinary HVAC

ductwork. Stronger, lighter, cheaper than sheet metal, requiring 20% less insulation. 100% recyclable.

While the above innovations are both real and quantifiable, there are other emerging HVAC technologies that could make the training, manufacturing, installing and repair processes faster and more efficient.

For example, someday 3D printing could be used to create missing or custom HVACR parts or even an entire HVAC unit needing to be installed in a particularly awkward spot. While virtual reality could help contractors visualize the blueprints of a room or building for better spatial recognition and faster, more efficient installation.

Yet none of these ideas discussed here have the groundbreaking impact for contractors and distributors as the Internet of Things.

What Contractors & Distributors Can Do Now to Capitalize on New Technology Trends:

1. Partnership and collaboration, both privately and publicly, are key to staying abreast of material innovation. Consider joining a dedicated material information company like ASM International to capitalize on its resources and be in the know about evolving HVAC materials.
2. Attend the AHR Expo annually. The world's largest HVAC/R event and tradeshow sponsors innovation awards for the industry's latest products, systems and technologies. [View the 2019 Awards.](#)
3. Encourage supplier training sessions on new materials and technology innovations, often held at distributorships.

The Internet of Things

The Internet of Things (IoT) – referred to by some as Factory 4.0 or Industry 4.0 – is ushering in a revolution on the factory floor -- one with clear implications for HVACR contractors and distributors.

With the adoption and deployment of smaller, less expensive sensors, the development of advanced analytics and the commodity storage options provided by the cloud, companies everywhere are embracing the opportunities for IoT's transformative business applications, HVACR companies among them. Why? The bottom line is, it's big business.

In a 2017 survey¹¹, Price Waterhouse Cooper found that 85 percent of U.S. manufacturers are already delivering, or planning to deliver, products with IoT capabilities. A McKinsey study¹² predicts that IoT will generate an economic value of between \$1.2 trillion and \$3.7 trillion on the factory floor by 2025 for operations and equipment optimization. This value will be created through new energy efficiencies, labor productivity, inventory optimization, and improved worker safety.

Connected HVACR solutions will offer the kind of contractor value that can lead to competitive advantage through offering customers potential benefits like these:

- The tracking of system performance

- Predictive maintenance
- More predictable downtime
- Compliance with environmental regulations
- Custom configurations
- Analysis/drill-down data that allows contractors to identify performance issues
- Mobile device functionality for ease of monitoring, intelligence gathering and analytics

Again, those are potential benefits. Where are HVACR companies now with IoT implementation? As reported in an article on [achrnews.com](#)¹³, here's what's happening with some of the major players and the residential contractors that support them:

- "In our market, we are still in the 'early-adopter' stage," said Steve Schmidt, president, Frederick Air Inc., Frederick, Maryland. "Security products like locks and window or door sensors, as well as IoT lighting solutions, are the first to sell. With the advent of Alexa and other voice command hubs, we are starting to see more interest in items for convenience, like connected outlets."
- "We sell the Comfort Guard Smart Maintenance," said Rob Minnick, Minnick's Inc., Laurel, Maryland. "With Comfort Guard, we send performance checks each month that let our Smart Maintenance customers know how well their

system is operating overall and when it's time for a cleaning. It also emails the customer in real time if there is an urgent issue with a component or when it's time to change their filter. Our customers are busier today more than ever, and they really appreciate only needing to have maintenance when the system lets us know, rather than having to go out to their home. It saves us all a lot of time."

- "Currently, the higher-end Bryant equipment we install utilizes a special Bryant thermostat that communicates with the furnace and air conditioner and is internet connected," said Butch Welsch, owner of Welsch Heating & Cooling Co., St. Louis. "Once set up properly, it will send notifications to designated emails. The notifications can be anything from regular maintenance reminders to replacing filters, as well as alarms if there is a problem with the equipment."
- Rich Morgan, CEO, Magic Touch Mechanical Inc., Mesa, AZ states that "the IoT products we're seeing the most traction with are wireless Energy Management Systems (EMS) and associated sensors and controls, smart thermostats, mini-split Wi-Fi controls, and, most recently, Wi-Fi lead detection and freeze detection sensors."

The Internet of Things

On the commercial side, Contracting Business magazine reports¹⁴ that IoT-enabled buildings are leveraging internal and external information sources to create actions and workflow that benefit energy efficiency, tenant comfort, building health and/or operational excellence.

