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ALSO IN THIS ISSUE:

- Industry Partner Spotlight: Sauermann Group
- Climate Resilience: Where the Rubber Hits the Road

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Sauermann's Tyler Nelson sees High-Performance HVAC Contractors as the "Curve" breakers. Why? Read more here.

RE-INSTALLING NEW HVAC EQUIPMENT



BEFORE ...



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Making the HVAC Industry Better: *One System Renovation at a Time*



Mike Weil is editor-in-chief and director of communications and publications at National Comfort Institute, Inc. Contact him at ncilink.com/ContactMe.

I believe it needs to be said: High-Performance HVAC™ Contractors should be recognized for their excellent work. You decided to invest the time and dollars into changing your approach to help your team AND help your customers understand that their indoor comfort and health is more than buying, installing, and servicing equipment.

And that is not easy.

As an industry, we have spent decade after decade selling based on price and efficiency. Meanwhile, complaints about being uncomfortable, battling dust, and dealing with other indoor air issues went unresolved.

These problems became more severe during the energy crises of the 1970s when government mandates led to the tightening of building (and home) shells. This inadvertently reduced the amount of incoming fresh air and led to problems with indoor air quality, mold, radon, and other maladies.

Manufacturers have creatively improved equipment efficiencies over the decades and continue to do so, but consumer utility bills haven't necessarily come down as promised.

TAKING A SCIENTIFIC STANCE

The idea of testing and measuring certainly is not new. But in the HVAC Industry, it wasn't until the concept of creating high-performance systems by accounting for not just the equipment but also airflow through ductwork that the industry could truly impact comfort, health, and efficiency.

And for those contractors who saw the advantages of taking a scientific approach, they invested in learning how to measure and interpret resulting data. They invested in the training necessary to do that.

They also had to (and still have to) battle the

competitive naysayers who cry foul when they lose jobs to more expensive and competent high-performance professionals.

IT'S NOT EASY, BUT IT IS DOABLE

Over the last 30 years, these efforts have started to pay off. The concepts behind what National Comfort Institute (NCI) calls system performance are more common today across all the channels in our industry. Though not everyone is taking a system performance approach (it isn't easy, and most people prefer easy), it makes more headway every day.


In this issue of **High-Performance HVAC Today**, HVAC Contractor Dawn Mroczek proves my point with a relatively simple system renovation that fixed acute comfort issues in a new construction home. You can read more about this at ncilink.com/GVReno.

"Today, our company's (GV's Heating and Air Conditioning) duct renovation installations have taken on a life of their own through customer referrals and service technician leads," she says.

Another contractor, John Boylan of Lakeside Service, says that for his business, the processes needed to set your company up for high-performance help to make the company stronger, more efficient, and ultimately more profitable.

"Since we've started a systems approach, I am beyond proud of the reviews and feedback our team receives from clients," he says.

These are only two of thousands of HVAC contractors who walk the high-performance path. The industry must recognize the importance of this and encourage more contractors to take the first step on that path.

For those already doing it, congratulations, and thank you. For those who aren't, please consider learning more about it. 

Written for HVAC Professionals by HVAC Professionals

NCI Duct Design Tables

Sweet, simple, and on-point are the words I use to describe the **NCI Duct Design Tables**. Most technicians use untested and unverified methods when it comes to sizing ducts. Before you get angry, test and verify that the duct sizing method you use works. If it does, disregard this tool review.

But if it doesn't, check out what **National Comfort Institute (NCI)** put together years ago to improve duct sizing methods to help contractors and their customers increase safety, health, comfort, and efficiency.

The Duct Design Table customizes the .10-in. WC traditional friction rate to a real-world value of .05 for flex duct, .06 for round metal, and .07 for rectangular duct.

The applied friction rates allow maximum airflow to maintain the equipment manufacturer's rated total external static pressure. It has some wiggle room built in just in case installation limitations may require a couple of extra turns.

Using the tables can be tricky, especially if it's your first time. There are three different tables: one each for flex duct, round metal, and rectangular duct. So, be sure to use the right table. Duct sizes are listed from 5 to 20 inches for flex and round metal ducts and rectangular ducts from 4-in. x 6-in. to 42-in. x 12-in. and everything in-between. Each duct size will have a designated airflow.

When the airflow you need does not appear on the table, select the airflow greater than what is needed and add a damper during installation so you can

NCI DUCT DESIGN TABLES					
Flexible Duct			Round Metal Pipe		
Duct Size	Design Airflow		Duct Size	Design Airflow	
5"	50		5"	60	
6"	75		6"	85	
7"	110		7"	125	
8"	160		8"	180	
9"	225		9"	250	
10"	300		10"	325	
12"	480		12"	525	
14"	700		14"	770	
16"	1000		16"	1200	
18"	1300		18"	1500	
20"	1700		20"	2000	

Flex Duct = .05" Metal Duct Calculator Round Metal Duct = .06" Metal Duct Calculator

