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BOA
Building Operators Association of Canada

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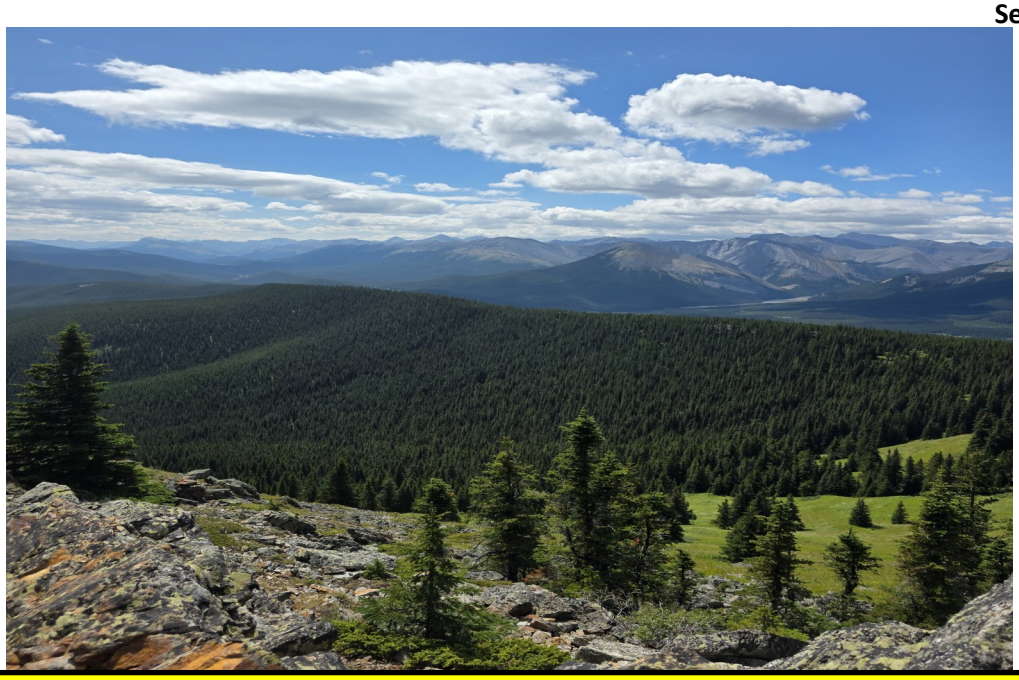
September 2025



Thorncliffe Greenview

Community Association

5600 Centre Street N at 5pm

What's Inside?

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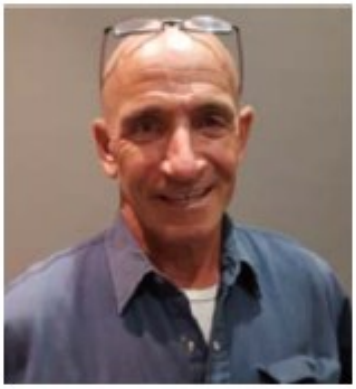
Important Phone Numbers

Emergency	911
Alberta Boiler Safety Association	403 291 7070
Alberta Labour (Emergency)	403 297 2222
Buried Utility Locations	1 800 242 3447
City Of Calgary (All Departments)	311
Dangerous Goods Incidents	1 800 272 9600
Environmental Emergency	1 800 222 6514
Poison Centre	403 670 1414
Weather Information (24hr)	403 299 7878

President's Message

I hope this message finds you & yours well and in good health



We are beginning the new year with some changes. The Danish Canadian Club has closed its doors, and we were left to find another place to hold our meetings. Mark Arton has found a potential new location at the:
Thorncliffe Greenview Community Association 5600 Centre Street North

The meeting dates and times will remain the same: second Tuesday of each month from 5-7 PM There is plenty of parking available and the meeting rooms are spacious and bright. Mark has not yet firmed up a guest speaker, but I know it will be informative and relevant for Building Operators.

It has been a challenge this past year for the Association. The magazine has been successful, but we just need to get you to attend the meetings. The guest speakers are awesome and the Q&A sessions after are as well; presenting an opportunity to have your questions answered by an expert in their field. If you know of a subject matter expert that supports the Building Operators and would be willing to present at an Association meeting. Drop Mark Arton a line to chairman@boacalgary.com.

Invoices will be sent out shortly to members. Please process these as the funds are necessary to continue holding meetings and producing the magazine.

PanGlobal, the past publishers of the Power Engineering Material have shut their doors and are no longer producing or updating the Building Operator books for the 5th Class certificate of competency. I was at a recent conference and the information that was given is that within a year, the owners of the material: SAIT, NAIT and BCIT will put all materials online to be able to download, at no cost, but there will be no updating of the material by the owners. What that means to the industry is the need to develop a course that is acceptable to the regulators. This is no small or inexpensive task. I will keep you informed as it develops.
Warm regards,