The article goes on to predict an immediate opportunity for mechanical contractors to embrace IoT technologies and the creation of IoT-enabled buildings. “The biggest benefit that IoT-enabled buildings will create for mechanical contractors is the advantage of information for remote diagnostics, troubleshooting, and solving building issues before they move to the critical stage. In addition, more and more customers will expect upgraded levels of IoT-enabled control over devices and the ability to view more comprehensive operational data.”

As technology progresses on both the residential and commercial sides, contractors will have to undergo additional training on the new tools available to them. This is a role distributors can fill. Contractors may also have to rethink their customer relationships. With continuous access to data that matters to their customers, relationships will change from reactive (dealing with breakdowns) to proactive and long-term.

What Contractors & Distributors Can Do Now to Capitalize on IoT Trends:

1. Follow IoT trends in the literature and current case studies. Attend technical conferences that may include information of market-specific IoT applications.
2. Get involved with industry associations. These groups frequently target technology implications like those of the IoT in their publications.
3. Encourage OEM training sessions on new IoT-enabled products
4. Consider how widespread IoT implementation will affect your existing service models. Will new service models be required as you shift your business from reactive service to preventive service?
5. Optimizing IoT in both legacy and new buildings will require new levels of collaboration among value chain partners. What role can you play in bringing architects, maintenance staff, technologists and product manufacturers together for the betterment of a building?



Parker Sporlan Type SSTK Smart Service Tools work with a SMART Service Tool App for smart phones or tablets along with sensors and pressure transducers to assist in diagnostic/service problems.

Conclusion

While some debate the existence of climate change, according to new projections published in the journal *Nature Communications*, cited in a recent [cnn.com](https://www.cnn.com/2019/02/12/health/climate-change-cities-projected-temperatures-study/index.html) article¹⁶, the 250 million people living in North American cities, it's going to get a lot hotter, with cities experiencing "novel climates with no modern equivalent."

As forward-looking city planners react to the news by tightening building codes for heightened energy efficiency and air quality, contractors and distributors are on the front lines of the impending changes. New materials and technologies will merge with connected controls, sensors and equipment to enable monitored data of temperature, humidity, time of day, occupancy, CO2 levels, VOCs and indoor pollutants. Using this data will enable total control over the HVAC system, making contractors predictive experts critical to keeping key HVACR systems functioning at peak performance in environments that could be anything but hospitable.

Cited Sources

1. <https://www.cnn.com/2019/02/12/health/climate-change-cities-projected-temperatures-study/index.html>
2. <https://esub.com/environmental-impacts-of-construction-projects/>
3. <https://www.usgbc.org/articles/world-green-building-trends-2018-green-keeps-growing>
4. <https://www.everbluetraining.com/blog/hvacr-companies-pursue-leed-stand-out>
5. <https://www.refrigerationschool.com/blog/hvacr/green-hvac-trends-to-watch-in-2019/>
6. <https://www.assemblymag.com/articles/94879-five-hvacr-industry-trends-to-see-at-ahr-2019>
7. <https://aristair.com/blog/how-will-the-r22-refrigerant-phase-out-impact-your-commercial-ac/>
8. <https://architizer.com/blog/inspiration/collections/sustainable-hvac-technology/>
9. <https://www.nrel.gov/docs/fy11osti/49722.pdf>
10. <https://www.scientificamerican.com/article/could-air-conditioning-fix-climate-change/>
11. <http://usblogs.pwc.com/industrialinsights/2017/09/18/for-us-manufacturers-the-iiot-future-is-now-part-1/>
12. <https://www.mckinsey.com/~media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20Internet%20of%20Things%20The%20value%20of%20digitizing%20the%2>
13. <https://www.achrnews.com/articles/136102-embracing-the-iiot-is-key-to-hvac-sales>
14. <https://www.contractingbusiness.com/commercial-hvac/inspiration-innovation-todays-and-tomorrows-building-iiot>
15. Interview with Parker Hannifin HVAC experts
16. <https://www.cnn.com/2019/02/12/health/climate-change-cities-projected-temperatures-study/index.html>



Parker Hannifin Corporation

Global Headquarters
6035 Parkland Blvd
Cleveland, Ohio, USA
phone 1-800-C-PARKER
www.parker.com