Rectangular Duct - Net inside dimension in inches											
4"	CFM	6"	CFM	8"	CFM	10"	CFM	12"	CFM	14"	CFM
6x4	80	6x6	60	6x8	90	6x10	120	6x12	150		
8x4	90	6x6	110	6x8	160	6x10	215	6x12	270		
10x4	120	8x6	160	8x8	230	8x10	310	8x12	400		
12x4	150	10x6	215	10x8	310	10x10	430	10x12	550		
14x4	180	12x6	270	12x8	400	12x10	550	12x12	680		
16x4	210	14x6	320	14x8	490	14x10	670	14x12	800		
18x4	240	16x6	375	16x8	580	16x10	800	16x12	950		
20x4	270	18x6	430	18x8	670	18x10	930	18x12	1100		
22x4	300	20x6	490	20x8	750	20x10	1050	20x12	1250		
24x4	330	22x6	540	22x8	840	22x10	1200	22x12	1400		
		24x6	600	24x8	930	24x10	1320	24x12	1600		
		26x6	650	26x8	1020	26x10	1430	26x12	1750		
		28x6	710	28x8	1100	28x10	1550	28x12	1950		
		30x6	775	30x8	1200	30x10	1670	30x12	2150		
21/2 x 10	40			32x8	1300	32x10	1800	32x12	2350		
21/2 x 14	70			34x8	1400	34x10	1930	34x12	2450		
21/2 x 30	150			36x8	1500	36x10	2060	36x12	2600		
				38x10	2200	38x12	2750				
				40x10	2350	40x12	2900				
				42x12	3050						

Rectangular Duct = .07" on Duct Calculator

Step One - Identify the volume of air that will be passing through the duct
Step Two - Select the duct size from the table that can carry that volume of air
Step Three - If desired airflow exceeds the CFM rating, increase to the next duct size
Step Four - Listed CFM is based on typical field results and may vary, install dampers
Step Five - If duct run exceeds 25' or has excessive transitions, increase to the next size
Step Six - Design alone is inadequate, always prove design by test and balance

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throttle it down if necessary.

Whether designing a new system or a small air upgrade, the NCI duct design system is the way to go. It hasn't failed me yet, and it shouldn't fail you.

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— Casey Contreras, NCI Instructor **NCI**

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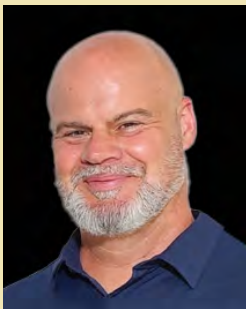
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Sauermann Group: Looking At Contractors Differently

One of the founding precepts of National Comfort Institute (NCI) is that ***If you don't measure, you're just guessing™***. As we all know, to measure correctly means not only having and using **the best measurement tools and technology** available but also understanding how to interpret the resulting data and apply it to benefit customer health, safety, system efficiency, and comfort.

Many instrument manufacturers are serving the HVAC Industry, but few seem to have taken it upon themselves to focus on the High-Performance HVAC™ segment.

One such company, Sauermann Group, Americas, has spent time and energy working closely with this subset of the industry in general, and with NCI in particular, to develop customer instruments to do combustion analysis, measure static pressures, airflow, and temperatures more accurately.



Tyler Nelson

According to Tyler Nelson, Sauermann's Americas Instrumentation and Industrial Sales Manager, "High-Performance HVAC contractors are

the **curve** breakers. They're the kids in school who always earned the "A" grades when everyone else got "C's."



The C-folks went crazy because the A-people crushed the curve," he says.

"The high-performance contractors that Sauermann caters to are the ones we elicited feedback from when designing our analyzer products. They lead the field. We chose them because they are the best contracting firms out there."

IN THE BEGINNING ...

As a company, Sauermann began life in Europe, in Belgium, to be exact. It was started in 1976 by Robert Sauermann to manufacture condensate pumps for the European marketplace. He secured a strong foothold in the HVACR wholesale market, specializing in fluid regulation components, and, according to their website, captured 80% of the market share held by the leader in just four years.

In 1985, Sauermann acquired a French-based instrumentation company called Kimo, which specialized in measurement instruments for indoor air quality (IAQ).

Eventually, Sauermann opened U.S. offices (2005), targeting the North American air conditioning industry with condensate pumps.

Nelson says, "In 2018, we purchased E Instruments, which sold a combustion analyzer line made by a

third party.

"In 2020, we ended our contract with that third-party manufacturer and, in September of 2021 we launched our own analyzer instrument line.

"Those instruments are designed and manufactured by Sauermann using our engineering expertise," he adds.

THE HVAC CONTRACTOR PERSPECTIVE

Nelson, who joined the Sauermann Group in August of 2019, had been in the HVAC contracting industry since 1997. He says he started on the technician side of things and, over the years, worked his way into management for a contracting firm based in New Jersey.

During his tenure with that contracting firm, Nelson earned his Master's in HVACR certification, became a NATE and a BPI instructor.

Nelson also served as president of the North Jersey Air Conditioning Contractors of America (ACCA) chapter for two years.

Today, he is a member of the National Carbon Monoxide Awareness Association (NCOAA), serving as a spokesperson to the media regarding CO poisoning.

"I'm also a carbon monoxide instructor," he adds.

His background, however, wasn't originally in HVAC. He was a college-educated finance/economics person whose skills lay in analytics.

"I was wooed into the HVAC business by a recruiter, so I changed careers and began working in the contracting business," he explains. "During these years, I began hearing about the idea of high-performance contracting and the company teaching it, National Comfort Institute (NCI).