Les Anderson
BOA Calgary President

BOA
Building Operators Association of Canada

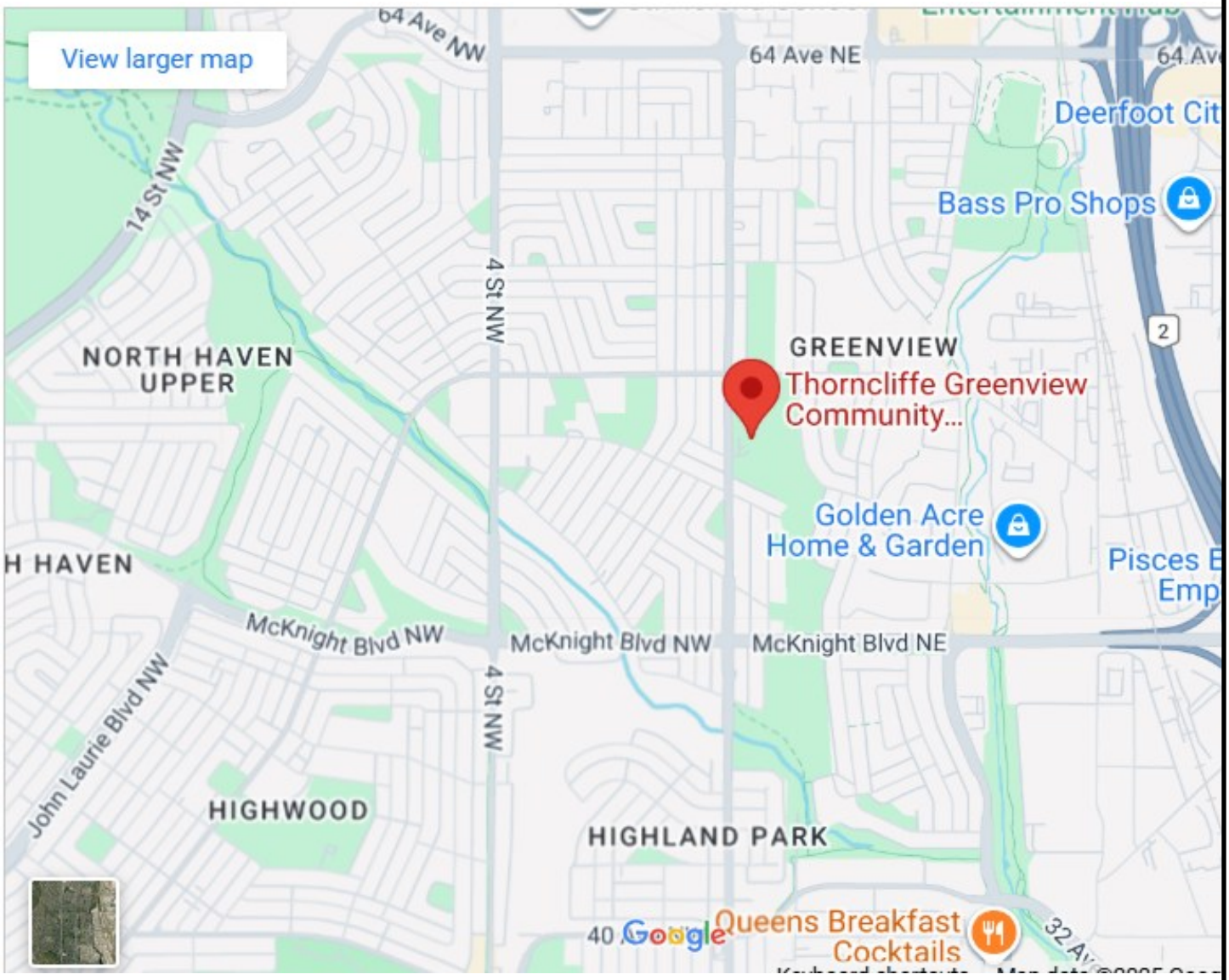
Join us at our Monthly Meeting on Tuesday

September 9th, 2025

at our new location:

Thorncliffe Greenview Community

5600 Centre St N, Calgary, AB T2K 0T3



Meeting starts at 5pm to 7pm
Free Parking

TEST YOUR OPERATOR IQ!

Are you equally adept at troubleshooting problems in the boardroom and the boiler room? As the resident facility guru, there's a lot riding on whether or not you know the difference between sounds control and a sound investment.

Try our monthly Operator IQ challenge...*answers on page 31*

1) A boiler which is built ready for installation is the:
a. Scotch marine boiler
b. firebox boiler
c. HRT boiler
d. packaged boiler
e. locomotive boiler

2) A boiler, which utilized a waterleg and was primarily used for heating purposes was the:
a. HRT boiler
b. locomotive boiler
c. firebox boiler
d. Scotch boiler
e. marine boiler

3) A boiler which will start and stop without human help once a startup is initiated is termed:
a. semi-automatic
b. self-regulating
c. automatic
d. modulating controlled unit
e. packaged

4) A corrugated furnace will give required strength with thinner metal, increase heating surface, and:
a. increase the boiler mass
b. add to the overall material cost of the unit
c. decrease combustion turbulence
d. will necessitate the boiler being made longer
e. allow for differential expansion and contraction

5) A hot water boiler is protected from over pressure by a/an:
a. safety pop valve
b. high limit pressure control
c. expansion valve
d. air release valve
e. safety relief valve

Caught in the Current: What Every Building Operator Must Do When Facing an Electrical Hazard.

Juan Carlos LaGuardia Merchán

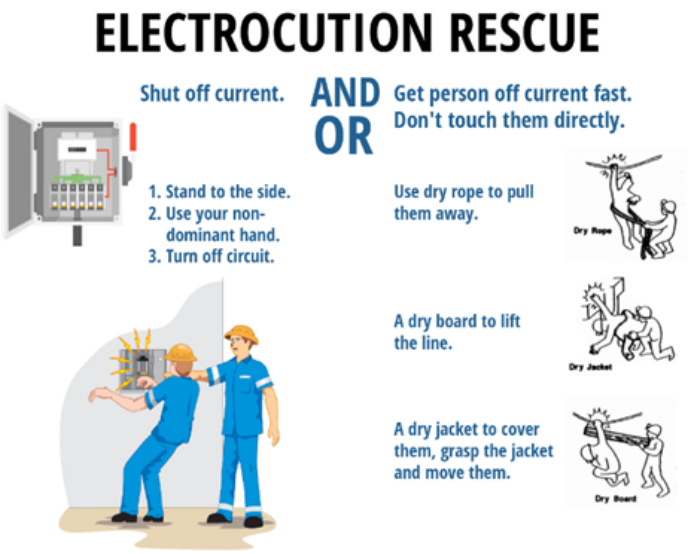
In the world of facilities management, few emergencies demand more immediate attention or come with greater risk than electrical hazards. One wrong move can mean injury, fire, or even fatality. Yet, too many building operators are caught off guard when a real threat emerges. Do you know what to do when the lights flicker, the circuit hums, or the acrid smell of burning insulation hits your nostrils? This isn't theory, it's your responsibility.

This article explores how seasoned professionals handle electrical emergencies and how you can be just as prepared, calm, and effective when it matters most.

A Real-World Wake-Up Call

Two years ago, in a research facility in central Manchester, a minor water leak from a rooftop chiller found its way into an electrical panel via a ceiling conduit. It happened overnight.

By morning, a facilities technician inspecting a temperature anomaly heard a faint crackling noise behind the panel and saw a slight wisp of smoke. He didn't panic. Instead, he followed protocol: isolated the panel, triggered the emergency shutdown, alerted the electrical response team, and evacuated the floor.



The potential disaster was neutralised in under 15 minutes. No fire. No injuries. Minimal downtime.

His quick action came not from luck, but training.

How to Handle an Electrical Hazard – Step by Step

1. Remain Calm and Assess the Risk. Do not rush in. Stay calm. Ask yourself: Is this an active arc? Is there smoke, heat, or sound? Do not touch anything that may be energised. Visual and auditory cues are often the first sign that something is wrong.

2. Isolate the Area Immediately. Keep people away. Secure the zone. Use signage or barriers. Preventing exposure to others is a top priority.

3. Shut Off the Power – If It Is Safe to Do So. If you know the source and can shut off the electricity from a safe, dry, and insulated location (like a main breaker outside the hazard area), do it. Never attempt this if water is involved or if there's visible arcing.

4. Contact the Right Emergency Services. Activate your internal emergency procedures. Alert your facility's electrical contractor or in-house qualified electrician. If fire or major damage is involved, call emergency services.

