

Change in the world of HVAC.

By Ron Prager

I fully admit that I hate change! Not just change within our industry, but almost any kind of change upsets my world. I mean, I still have shoes that I haven't worn in 15 years; but giving them up means that they are no longer relevant to my world and that disturbs me. So, when a retailer at the recent PRSM Conference brought up the question of what changes I'd seen in the HVAC industry over the past several years, and what changes I thought we'd see in the near future, two thoughts came into my mind. The first was that this would be a really good topic for a magazine article. The second was that I was going to have to re-live the stress I went through each time someone moved my cheese. Don't get me wrong; sometimes change is good. As a matter of fact, in most cases change eventually leads to good things happening. It's just coping with the process that is unnerving. Remember when problems became issues? I understood that we wanted a more positive way to describe the negative aspects of our job. Then issues became challenges, and I thought we were getting a little too positive about our problems, but I was still on the team. However, I just can't get my arms around how my "problems," have now become "coaching opportunities." Do you understand my issue? I mean opportunity, I guess. So, attempting to put my personal feelings about change aside, let's look at how HVAC has evolved over the past several years.

R22 is Going Away:

Even if you have no technical knowledge of HVAC, if you work in facilities, you are aware that Refrigerant 22 is being phased out. As of January 1, 2010, it will be illegal to charge R22 into a system unless that system was built prior to January 1, 2010. The bottom line is that all manufacturers will be building systems that utilize a refrigerant other than R22 by that date. As of January 1, 2020, all production of R22 will cease, and the only R22 available in the United States will be refrigerant that has been recovered from existing equipment. As of January 1, 2030, R22 may not be used at all. Keep in mind that almost all of the air conditioning equipment currently serving your stores is charged with R22. R22 has also been the refrigerant used in almost all residential air conditioning systems and has been used extensively in commercial refrigerators. Even with the deadline looming only 1.5 years from now, the majority of commercial HVAC units currently being sold are still R22 units.

So how does this rock your world? There are lots of things to be concerned about. Most manufacturers are in the midst of switching production over to equipment that utilizes R410A as a refrigerant. The nature of this refrigerant is such that it operates at pressures approximately 1.5 times higher than R22. All of the components that were used for R22 systems have to be redesigned for the higher pressures found in R410A systems. This includes coils and compressors. The first challenge will be for component manufacturers to produce a sufficient quantity of R410A compatible components to fill the need for all of the new equipment being produced. The next challenge, will come down the road,

when component manufacturers become reluctant to produce replacement parts for R22 systems because they know the future need will be limited and they have converted their production lines over to producing components that are compatible with R410A. What will the availability be for replacement parts for the systems currently serving your stores? So, we need to concern ourselves with the current and near future availability of R410A units, as well as the future availability of R22 replacement parts.

We also need to be concerned about the limited availability of R22 for repairs to existing equipment. The production of R22 is being phased out and limits have been set as to how much R22 can be manufactured. The United States Environmental Protection Agency has modeled the phase out of R22 based upon current use, current supply, and allowable production. It has included the use of refrigerant that is reclaimed and recycled from existing systems in this model. EPA has predicted that there will be sufficient Refrigerant 22 available to meet the needs of existing systems through the year 2030. What if they are wrong? What if manufacturers of R22 decide to shut down production facilities for R22 rather than maintain lines used to produce a product with a limited future? What if the EPA's estimate of the quantity of refrigerant that will be recycled is not correct? There are some refrigerant mixtures that have been brought on to the market recently that are



being sold as “drop-in,” replacements for R22. These are relatively new products and their ability to perform over the long term has not yet been proven.



Another item of concern, is the fact that R410A is actually a mixture of refrigerants, and as such, when it leaks out of the system, the components of the mixture leak out at different rates. This makes the practice of simply adding refrigerant to a system that is low on charge questionable. I have heard differing opinions on this from different manufacturers. It appears that the current safe bet is to remove the existing charge and completely recharge any system that is low on refrigerant. If the R22 substitute mixtures mentioned above become used widely, they will be subject to the removal and recharge scenario as well because they two are mixtures.

We are speaking mostly of availability issues here, and as we know from experience limited availability causes large increases in cost. We have no way of predicting where the cost of R22 and components designed for R22 will go. In the last year, we have seen the wholesale cost of R22 increase by 90%. In the early 1990's, a refrigerant known as R12 was phased out. The federal government actually taxed the refrigerant at 100% of its value and escalated the tax each year in an effort to speed up the process of changing over to other refrigerants. I have no doubt that if it appears that the supply of R22 is going to be insufficient to meet the demand, the cost of R22 will skyrocket no matter if the government chooses to levy taxes or the market availability pushes the cost.