"At that point, we hadn't sent any of our technicians to an NCI class but were told by several different distributors to consider taking training by these guys. Those distributors told me that NCI was one of the best training entities in this country and in the world. As it turns out, they were right.

"But it took me changing careers to discover it. "

MAKING MORE MOVES

Nelson says that toward the end of his tenure in contracting, he was approached by different manufacturers to work for them.

"At first, I didn't pay much attention to it, but working six, sometimes seven days a week became arduous over time, and I came to a point where it was time to make a switch. It was time to listen to these offers, and that's when the Sauermann name came up."

The rest, as they say, is history.

While learning the ropes and Sauermann's product line, Nelson says he became very interested in how NCI training might help his customers. It wasn't until Sauermann launched its new analyzer product line after ending its relationship with the third-party manufacturer that he says he reached out to NCI.



One reason for the partnership between NCI and Sauermann is the fact that Sauermann listened to what High-Performance HVAC™ Contractors needed and built an instrument that provided it. Pictured here is the co-branded NCI Si-CA 030 Combustion Analyzer.

"I met Dominick Guarino at the HARDI conference in December of 2021. Dom talked about how NCI used tools in their training and was interested in testing our analyzer. At that time, they used instruments produced by two different manufacturers, and I thought it would be amazing if they tried Sauermann products as well."

Unfortunately, COVID-19 swept the planet, and things were put on hold. Eventually, Nelson says he met with NCI's vice president of training, David Richardson, to review the analyzer's features and discuss its benefits. Then, they shipped him a few to test.

Apparently, Nelson says that after receiving the instruments, the NCI team really "kicked the daylights" out of the analyzer, then had one of their High-Performance HVAC contractors test them.

NCI-SAUERMANN PARTNERSHIP

Several months later, Dominick and David got back to him and said they were interested in the analyzer but had one or two suggestions for making the instrument fit better with NCI protocols.

"The major ask was for a separate draft probe that could test draft and combustion simultaneously," Nelson says. "The thing is, we already had such probes. We just never thought to share them. So it all worked out fabulously.

"We then shipped them seven analyzers **and** probes. We created a customized kit with the NCI logo for sale through [TruTech Tools](#)."

The two kits are the [residential NCI Si-CA 030](#) and the [commercial NCI Si-CA 130](#) combustion analyzers, including an O₂, CO, Flue gas, and draft probe for High-Performance HVAC contractors. The CO monitor that comes with these kits includes a wireless connection to Sauermann's smartphone app and can generate service reports and certificates based on the measurements.

"We have a saying at Sauermann, an ethos if you will, that our products are designed by technicians for technicians. These two kits are an example of just that," Nelson continues.

"We elicit feedback from the industry as we develop different products. Sauermann has some products similar to those of other manufacturers,



but we also have instruments with features and benefits that stand alone and are in a class by themselves.

“For example,” he continues, “NCI uses our analyzers because of their robust feature set. That feature set came from asking contractors what they needed and wanted. And we got an exhaustive list from them!

“The good news is that we delivered everything the contractors requested. That is our mindset. We learned through the years that you win if you really listen to what your customers tell you, document it, and then design those features and attributes into what you are making.

“With regard to high-performance contractors, we find they are the companies with the soundest business practices, who look at buildings as individual ecosystems and seek answers to questions on how heating and air conditioning equipment will play in those ecosystems,” Nelson continues.

“They focus on how air quality and airflow should play nicely together in the sandbox.

“From my perspective, these contractors are the ones who care about doing the best job for their customers,” Nelson adds.

“The team here at Sauermann loves this approach. It’s the same reason we’ve teamed up with [MeasureQuick](#). We’re the only analyzer on the MeasureQuick platform right now. We can cast a wider net because technicians using MeasureQuick typically work for High-Performance HVAC contractors. They go through an entire system performance evaluation from soup to nuts.

“They then make recommendations based on their results. They want to do

the best job; they feel any other way is just a race to the bottom. At Sauermann, we want a rising tide to raise all boats. We want that level of craftsmanship to raise all the levels of all the contractors around them. If not, they will be left behind. Everybody needs to perform.”


LOOKING AT THINGS DIFFERENTLY

Nelson says that he believes being in an industry partnership with NCI has made the team at Sauermann look at things differently. He cites a quote originally credited to the late Wayne Dyer, an American self-help author and motivational speaker. The quote is, “***When you change how you look at things, the things you look at change.***”

“That is what our partnership with NCI is like,” he continues. “It changed how we looked at our products to consider whether a new feature would benefit NCI and their high-performance contractors. We also consider whether NCI trainers can train using that product.

“From my standpoint, when our tools resonated with NCI, it reaffirmed our efforts. That gave us more enthusiasm to create the next product. It gave us more impetus to improve the product because we realized we did something approved by the most critical of eyes.”

Furthermore, he says that Sauermann’s overseas partners also recognize the importance of this relationship with National Comfort Institute.

“There are no organizations like NCI in Europe. They want our guidance based on what we learn from NCI and NCI-trained contractors.” 

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Making a Real Difference with High-Performance HVAC Renovations

My dad started GVs Heating and Cooling in 1990 before I was born. You can say I was raised in the HVAC industry. As a child, I asked him to take me to work every year on Take-Your-Daughter-To-Work Day.