5. Evacuate If Required. Don't hesitate to evacuate if there's any indication of fire or potential for explosion. Follow your facility's fire and life safety protocol.

6. Keep a Log of Events: Time of detection. Observations. Actions taken. This record will be crucial for post-incident reviews and insurance purposes.

7. Initiate Lockout/Tagout Procedures. Once safe, ensure the affected system is locked out and tagged until a certified technician verifies its safety.

8. Conduct a Root Cause Analysis. Every electrical hazard is an opportunity to learn. Was it equipment failure? Moisture ingress? Human error? Identify the cause and prevent recurrence.

9. Review and Update Protocols Ensure that lessons learned translate into updated SOPs, enhanced training, and improved infrastructure.

10. Communicate With Your Team. Transparency builds trust. After the event, debrief your team. Share the incident, the lessons, and the plan going forward.

Why This Matters More Than You Think

Most electrical incidents in buildings are preventable, yet thousands occur annually in the UK alone. Building operators are the first line of defence. It's not just about preventing

property damage; it's about protecting lives and sustaining critical operations. An untrained or unprepared response can turn a manageable issue into a catastrophe.

The Hidden Dangers You Might Overlook

- **Improperly labelled panels**
- **Wet environments near power sources**
- **Ageing or uninspected electrical infrastructure**
- **Overloaded circuits**
- **Poorly managed third-party contractors**

Each of these is a silent threat waiting to become your next emergency.

Investing in Training Saves Lives

Do not wait for your first electrical emergency to become your training session. Invest in:

- Annual electrical hazard awareness training
- Regular emergency response drills
- Documented isolation procedures

Frequent inspection schedules

Your team's confidence in handling electrical hazards must match their confidence in routine maintenance.

If you're a building operator reading this, ask yourself: When was the last time I walked through our emergency electrical response protocol? If your answer is anything other than "within the last three months," you're overdue. Schedule a review. Conduct a drill. Talk to your team. Bring your electrical contractor in for a refresher. Don't wait for the smell of burning plastic to be your wake-up call.

Because in an electrical emergency, being reactive is already too late.

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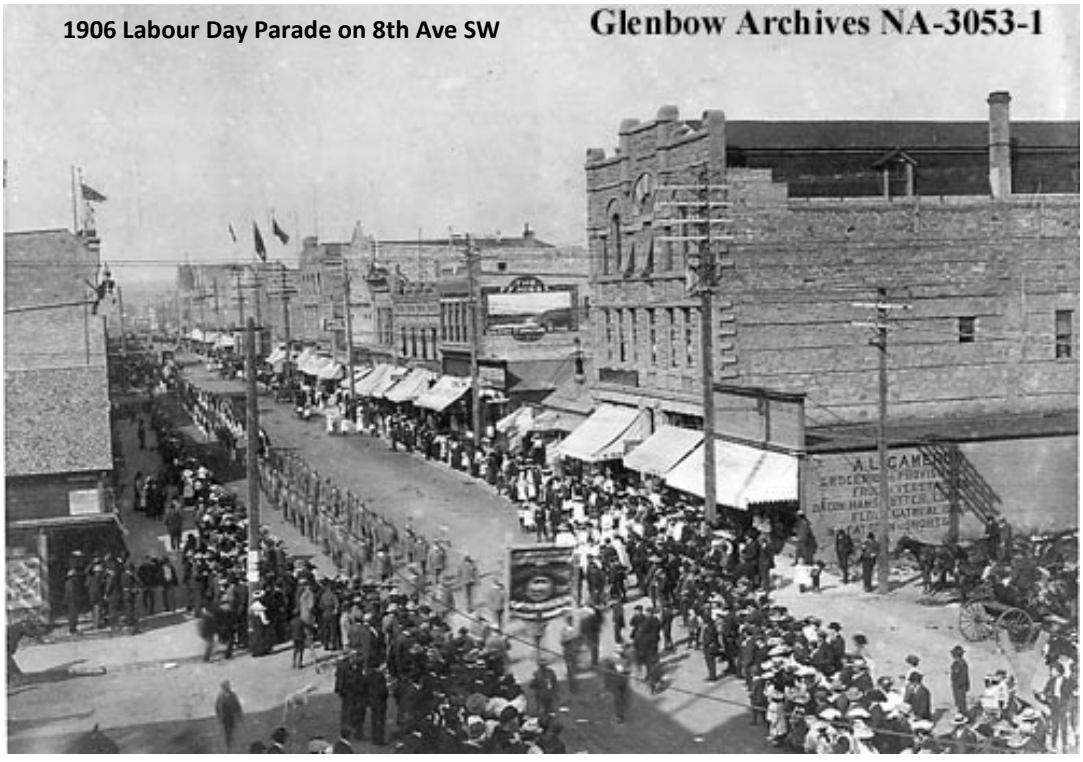
LABOUR DAY: A CELEBRATION OF CITY BUILDING



1906 Labour Day Parade on 8th Ave SW

Labour Day became a statutory holiday in 1894, and Calgary Labour Day traditions since the early 1900s run deep. On the first weekend in September, Calgarians came together to celebrate the hard-working community members who were building this blossoming city. These days most people see Labour Day as just another long weekend.

Definitions of Major Preventive Maintenance for UPS System

Mohsen Abedi P.Eng, PSM.Eng

Major maintenance on UPS (Uninterruptible Power Supply) systems involves more comprehensive and extensive tasks compared to regular maintenance. Major maintenance is typically conducted at longer intervals and is aimed at ensuring the UPS's continued performance and reliability over an extended period. Here are the tasks that need to be performed during major maintenance on UPS systems:

Visual Inspection: Conduct a thorough visual inspection of the UPS system, including its components, wiring, and connections. Look for signs of physical damage, loose connections, or overheating.

Battery Testing: Test the UPS batteries to assess their health and capacity. This includes checking the voltage, internal resistance, or performing load tests to determine how long the batteries can sustain power during an outage.

Cleaning: Dust and debris can accumulate inside the UPS, affecting its cooling efficiency and overall performance. Clean the internal components, cooling fans, and air vents to ensure proper ventilation.

Inspection or Replacement of Components: Inspect and Replace any time-out or faulty components, such as capacitors, fans, or damaged circuit boards. Using genuine replacement parts is crucial to maintain the UPS's reliability.

Firmware and Software Updates: Check for any firmware or software updates provided by the UPS manufacturer.

Keeping the UPS's firmware up-to-date helps address known issues and improve performance.

Calibration and Adjustment:
Calibrate and adjust the UPS as per the manufacturer's guidelines to ensure accurate function.

Environmental Checks: Ensure that the UPS is installed in an appropriate environment with proper temperature and humidity levels. Check for any issues that may arise from the operating environment, such as excessive heat or dust.