So what can you do to soften the blow that we are going to receive as R22 is phased out? The first thing you can do is to make sure all of the HVAC equipment purchased by your company for new construction as well as replacement work utilizes R410A rather than

R22. Systems that use R22 may be less costly and more readily available in the current market, but you may be mortgaging your future by continuing to purchase R22 equipment. The second thing you can do to lessen the effect of R22 phase out on your company is to institute an aggressive, proactive replacement plan. Reducing the number of R22 units at your stores is the only way to control your future HVAC repair costs. You really don't want to be in the position of having 80% of your stores being cooled by units that are 15 years old or older in the year 2020.

Comparison of the Montreal Protocol and United States Phaseout Schedules

Montreal Protocol		United States	
Year to be Implemented	% Reduction in Consumption and Production¹, Using the Cap as a Baseline	Year to be Implemented	Implementation of HCFC Phaseout through Clean Air Act Regulations
2004	35.0%	2003	No production and no importing of HCFC-141b
2010	75.0%	2010	No production and no importing of HCFC-142b and HCFC-22, except for use in equipment manufactured before 1/1/2010 (so no production or importing for NEW equipment that uses these refrigerants)
2015 ²	90.0%	2015	No production and no importing of any HCFCs, except for use as refrigerants in equipment manufactured before 1/1/2020
2020	99.5% ³	2020	No production and no importing of HCFC-142b and HCFC-22
2030	100.0%	2030	No production and no importing of any HCFCs

¹ Adjustments to the HCFC phaseout schedule agreed at the 19th Meeting of the Parties to the Montreal Protocol, September 2007. More details about the September 2007 adjustments to the Montreal Protocol are [available here \(PDF\)](#) (4 pp, 38K, [About PDF](#)).

² The Parties agreed to address the possibilities or need for essential use exemptions, no later than 2015.

³ The Parties agreed to review in 2015 the need for the 0.5 per cent production or import for servicing during the period 2020-2030.

Bright Future for EMS:

The use of energy management systems in our industry used to be limited to big- box retailers with large electrical loads, long leases and large air conditioning units. They required miles of wiring, dedicated telephone lines, and a technical interpreter for monitoring. Some of the older systems didn't even allow you to make global changes to schedules. Many of the systems were so proprietary in nature that technicians needed special training to determine if an issue was EMS related or HVAC unit related. Simple payback estimates of 5 years were not uncommon.

This industry has undergone and is currently undergoing a complete metamorphosis. Driven by internet technology, wireless technology, and extremely sophisticated software, even the smallest location can benefit from energy management products. The industry has moved away from black boxes wired to control modules mounted in each HVAC unit, to communicating thermostats. Wiring between your HVAC unit and the new thermostat follows the same letter and color code that the industry has used for years with conventional thermostats. The thermostats are connected to each other and to a communications interface via wiring known as a communications buss. Sometimes, the communications interface isn't even required and the thermostat plugs directly into a network cable. If lighting and auxiliary loads need to be controlled, the module that controls them resides on the same buss. These devices communicate via the internet with a server. Anyone with access to a web browser and the correct login and password can now access a website on the server and perform diagnostics, view trends, and have access to change set points and schedules. Obviously, being web based, interaction is far faster than dial-up access and no telephone lines are required.

In order to perform diagnostics on a unit, the EMS system must provide the viewer with discharge air temperature and proof of air flow. In the past, this required physically running additional wiring between the HVAC unit and a module on the communication buss, or between the unit and a communicating thermostat. Obviously, running long lengths of control wiring in an operating retail store becomes extremely expensive. Today, many manufacturers have developed wireless sensors that allow this information to be communicated between sensors located at the HVAC unit and a remote mounted receiver. This has the ability to lower installation costs significantly. There are even some systems that don't require a communications buss and communicate all information using wireless technology to a communications module connected to the internet.



The bottom line here is that EMS systems have become more reliable, less costly, and easier to use. As the cost of energy increases and "Going green," becomes a necessity, almost every retail site can make use of some form of EMS and can see simple ROI's of 1.5 years or less.