So, it was no surprise that in 2006, I decided to join the family business, doing odd jobs around the office, and eventually, somewhat reluctantly, took sales training at the recommendation of our Trane territory manager.

TRAINING CHANGED EVERYTHING

That changed everything for me.

Fast forward to 2017, when I earned my first certification from the National Comfort Institute



Diagnostics testing includes taking static pressure and temperature drop measurements, among several other tests.

(NCI) [Commercial Air Balancing](#) class with Scott Fielder. To this day, I haven't looked back. This class changed my perspective on implementing a High-Performance HVAC approach to contracting.

The result is that GVs Duct Renovation Installations have taken on a life of their own over the last few years through customer referrals and service technician leads.

The best part about being a Comfort Specialist is evaluating a client's comfort system and collecting the data. I don't only do furnace or air conditioner equipment changeouts. Frankly, that got a little too boring.

The high-performance approach makes my job fun because I get to solve problems no other contractor can solve!

Recently, I had the privilege of presenting an educational seminar with NCI's Dominick Guarino at the AHR Expo in Chicago.

During our presentation, titled "**Why and How to Sell High-Performance HVAC**," we discussed three types of sales calls:

- Traditional Replacement Leads
- Service-Generated Call Turnovers
- Homeowners Seeking Solutions.

FINDING REAL SOLUTIONS IS MY FAVORITE SALES CALL

During that session, we asked the audience which type of sales call was their favorite. For me, hands down, my favorite is the last one — working with homeowners seeking solutions.

Over the last few years, I've received multiple leads for homeowners who newly renovated their homes or built a brand-new home that had comfort issues. They were irritated with hot and cold rooms, furnace/air conditioners not running

RE-INSTALLING NEW HVAC EQUIPMENT

efficiently, furnaces not running safely, and high utility bills.

Imagine how frustrating this would be, especially if the problems happened in a brand-new house!! In one case, the customer gave up on the installing contractor and just wanted a solution.

CASE STUDY: THE SILVER HOME

This client, The Silver family, lived in their newly constructed home for about six months before experiencing extreme room temperature differences on the second floor. This home had two systems: a basement furnace (provided heat for the basement and first floor) and a furnace located in an attic to condition the second floor.

Mr. Silver provided a tour of the second floor, pointing out that the storage room and kid's playroom were extremely cold during winter. I will never forget how, after pulling down the attic access ladder, I was hit with a breeze that blew my hair like a fan was blowing on it! I was so excited to dive deep into evaluating this system.

So, where do you start? Using my High-Performance HVAC™ training, I always evaluate homes from scratch, testing and measuring to collect all the data necessary to provide a solution.

This from-scratch evaluation means performing a Manual J room-by-room load calculation, measuring static pressure and temperature rise, and taking supply temperatures in each register.



BEFORE ...



... AFTER

I also measure return temperatures at each return grille, measure all ductwork, and count how many supplies and returns are in each room.

This process also includes measuring airflow and evaluating blower wheel conditions and speeds. Performing these diagnostic tests takes about two to three hours, depending on the extent of the diagnostics. While doing these tests, I always try to include the homeowner and then teach them what our measurements mean. This can be very eye-opening for them.

I collect all the data, take pictures and videos of the furnace and ductwork, then start the evaluation.

OUR FINDINGS

When evaluating Mr. Silver's furnace, I saw the system going off on limit, which made me immediately think this was why the system wasn't heating some of the rooms in the home.

The Silver furnace was installed upright in a "room" in the attic. The height of the supply plenum off the

evaporator coil was only seven inches high! How could the air remove the heat from the heat exchanger?

It couldn't!

I measured a 148°F supply temperature and a 79°F return temperature (69°F Delta T). This furnace was rated for 35-65°F.

The return trunk was "slapped" to the side of the furnace with a filter that was wide open to the attic, along with a bypass humidifier on the return trunk. The system was performing within the static pressure range, but after further inspection, I also found duct leakage as a culprit. That clarified why my hair was moving after opening the attic access.

After collecting all the data, measurements, pictures, and videos, it was time to assemble a solution.

How do you educate your client and present your solution? During the day of the evaluation, there is a lot of information for the client to absorb. At GV's Heating & Cooling, we put together a [Performance Report](#). In



Test-In and Test Out Report

this report, we number each issue and include a corresponding remark and pictures.

For the Silver Residence, we discovered the following seven issues:

1. Supply Plenum was restricting airflow
2. Return Air Drop was restrictive, and the filter was open to the attic
3. The Evaporator Coil was only an up-flow coil
4. The Supply Trunk was undersized for the east side of the house (Master/Storage room and playroom)
5. A dirty Blower Wheel
6. The furnace was short cycling, going off on limit due to low airflow, restrictive supply/return, and bypass humidifier on return
7. Smelled gas – found numerous gas leaks by the furnace.

Along with this report, I also attach a “Test In” Visual Report from **ComfortMaxx™**. ComfortMaxx is a third-party software-based system

verification test. Using this software, I found that the Silver residence had the following:

- 66% **Heating Equipment Performance Score**
- 65% **Heating System Performance Score.**

This system required a fan airflow of 1,200 CFM, but I measured only 658 CFM. This brand-new system only performed at 55% of the required fan airflow.