Load Bank Testing: For larger UPS systems, perform load bank testing to simulate real-world operating conditions and verify that the UPS can handle its rated load.

Alarm and Log Checks: Review the UPS system's alarm logs to identify any historical issues or warning messages. Clear any false alarms and address any recurring issues.

Remote Monitoring Configuration: If the UPS supports remote monitoring capabilities, configure and test the monitoring system to ensure proper communication and alerts.

Review of Operating Parameters: Check and review the UPS system's operating parameters, such as input and output voltage, frequency, and waveform. Verify that the UPS is within acceptable operating limits.

Documentation and Reporting: Maintain detailed records of the maintenance activities performed, test results, and any identified issues. These records are useful for future reference and warranty compliance.

UPS Bypass Test: Test the UPS's bypass functionality to ensure a seamless transfer of power in case of UPS failure or maintenance.

Emergency Shutdown and Restart Tests: Test the emergency shutdown (EPO) and restart procedures to ensure the UPS can respond appropriately during critical situations.

It is crucial to follow the manufacturer's guidelines and recommendations for major maintenance. This level of maintenance often requires specialized skills and tools, so it's best to have the work performed by trained and qualified UPS service professionals. Major maintenance ensures that the UPS continues to provide reliable backup power and safeguards critical equipment during power outages or disturbances.

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From Rubbish to Responsibility: Transforming Building Staff into Waste Management Champions

Juan Carlos LaGuardia Merchán

Every building has bins. But not every building has a culture of sustainability. That culture begins and often ends with the people who operate the facility daily. As a facility manager with over two decades of experience across complex sites from data centres to biotech laboratories, I've seen the transformational power of equipping staff with the right knowledge and motivation to handle waste smartly and sustainably.

This article is not just a guide, it's a call to action. Waste is a resource in disguise, and recycling is an opportunity, not a chore. If you want your building to operate efficiently, comply with local regulations, and contribute meaningfully to environmental goals, then training your building staff on waste management is not optional; it's mission critical.

The Why Behind the Waste

Before launching any training, your team must understand **why** waste management matters. Here are the pillars I use to frame this context:

- **Regulatory compliance** – Fines and inspections are real. Staff must know the rules to avoid costly mistakes.
- **Environmental impact** – Understanding carbon footprints, landfill

consequences, and circular economy principles builds intrinsic motivation.

Brand reputation – Tenants notice. Sustainability can be a selling point—or a scandal.

Operational cost reduction – Waste segregation reduces disposal costs and increases rebates for recyclables.

Personal pride – Empowering staff to contribute to a greener workplace boosts morale and engagement.

Building the Training Programme: A Step-by-Step Approach

1. Start with an Assessment

Conduct a waste audit. Where are the gaps? Which bins are being misused? This will inform your training content and give you baseline data to measure progress.

2. Tailor Content to Roles

Don't teach everyone the same thing. Security staff should know how to spot hazardous waste mishandling. Cleaners need hands-on training in segregation. Engineers must understand how waste affects equipment rooms and airflow.

3. Choose the Right Format

Use a mix of methods:

- **Classroom sessions** for regulatory and theoretical knowledge
- **Toolbox talks** for quick reminders
- **On-the-job coaching** to reinforce behaviours

Digital modules for remote teams or refresher training

4. Make It Visual and Practical

Use colour-coded bins, signage, infographics, and physical demonstrations. People remember what they see and do, not just what they hear.

5. Empower Your Champions

Identify natural leaders among the staff—

those who show initiative or curiosity. Give them extra training and recognition as "Green Ambassadors".

Beyond the Training Day

6. Conduct Regular Spot Checks

Don't let training fade. Conduct random audits and use checklists. Offer praise for good practices and constructive feedback when needed.

7. Update Training Materials

Waste management guidelines evolve. Keep materials current. Share lessons learned from other buildings or case studies from the industry.

8. Involve Tenants

Training shouldn't stop with staff. Educate occupants about waste points, contamination risks, and how their behaviour impacts your recycling rate.

9. Reward & Recognise

Celebrate milestones. "Three months without a recycling error" is just as worthy of a cake as "zero lost-time accidents".

10. Track and Report Progress

Visual dashboards in staff rooms help show impact: kilograms of waste diverted, cost savings, and CO_2 emissions avoided.

Pitfalls to Avoid

- **Assuming everyone already knows**, Many staff feel embarrassed to ask questions. Start with the basics.
- **Lack of leadership commitment,** if managers aren't modelling the right behaviour, staff won't take it seriously.
- **Overwhelming with data** – Keep it simple and actionable.
- **Forgetting language and literacy barriers** – Use symbols and multiple languages if needed.

Real-World Example: Turning a Problem Site Around

At one site I inherited, bins were a mess—recyclables mixed with general waste, contractor waste left outside skips, and cleaning staff demotivated. I introduced a monthly "Green Team" meeting, where cleaners, maintenance staff, and supervisors could share problems and solutions. We implemented bi-weekly five-minute refreshers and introduced a point system where the winning shift each quarter received vouchers. Within six months, the recycling rate rose from 14% to 63%, and our contractor's disposal costs fell by 18%.

That's the power of engagement over enforcement.

It Starts with Us

In facility management, we often focus on HVAC systems, BMS alarms, or fire compliance critical issues, no doubt. But waste?

Waste is visible. Tangible. It's one of the few areas where **every single member of your team can make a difference every single day**.

Don't underestimate the cultural impact of teaching your staff how to deal with waste properly. You're not just training them to follow a process; you're training them to be responsible citizens of the built environment.

So, here's your challenge: take a walk through your facility today. Open the bin lids. Talk to your staff. Are you proud of what you see? If not, it's time to act. Train. Engage. Inspire. Because in the world of facilities, sustainability doesn't start with strategy; it starts with people.

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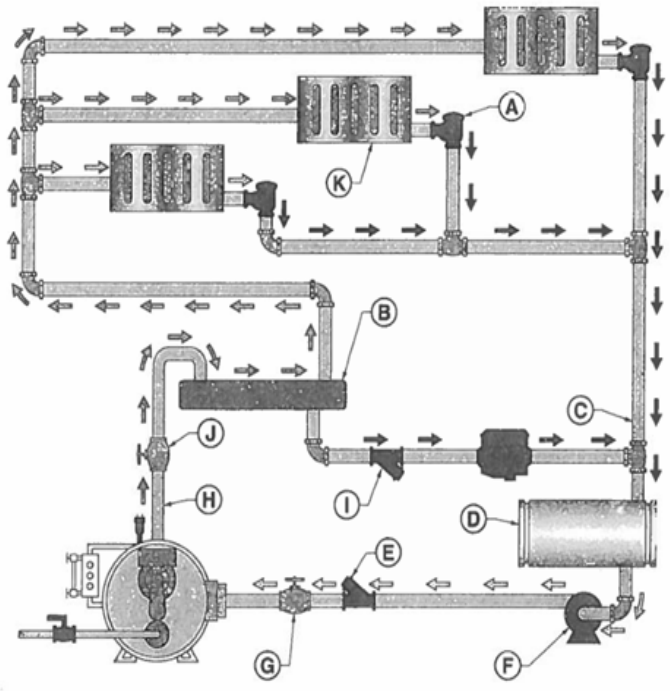
Steam Trap Location