Technology Systems:

Do you remember when metrics was a system of measurement that no one in the United States wanted to use? Now metrics is the way retail facility managers measure the performance of their vendors. I thought I was done getting report cards when I graduated from high school, but thanks to the forward march of technology, my company now receives report cards. The technology systems I am referring to are of course, the independent web based reporting systems that retailers are using to track and process work orders. Service Channel, Big Sky, and Officetrax seem to be the major players in the retail facilities world, and they have changed our world in many ways. Facilities managers used to spend much of their time entering data, processing invoices, and performing other non-managerial tasks because they didn't have sufficient staff. Many of the facility managers I know did not have the time to collect and analyze information; nor did they have the time to use this information to revise their strategies and programs. Technology systems are tools that allow the retail facility manager to actually manage. What I find interesting is the fact that the use of these systems only became widespread post the Enron debacle and post Sarbanes Oxley Act. Retail facilities managers needed better management tools for years, and many petitioned their management teams to fund acquiring these tools. However, funding for these systems only became a reality after upper management personally had to vouch for validation of spend and work performed..



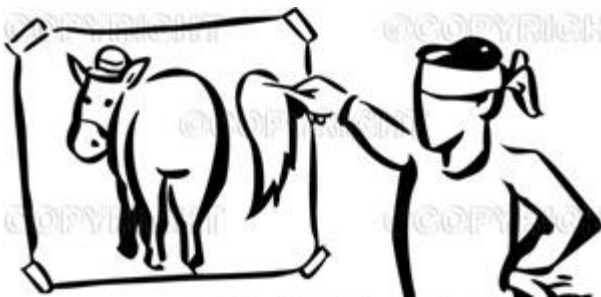
While these systems have given facility managers some excellent tools, similar to the tools of the tradesmen being managed, the tools are only useful when used properly. Like the carpenter's apprentice who misuses a circular saw and ends up cutting off a finger, it's all about judicious and appropriate use of the tool. Good management existed before the advent of technology systems and it continues to exist. Good vendors had integrity in the past and validation of work existed in the past. It just took other forms and was more difficult to provide. Technology systems are certainly a step forward, but both facility managers and vendors must learn the systems thoroughly and must apply the systems 100% of the time. Most important, these systems do not replace personal interaction or personal relationships. The store manager experiencing a major issue will never get the comfort level from a web

based dashboard that he or she gets from a concerned representative who understands the nature of the issue, promising immediate assistance.

Sourcing Facilities:

In the past retail facility managers with years of experience chose their own vendors. They may have issued requests for proposals, and perhaps their choices and methods were reviewed by Vice Presidents of operations or finance, but they pretty much were responsible for selecting the vendors they were going to work with. Pricing was always a major factor but so was proof of the ability to perform the work. Today these choices and the methods used to make these choices are largely controlled by purchasing departments. Call it “Strategic sourcing,” or “Procurement,” it’s still a purchasing function, and in some cases, all or part of the process is being outsourced. In some cases, the prospective vendor is required to participate in an RFP and then participate in a reverse auction. In other cases, it’s an RFI and then an RFP. In almost all cases, the documents request a huge amount of what most vendors consider proprietary and confidential information. One begins to wonder if the client is interested in utilizing the vendor’s services, or acquiring the company.

Some of the RFP’s and sourcing practices we have seen have been extremely professional and show that the group that produced the package knows the industry and knows exactly what they are looking for. Others seem to take the approach of let’s ask



every question we can think of, throw all the answers up against the wall, and see what sticks. It is interesting to see how many times an RFP is sent out and the retailer makes no change in its current program or vendor base. It is also interesting to see how many times the final program negotiated with RFP respondents looks nothing like the

program outlined in the RFP. I think it would be extremely helpful for vendors to observe the complete selection process from the retailer’s side. It might help us to understand the process and the reasoning behind the questions being asked.

In truth, change as described above is both good and bad. The change from R22 to R410A is bad for our pocketbooks, but good for the environment. Better and less expensive EMS systems will require an initial outlay, but in the long run they will pay for themselves and lower our energy use: also better for the environment. Technology systems provide an excellent management tool for those who are willing to use them well on both sides. Sourcing encourages vendors to think outside the box and allows purchasing managers and facility managers to learn about the business models employed by different vendors. The reoccurring theme here is that there is a definite cost associated with the learning curve required due to change and the ability of the work force to learn the required processes. One must continually compare the benefits with the costs of any change prior to committing to it.