GV'S SOLUTION PROPOSAL

How many times do we go into a home and have tunnel vision? We only see what is in front of us. I want to give a shout-out to NCI's John Puryear, who, during a class he was teaching, mentioned that just because you see a furnace in an up-flow position, it does not mean it has to stay that way. He said, “We have to go into these homes and open our vision to a new perspective.”

In this situation, I did just that at the Silver's home.

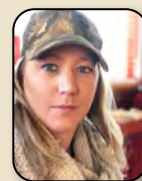
The furnace “room” was only 7 feet wide x 7 feet deep x 5 feet 2 inches high. To make this system work efficiently, I knew the way it was installed was not working. In this case, there was more room horizontally than vertically.

We needed to uninstall the furnace, evaporator coil, and ductwork in the utility room. The good news was that Silver's furnace and air conditioner were sized correctly. The only piece of equipment GVS had to replace was the evaporator coil because it could not be installed horizontally.

By re-installing the furnace in a horizontal position, adding a new supply plenum, increasing the supply trunk to the east side of the home (main suite, storage room, and playroom), adding a properly sized return duct, installing a new automatic humidifier, sealed filter cabinet, and sealing all the ductwork, we drastically increased this system efficiency.

The ComfortMaxx “Test Out” scored a Heating Equipment Performance Score of 100% and a Heating System Performance Score of 93%. The system was now delivering 1,139 CFM!

Plus, our solution eliminated the excess attic pressure. We no longer have blowing hair! **NCI**



Dawn Mroczek is the comfort specialist at GV's Heating & Cooling in Buffalo Grove, IL. In 2007, she moved into the sales position. She is certified in Commercial Air Balancing, Duct System

Optimization, and was recognized as one of the 'Wonderful Women in HVAC Sales' with Sharon Roberts. She is also the 2020 recipient of NCI's High-Performance Sales Excellence Award. You can reach out to her with questions at ncilink.com/ContactMe.

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Climate Resilient HVAC: *Where the Rubber Meets the Road*

Have you noticed that the frequency and significance of weather-related disasters seem to be increasing year after year? Scientists have linked this trend to human-caused climate change. Global average temperatures are increasing, and sea levels are rising, which can shift weather patterns and intensify droughts, wildfires, floods, hurricanes, and even winter storms.

Another term – global warming – implies that it's mostly higher temperatures that we need to worry about. Still, paradoxically, the shift in the climate can lead to extreme cold temperatures in areas where that's not usually an issue.

fossil fuel usage, both on the energy supply and the demand side of the equation.

According to the [Rewiring America website](#), there are \$369 billion in tax credits and incentives available in the U.S. These credits alleviate the costs of replacing gas and oil furnaces and boilers with electric heat pumps, to replace gas water heaters with heat pump water heaters, install solar panels, and otherwise “electrify everything.”

Granted, it's an idea that has its [detractors](#), but electrification is taking hold and will change how we do business in the heating and air conditioning industry.







A similar push during the 1970s energy crisis helped initially propel heat pumps to popularity. But the heat pumps of yesterday were less efficient and weren't up to the task of heating in climates with colder winters. Their adoption was mostly limited to warmer-weather areas with lower electric rates. Texas and Florida come to mind, for example. As oil prices regulated, the focus on heat pumps waned, and gas furnaces remained the go-to heat source for most Americans.

Fortunately, the renewed effort to promote efficient electric heating coincides with decades of improvement to heat pump technology. Modern heat pumps are around 60% more efficient than in the 1970s, and some cold-climate heat pumps can be effective down to below-zero temperatures.

These technological improvements mean heat pumps **are** a viable option in many more regions than they were back then. Combine these with the public funding and marketing push to electrify homes, and we find ourselves in the beginning stages of a heat pump revolution. If you're not seeing increased interest in heat pumps in your area yet, odds are you will soon.

While this is great news for our environment,

Climate Resilient HVAC Goals

-  Dramatically reduce emissions relative to fossil fuel heat
-  Limit negative impacts on electricity grid reliability
-  Minimize high utility bills
-  Handle more frequent extreme weather
-  Provide essential services in a power outage
-  Provide clean indoor air and prevent moisture issues

The devastating [Texas winter storm in 2021](#) is a prime example of this paradox. Regardless of the cause of these obvious changes, it's up to us to figure out what to do about it.

In an endeavor to slow climate change, significant public investments are being made to reduce

being aware of potential downsides and risks is essential. The very attribute that makes heat pumps a more climate-friendly solution – they run on electricity – also leaves them vulnerable to power outages and high electricity prices.

As discussed earlier, power outages are often caused by extreme weather events, which are becoming more common. They can also be impacted by grid capacity and load-balancing issues. These issues could become more common as we collectively work to electrify vehicles, homes, and businesses simultaneously.

Adding loads to the grid will likely require significant investment into grid infrastructure to minimize capacity and load balancing issues, potentially driving up costs for electricity just as we become increasingly reliant on it.

When outages coincide with extreme weather events such as a freak winter storm, buildings, and lives can be put at risk.

As more of our customers look to adopt heat pumps, our job as HVAC experts is to advise on these risks and offer solutions to help keep customers safe, healthy, and comfortable. All this leads to a clarified concept of what makes a great HVAC system – enter **Climate-Resilient HVAC**.