_____ 1. Feedwater pump
_____ 2. Check valves
_____ 3. Main steam line
_____ 4. Steam trap
_____ 5. Heating unit
_____ 6. Stop valves
_____ 7. Main steam stop valve
_____ 8. Condensate return tank
_____ 9. Strainer
_____ 10. Main steam header
_____ 11. Condensate return line



Signs of Safety

Clear and concise signs are central components of programs designed to protect facilities and workers

Designing, implementing, and maintaining an effective building signage program can be an ongoing challenge for maintenance and engineering managers. Signs are necessary to inform or direct employees, customers, and the general public while at your facility. Selecting sign materials, colors and placement can be a chore of its own without also having to comply with the many regulatory requirements. One of the more difficult categories of signage is safety signs.

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Safety signs and OSHA

Safety signs are designed to provide a clear and understandable warning regarding workplace hazards. The Occupational Safety and Health Administration (OSHA) regulates many of the safety signs, markings, tags and labels required on an employer's site. Although many OSHA standards have specific signage requirements regarding size, lettering, wording, color and placement, most safety signs fall

OSHA® Occupational Safety and Health Administration

This Photo by Unknown Author is

under OSHA's Specifications for Accident Prevention Signs and Tags, 29 CFR 1910.145. This standard is primarily a performance-based standard that can be non-specific or vague in many instances.

OSHA's performance-based standards generally tell employers what safety criteria must be achieved, basic rules to follow, and prohibited methods employers must not use to "perform" to the expectations of the standard. Understanding OSHA's performance -based signage criteria will assist managers in determining the selection, design and placement of safety signs.

In general, OSHA requires safety signs in any work area where failure to post a warning sign might lead to accidental injury or property damage. These signs should be classified according to their intended use. A description of each of the four main categories of safety signs and color coding requirement is as follows:

Danger signs. Facilities should limit the use of danger signs to warning employees about immediate workplace hazards. Special precautions also might be provided that inform employees of necessary steps they can take to protect themselves. These signs use red, black and white. Specific danger signs must be consistent in design throughout the facility.

Caution signs. Facilities should use caution signs to indicate potential hazards and to caution employees against unsafe practices. These signs use a yellow background with a black panel and yellow lettering.

Safety instruction signs. The use of these signs should be limited to conveying general instructions and suggestions regarding appropriate safety measures. These signs use a white background with a green panel and white lettering.

Specific signs. The use of specific signs is mandated under specific OSHA standards. Examples include specific color coding requirements, such as red-orange for biohazards and purple-yellow for radiation symbols.

The signs themselves also must meet performance standards mandated by OSHA. Sign must have rounded or blunt comers and be free of sharp edges, burrs, splinters or other sharp projections. The ends or heads of bolts must be located so that they do not constitute a hazard to employees.

OSHA provides requirements on the nature of wording used on signs. Signs should be clear and concise and easily understood. The wording also should be accurate in fact and should make a positive suggestion, rather than a negative suggestion.

To determine if safety signs perform up to OSHA standards, managers should check to see that signs:

achieve the performance criteria by communicating the safety hazard or unsafe work practice; follow basic rules on intent, color coding, case of readability, and understandability; avoid negative suggestions; and not create hazards themselves.

Signage types

OSHA has many sign, marking, tagging and labeling requirements, so determining when and where safety signs are needed requires an understanding of the OSHA regulations as they relate to a facility. Facility wide safety inspections are a good tool for identifying signage needs. Managers can organize inspections by areas or by the OSHA standards. The following is a listing of the more common signage requirements of certain OSHA standards. Refer to the complete OSHA regulations for more specific requirements.

Means of egress (1910.37). Check to make sure exits, as well as doors that are not exits, are marked property. Exit signs should be distinct in color and contrast with decorations, interior finish and other signs. Every exit sign has to be illuminated internally or by a reliable sight source.

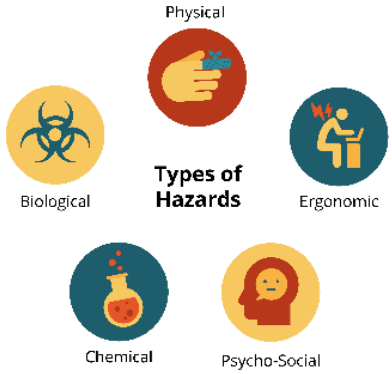
Ionizing radiation (1910.96). Radiation areas, including high-radiation and airborne radioactivity areas, must be posted with a sign bearing a caution symbol and description of the hazard.

Hazardous materials (1910.101 through 1910.111). Signs are required in general for compressed gases, with specific requirements for acetylene, hydrogen and oxygen. Storage cabinets for flammable or combustible liquids require signage identifying, "Flammable- Keep Fire Away."

Fire protection (19 10.15 7). Portable fire extinguishers should be mounted, located and identified with signage that makes them readily identifiable. Managers must make sure signs and portable extinguishers are unobstructed.

Material handling (1910.176). Permanent aisle and pathways must be marked as required by 1910.144 safety color code for marking physical hazards - with clearance signs to warn of clearance height limitations.

Toxic and hazardous substances. OSHA has developed specific health standards for more than 25 toxic and hazardous substances, and each standard has signage requirements. These signs must be posted at entrances and exits to regulated



areas. Many of these materials are carcinogenic, a respiratory hazard or poisonous. A frequently cited hazard is signage required under the asbestos standard 19 10. 100 1. Asbestos warning signs are required in routine maintenance areas where employees could come into contact with asbestos-containing materials.

Bloodborne pathogens (1910.1030). A hazard sign

incorporating the universal biohazard symbol must be posted on all access doors where potentially infectious materials or animals are present in a work area. Signs also are required at entrances to HIV and HBV research laboratories.

Facility specifics

Various areas of commercial and institutional facilities pose specific and unique problems for managers developing or updating a safety signage program:

- Warehouses. Managers must consider fire safety extinguishers and hoses - means of egress, carbon monoxide hazards from vehicles or heaters, compressed gases, flammable materials, spill kits, battery charging areas, and material handling.
- Compressed gas storage. Managers should focus on fire protection, storage identification formaterials such as hydrogen and oxygen, and no-smoking signs.
- Maintenance shops. Signs should address no-smoking requirements, mandatory use of personal protective equipment, and hazards that include high voltage, flammable materials and asbestos.
- Loading docks. Signs should address clearance limits, spill control, fire extinguishers, carbon monoxide and floor markings.
- Chemical-storage areas. Signage should cover no smoking requirements, fire extinguishers, spill kits, safety showers, eye-wash stations, personal protective equipment, and flammable and substance- specific warnings, including formaldehyde and ethylene oxide. Laboratories. Among the more common signage for labs are eye-wash stations and emergency showers, fire extinguishers, emergency shutoffs, fire blankets, personal protective equipment, emergency exits, eating/non-eating areas, chemical storage, compressed gas cylinders, first aid and spill kits. Managers can consult 1910.1450 for more specific chemical storage and laboratory-safety signage requirements.

Vehicle maintenance areas. Signs should cover gasoline and flammable materials, personal protective equipment, carbon monoxide, floor markings, compressed gas cylinders, no-smoking requirements, no-oil-use requirements, fire extinguishers, welding, and exits.

A sound knowledge of OSHA is crucial for determining performance of safety signs. For safety signs to perform, managers must know their intent, make them clear and concise and make them understandable to the work force. The results will help protect the workplace from injuries and property damage.

Making Signs: An Inside Job?

The design and manufacturing of signs is big business, and it can be big money. For this reason, many managers have decided to design and manufacture various types of building signage with in-house resources.

In-house design of safety signs requires careful attention to avoid compliance problems. OSHA requires that signage color coding and symbols use the specification of ANSI Z535.2 Standard. To prepare proper signage, safety directors and maintenance managers should review specific safety standards to determine if exact wording or phraseology is required.

If specific wording is not required, design becomes more important. Remember to follow

performance requirements for signs under 1910.145 as discussed in the accompanying article.

Determine the intent of the sign -danger, caution, instructional- and develop a positive message. Communicate the message clearly, concisely and understandably, and create a hazard-free sign with no sharp edge or protrusions.

Those seeking to design signs in compliance with federal, state and local regulations have an abundance of information and assistance available. Several sign associations provide guidance on sign manufacturing, materials to use, and positioning of signs.

Also, the Internet has resources - many free - that provide example signs, downloadable signs for computer sign-making programs, facility signage surveys, recommendations on materials, placement, and installation, and regulatory research. Typing "signage" into a search engine can help departments tap into these resources.

Managers can obtain comprehensive safety inspection check lists from trade associations and safety publications. The American Society of Safety Engineers (ASSE), a nationally recognized safety association, provides training, publications, as well as referrals for industry-specific safety inspections. Managers can visit its Web site. Finally, OSHA has many safety inspection resources available at its Web site.

Coordination with other departments is the final step in the safety signage program. Managers should consult with the safety officer, area supervisors, and maintenance staff to determine final design, installation and placement criteria. Signs should be placed where they are visible and unobstructed.

Lighting, maintenance, storage and other barriers should be an important consideration when selecting final sign location. It is not unusual to find supplies or equipment obstructing safety signs. Doors can open and block signs and safety equipment.

Language barriers also can hinder the safety message. Managers should review signage requirements with area departments to determine proper placement, material and installation requirements, and secondary language issues. Remember, signs that "perform" in compliance with OSHA must be visible and understood.

Safety signs can easily be incorporated into an in-house signage program. Proper design, placement and installation require research and investigation.

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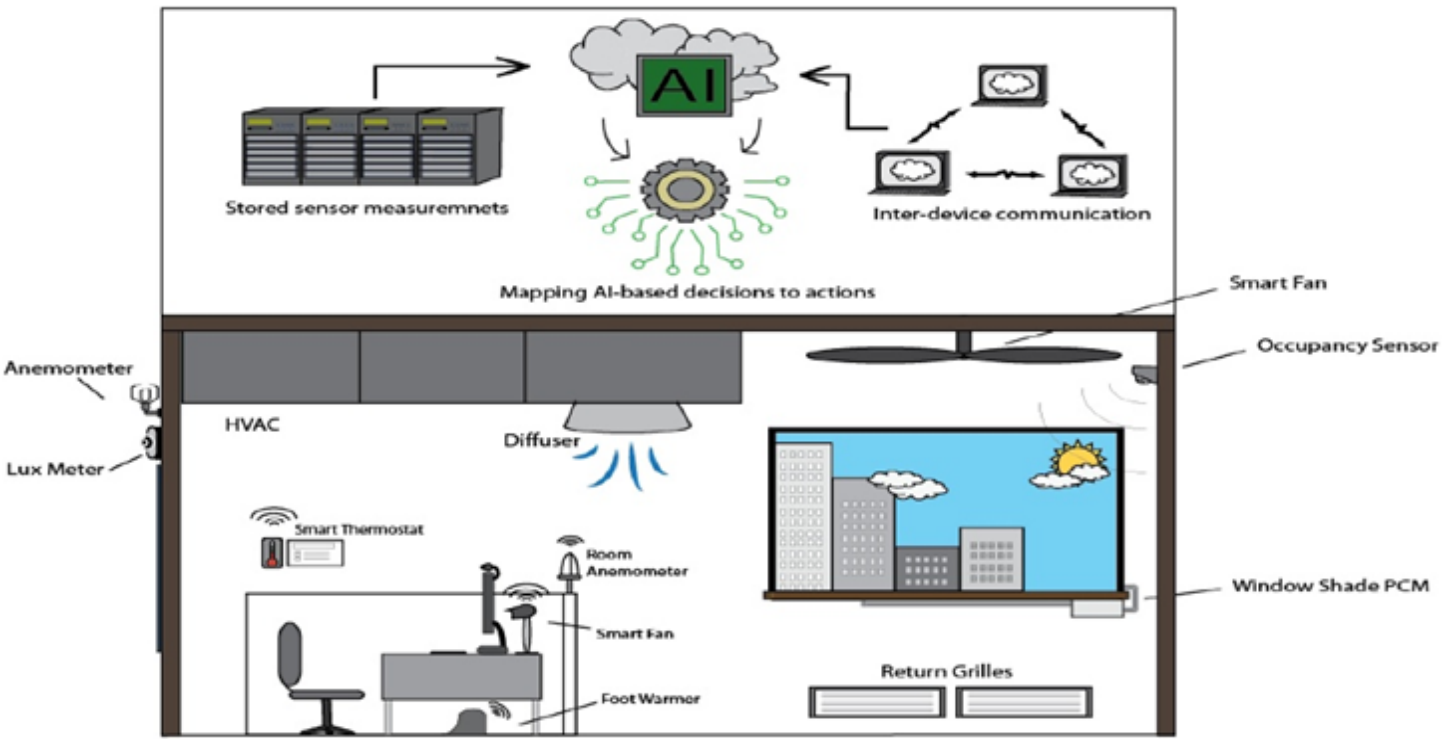
Temperate Zones



New HVAC technology offers total climate control

CONSIDERING THE CONFLICTING goals that HVAC professionals have to meet when installing a heating, ventilation and air conditioning system, it is amazing that they manage to install anything at all.