Climate-resilient HVAC systems do more than work okay most of the time – a lot more. Consider these goals of a great HVAC system that is ready to handle any demands thrown at it, now and into the future:

1. Dramatically reduce pollution and carbon emissions relative to fossil fuel heating.

This is the big reason behind the



push for heat pumps and electrification, but contrary to political talking points and marketing campaigns, achieving the reductions needed requires more than just simple “box swaps.”

A heat pump that isn’t thoughtfully selected and skillfully installed will likely not perform near its rated efficiency. Carbon reductions can evaporate depending on how “clean” the electricity supply is. It’s up to skilled contractors to ensure the heat pump efficiently delivers what it can deliver.

2. Limit increasing and more unpredictable demand on the electric grid.

Replacing furnaces with heat pumps increases demand on the grid. Electrification may lead to new wintertime peak periods in some areas where they were never considered.

Overusing electric heat strips for backup or supplemental heat could exacerbate periods of high demand, increasing prices or even causing blackouts. We must achieve high-performing heat pump installations and

carefully consider equipment sizing and alternatives for any required backup or supplemental heat.

In cold and very cold climates, it makes sense to **consider dual-fuel systems** that use a furnace when temperatures fall below the point where heat pumps can keep up.

3. Minimize high utility bills.

This is the customer side of the two previous goals. A well-selected and installed heat pump, with thought put into backup or supplemental heat, minimizes the potential for high electric bills.

Selecting a cold climate model for areas where temperatures regularly reach 30 degrees or lower reduces the cost of running expensive heat strips.

Better yet, dual-fuel setups usually provide the cheapest heat when temperatures are frigid. They provide some insurance if electric rates increase to cover necessary grid system upgrades.

The same demand response controls discussed above help with grid stability and help customers optimize when

and for how long heat pumps run. This can limit the impact of high peak electricity rates on utility bills.

In the future, it may be possible for systems to dynamically select from electric or gas heat based on operating efficiency and rates at any given time.

4. Handle the potential for more frequent and extreme weather events.

Climate change doesn't just bring higher average temperatures. It also contributes to higher precipitation and less predictable global weather patterns. This could place demands on systems that exceed today's design values for high and low temperatures and high humidity.

With that said, I don't advocate excessive oversizing to accommodate these changes. Instead, I prefer performing careful load calculations and evaluating different systems to see how they may handle temperatures that are a bit higher or lower than the design.

Many modern inverter systems can operate above their maximum rated capacity when called to do so.

Higher temperatures and sea levels also mean more atmospheric moisture and higher dehumidification loads in some areas.

After a big rainstorm or hurricane, elevated humidity could cause mold or bacterial growth. Consider adding dedicated dehumidification in places where it gets sticky outside.

5. Provide essential services in an extended grid outage event.

Whether the power goes out due to excessive grid demand, a weather-related issue, or some other reason, it's never fun to suffer without heating or air conditioning for long periods.

If a power outage coincides with a winter storm or extreme cold snap, failing to plan for backup heat properly can become hazardous or even life-threatening.

For all-electric systems, backup generation needs to be appropriately sized to handle not just the running load of the heat pump (plus any other connected loads), but also the starting load, which can be several times higher than the running load.

Inverter units or the addition of a soft start can significantly reduce generator capacity requirements. Always use inverters if a customer plans to run the system on a generator or battery backup.

Dual-fuel systems dramatically reduce backup power requirements – all that's needed is a small portable generator to run the furnace blower and controls.

6. Provide clean indoor air and prevent biological growth due to excess humidity.

With the potential for higher and more frequent high-humidity days comes an increased risk for mold and bacteria to take over a home. That means you must seriously consider the impact of dehumidification loads.

Doing an "extra" load calculation for peak dehumidification loads is prudent. Climate change also increases the occurrence and severity of wildfires, bringing smoky and unhealthy air.

Where wildfires are a concern, MERV-13 or higher filtration can keep indoor air from reaching unhealthy

Examples of Climate Resilient HVAC Systems

ALL ELECTRIC	HYBRID	ECONOMY HYBRID
<ul style="list-style-type: none"> • Variable capacity heat pump • Demand-response thermostat and controls with pre-conditioning and coasting capability • Large solar array + batteries, whole home generator, large portable generator 	<ul style="list-style-type: none"> • Dual fuel heat pump with furnace • Demand-response thermostat and controls with pre-conditioning and coasting, and fuel switching capabilities • Small dedicated generator 	<ul style="list-style-type: none"> • Code minimum heat pump • Wood stove or gas fireplace for emergency backup

particulate levels and protect occupants from long-term health issues.

Don't forget to assess the pressure drop from higher MERV filters when selecting equipment and scoping duct upgrades.

THE NEW GOLD STANDARD

Modern heat pumps hold a ton of potential for helping to reduce emissions from burning fossil fuels. However, this widespread shift to electric heating coincides with many challenges, from weird weather to possible grid instability. In this environment, broadening design considerations and installation practices to meet the above goals protects your customers, your reputation as a high-performance contractor, and even society.