The first thing HVAC contractors must determine is the size and capacity of equipment needed to deliver adequate air, heating, and air conditioning for the size, shape and complexity of the building. When specifying the appropriate chillers, boilers, ducts, piping and other equipment, the contractor has to consider not only the size and shape of the building, but also what it's used for, how many people will be in it, what other kinds of equipment will be in the plant, how much heat that equipment creates, and what the different areas, or zones, of the building will be used for.

At every stage, the contractor has to balance conflicting desires: offices need different air flows than manufacturing or storage areas, and partitioning once-open rooms into smaller offices changes the air flow and puts a different load on the system. Meanwhile, it seems that no one is ever happy with the air conditioning - the building is too hot, or too cold, and someone always wants to increase or to decrease the air flow in his or her area.

Of course, the HVAC contractor can try to install the perfect air conditioning system with multiple zones that can be individually adjusted. But then reality strikes usually from the accounting area. New trends in building and in maintenance are also putting even more constraints on HVAC contractors. Buildings are getting more complex, as

are environmental and safety regulations and building codes; owners and occupants are demanding shorter schedules for completing HVAC installation. There is also continued pressure on contractors to keep prices from rising. All too often, a more sophisticated HVAC control system is sacrificed in order to save money on the installation costs, without considering the ongoing cost of HVAC.

Control systems save money, improve performance

Fortunately, new developments in control technology and in electronic communications are being applied to building maintenance today. HVACs can be controlled by systems that offer more flexibility for occupants while reducing power consumption at the same time. What's more, these systems can be linked to, or even become part of an integrated building automation system.

A central control and monitoring system, or CCMS, is perhaps the most effective HVAC energy-saving program - even if all it can do is turn the HVAC system on in the morning and off again in the evening. And by using the system judiciously, the CCMS can reduce wear and tear. This system can also be used for regular maintenance shut-downs, further extending the life of the components.

One of the most common complaints about HVAC systems comes from the occupants of the buildings however, occupants traditionally have no direct way of controlling the temperature of their own work areas. This goes against the grain of standard HVAC design.

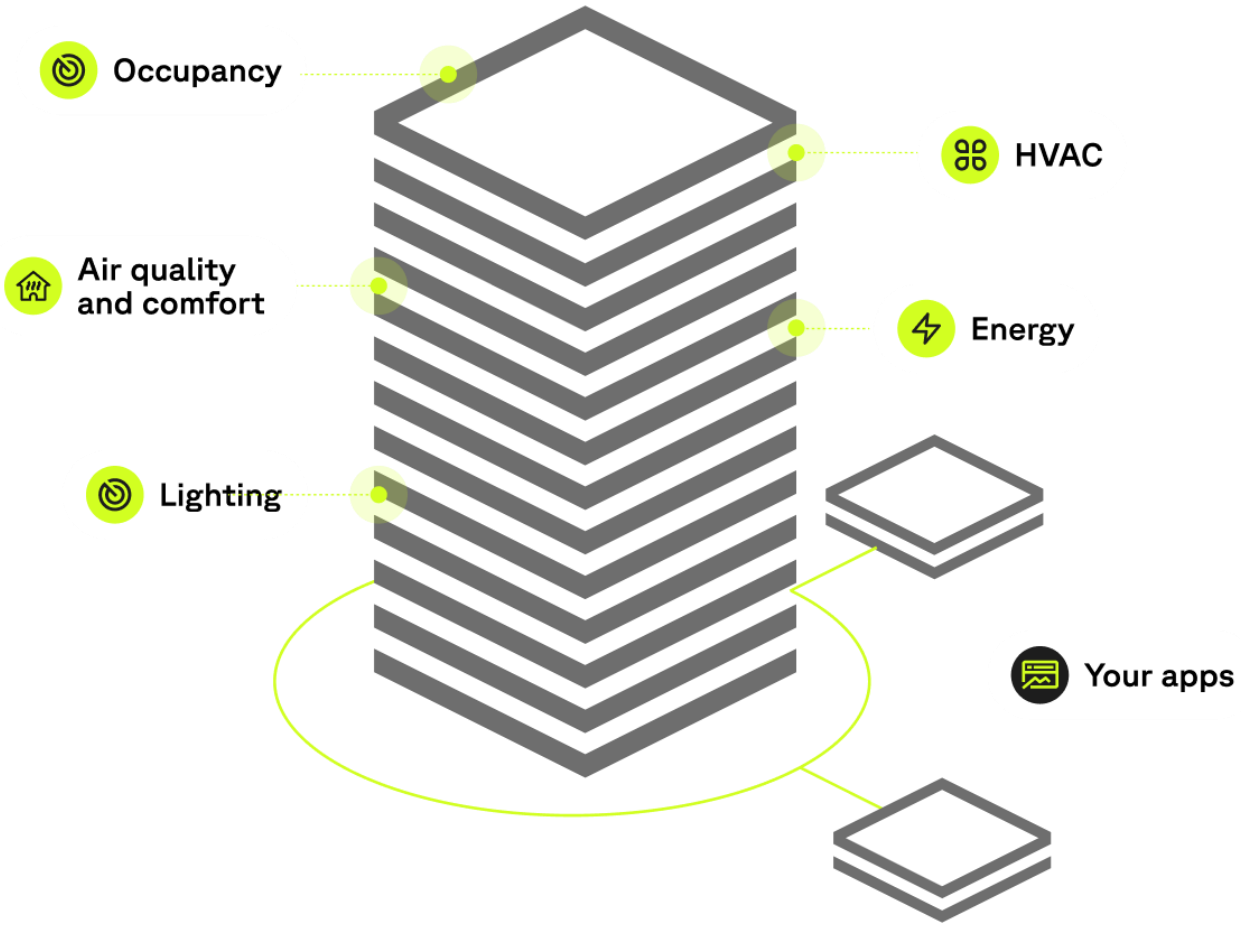
Conventional HVAC theory dictates that adding more individually controlled zones means driving up the cost, not only of the installation, but also of maintenance and operation. The prevailing wisdom says that if people are continually adjusting the temperature settings, the company is spending more on power and maintenance of the system. In theory, as long as you design an HVAC system that delivers the right amount of air and maintains the right average temperature, then everyone inside should be comfortable and won't have to adjust the temperature. Changing the

temperature or the airflow, according to this theory, will just complicate the problem and pull more electrical power.