Climate-resilient HVAC will become the new gold standard in High-Performance HVAC contracting in a world that will continue to warm and change for the foreseeable future. **NCI**



Ben Lipscomb, P.E. has more than 16 years of experience in the HVAC industry, including laboratory and field research, Design/Build contracting, and utility energy efficiency program design. He is National Comfort

Institute's director of engineering and utility programs and may be contacted at ncilink.com/ContactMe.



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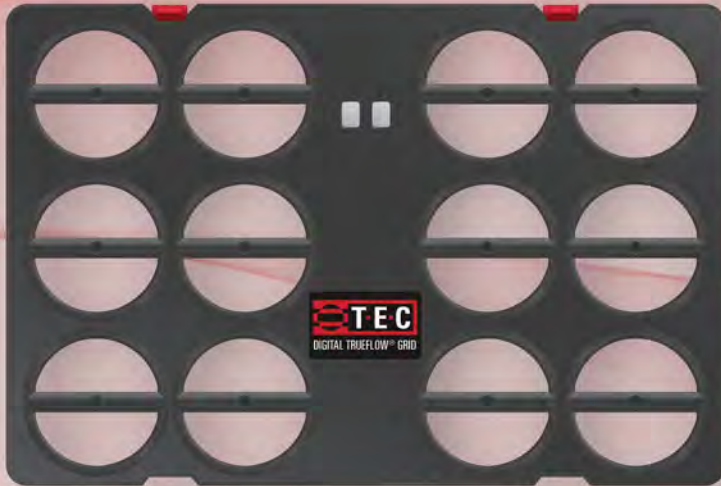
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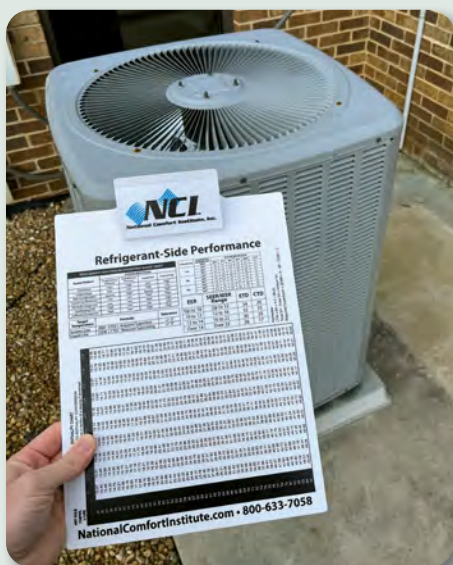


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NCI Introduces New Refrigeration Clipboard

National Comfort Institute's (NCI) **Refrigerant-Side Performance clipboard** has 10 different tables and charts printed on it to help you complete refrigerant-side troubleshooting and diagnostics. The two-sided clipboard has the essential information so it is always at hand.



It includes the following reference charts and tables:

- Wet Bulb to Enthalpy Conversion
- Refrigerant-Side Troubleshooting Quick Chart
- Target Enthalpy Change Table
- Target Refrigerant Line Temperature Table
- NCI Generic .30 in. of WC Constant Speed Fan Table
- NCI Generic .50 in. of WC Constant Speed Fan Table
- NCI Generic .80 in. of WC Variable Speed Fan Table
- Residential Equipment Nomenclature
- NCI Generic Heat Pump Performance
- NCI Generic Cooling Capacities Table.

The clipboard is made of high impact plastic and all the tables and charts are

silk-screened right onto the board. They are clear and easy to read. The four-inch clip has great gripping strength so your papers won't blow away.

Order your Refrigerant-Side Performance clipboards today. Call **800-633-7058** and talk to your NCI customer care representative.

Videos and Podcasts with Your NCI Team

The National Comfort Institute (NCI) is hitting cyberspace across the HVAC Industry via podcast interviews and video recorded panel discussions. In the last two months they have addressed everything from attracting new people into the industry to the latest technologies that will impact the High-Performance HVAC approach to HVAC contracting.

In January, NCI CEO **Dominick Guarino** provided the high performance viewpoint on a streaming panel discussion of industry experts during the annual **AHR Exposition** in Chicago.



The panel included Guarino, and also **Talbot Gee** of **HARDI**, **Ginger Scoggins** of **ASHRAE**, **Greg Walker** of **ASHB**, **Steve Yurek** of **AHRI**, and **Bryan Orr** of **HVAC School** and **Kalos Services**.

Check out this lively debate and discussion on the state of today's market — the challenges and opportunities it presents and what lies ahead. Go to vimeo.com/910000787 and watch the entire discussion today.

You can also listen to Dominick moderate another panel of experts who discuss **HVAC Industry Workforce Development** in this additional AHR Expo video.



Participants included representatives from industry training institutions, contractors, and manufacturers who shared their views on how this industry needs to build its workforce up to meet current and future needs.

Check out the stream of this discussion at vimeo.com/910005758.

NCI also participated as facilitators and moderators during a number of training sessions at AHR Expo. If you missed them, no worries: just go to ncilink.com/AHRppts and check out the PowerPoint presentations today.


Additionally, if you want to listen to three experts discuss the opportunities and challenges facing plumbing and HVAC contractors in 2024 and beyond, check out this video from the **5th Annual HVACR Symposium**: ncilink.com/BORrVid.




Watch Bryan Orr of Kalos Services and HVAC School interview **Dominick Guarino** of NCI and **Richard Trethewey** from "This Old House."

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HVACR Symposium Knocks it Out of the Park!



Dominick Guarino is publisher of *High-Performance HVAC Today* magazine and President & CEO of National Comfort Institute, Inc. He can be reached at ncilink.com/ContactMe.

I recently returned from a great conference attended by HVAC and home performance professionals. It is called the **HVACR Training Symposium**. This forward-thinking event brought together contractors, technicians, and other professionals to learn and share.

Their event covers fundamentals and advanced design and diagnostics aimed at helping to create a higher level of indoor comfort and performance.

The Symposium, now in its fifth year, which took place last month in Clermont, Florida, has often been referred to as an HVAC practitioner Woodstock. If you're too young to know what Woodstock was, you may want to Google it!

This great meeting featured indoor and outdoor sessions in Kalos Services' warehouses, and under tents. Topics included HVAC design, the interactions between a home and its comfort system, carbon monoxide and combustion, airflow, refrigeration, heat pump technology, indoor air quality, building science, and so much more.

TWO SIDES OF THE SAME COIN

A number of us from NCI presented sessions and participated in panel discussions. What struck me the most about the event was the similar intensity and passion of the contractors and professionals who attend NCI's **High-Performance HVAC Summit**.

While the two conferences are structured very differently, with Summit focusing more on execution of NCI-specific approaches, these events share the same goal: to raise the bar for our industry. In many ways the two meetings can be likened to two different sides of the same coin.

As a 30+ year veteran of the HVAC industry, it's exciting to witness this. Like Summit, the Symposium is based on education, and looking forward to where we are going and where we need to be.

This is not to take away from other industry association meetings and best-practice events. What's different about the participants is they are not necessarily part of a formal group or association, rather they are a bunch of folks from all walks of life who want to be together and learn from one another at a deep technical level.

CHECK OUT SYMPOSIUM

If you aren't already familiar, I encourage you to learn more about Symposium. Here is a link to the website, where you can also get access to a virtual version of the workshops and sessions: ncilink.com/5thAnnualSymposium.

By the way, you'll also see information on HVAC School on this site, which was created by founder, Bryan Orr, president of Kalos Services. The free website contains hundreds of lessons, podcasts, webinar-like sessions, and more.

SEE YOU AT SUMMIT!

These types of educational events, podcasts, and websites are exactly what our industry needs to grow and move forward together.

NCI's Summit, which is now in its 21st year, is where like-minded High-Performance HVAC™ contractors meet to learn and share their challenges and successes.

In case you are wondering, Summit 2024 registration is open. It takes place from September 10-13 in Asheville, SC. We are putting the finishing touches on the Agenda and Schedule which will soon be available at GoToSummit.com. But don't wait, register today to secure your spot in what is shaping up to be our best Summit ever!

Congratulations to Bryan Orr and his team for a job well done this year. Our industry needs more leaders like you! NCI

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PUBLIC LIVE TRAINING

Commercial Air Balancing Certification Program

March 5-7: Union City, GA
March 12-14: Glen Burnie, MD
March 12-14: Waterbury, CT

Airflow Testing & Diagnostics

March 12: Lewisville, TX
March 19: Austin, TX
March 19: Mentor, OH
April 2: Pittsburgh, PA
April 2: Roswell, GA
April 9: Denver, CO
April 9: Hartford, CT
April 9: Houston, TX
April 9: Landover, MD
April 16: Charlotte, NC
April 17: Raleigh, NC
April 30: Louisville, KY

Combustion Performance and Carbon Monoxide Safety Certification Program

March 12-14: Centennial, CO
March 12-14: Monroeville, PA
March 19-21: Utica, NY

Residential HVAC System Performance and Air Balancing Certification Bundle

March 26-28: Tampa, FL
March 26-28: Troy, MI
April 2-4: Salt Lake City, UT
April 16-18: Lewisville, TX
April 16-18: Kissimmee, FL

PUBLIC LIVE TRAINING (cont.)

Duct System Optimization Certification Program

March 13-14: Lewisville, TX
March 20-21: Mentor, OH
April 3-4: Pittsburgh, PA
April 3-4: Roswell, GA
April 10-11: Denver, CO
April 10-11: Hartford, CT
April 10-11: Houston, TX
April 10-11: Landover, MD

Refrigerant-Side Performance Training Program

March 20-21: Austin, TX

Duct System Optimization and Residential Air Balancing Certification Program

March 26-28: Richmond, VA
April 2-4: Grand Rapids, MI
April 16-18: Austin, TX
April 16-18: Utica, NY

Commercial System Performance

April 23-24: Livonia, MI

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April 16-17: Anaheim, CA

Refrigerant-Side Performance Training Program

April 24-25: Tulare, CA

**TECH CLEAN CALIFORNIA TRAINING ncilink.com/TECHCleanCA

High-Performance HVAC Design and Redesign for Electrification

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March 26-28: Anaheim, CA

Airflow Testing & Diagnostics

March 19: Anaheim, CA

Refrigerant-Side Performance

March 20-21: Anaheim, CA

Residential HVAC System Performance and Electrification

April 2-4: Hayward, CA
April 30 - May 2: Anaheim, CA

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Visit **NCIlink.com/ClassSchedule** to view the latest schedule.