Now consider a new approach to 14VAC: all parts and control points linked to the same network that runs the building automation system - and that links all the building's computers. With a few mouse clicks, the building occupant can open up the environmental control program for his or her area and adjust those parameters that the maintenance manager has given him or her. The occupant can increase the temperature a little, or increase the air now, and these adjustments don't affect the system's performance anywhere else because the system can compensate automatically.

This kind of HVAC controlling system can also be integrated with the controls for the other building systems, such as lighting, fire alarms and security. At the top end are integrated Building Automation Systems (BAS), that link all the physical controls to the owner's management system, enabling building owners or facility managers to monitor, track and control costs, and link BAS data with accounting, purchasing and other management software. More management information means potentially even greater savings.

These systems can also mean greater comfort and security for the building's occupants. Using occupancy sensors such as motion sensors, temperature sensors or other devices, a BAS can determine that someone is in a office after hours. It can turn on the hallway lights for that person, adjust the temperature in the office and even send an empty elevator to that floor to be waiting when the night owl finally leaves. This concept is not so farfetched: these systems, including sensors, controllers and software, are already in place in many buildings. For more information on this idea,



see the Lighting Answers Web site maintained by the Lighting Research Centre of the School of Architecture at Rensselaer Polytechnic Institute in Troy, New York at www.lrc.rpi.edu. A U.S. study of office and industrial building owners found that more than half have already invested in some kind of integrated building control system. Their main reasons were:

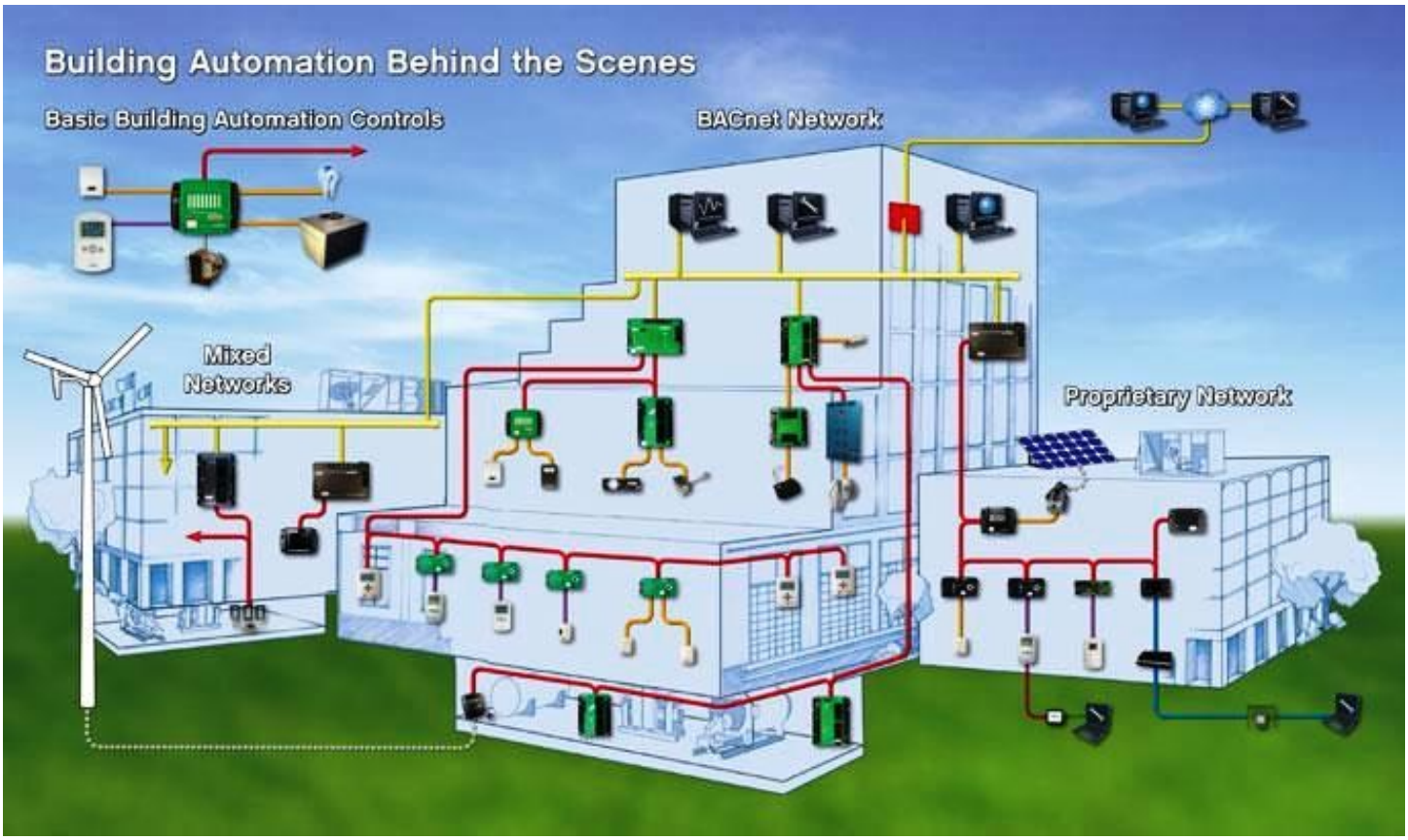
- reduced operating costs; a lower maintenance and repair costs;
- better tracking and management of systems;
- improved employee/occupant comfort; the ability to avoid major systems failure.

The trend in HVAC today is to integrate its controls into a total building management system or building automation system (BAS). The results of doing so are greater efficiency in the HVAC system, lower power consumption, longer life of the components of the system, and greater productivity from more comfortable workers inside the buildings.

Types of building and HVAC controls What is needed to automate a building's HVAC controls' The components and the communications networks to tie them together are readily available and getting less expensive and easier to use.

The simplest centralized building control system allows the operator or manager to check the status of the various building systems: HVAC, fire and security, power consumption and so on. At the other end is the direct digital control network, or DDC, in which a computer not only monitors the systems, but adjusts settings so they're operating at optimal levels.

Every building management system has the same basic capabilities: a start/stop program to turn HVAC equipment on and off according to a schedule. Adding complexity to the equation, a reset program can reduce RVAC operation during off-peak hours, or turn it on in time to restore comfortable conditions when employees arrive. More complex systems can provide reports on total daily or monthly cooling and heating loads,



energy consumption and other statistics, as well as calculate preventive maintenance.

For some years now, many HVAC control system vendors have been adding lighting, fire alarm and security alarm controls to the HVAC control system.

As the systems or buildings operated by HVAC systems get larger, they have more "addressable points:' which are elements or components to control, and that communicate in some way with the central processing unit. After about 2000 points which can include sensors, thermostats, valves, chillers, boilers and so on - the data gets too large for a single computer to handle efficiently. At this point, the addressable points are grouped, with each group communicating with one data gathering panel, which in turn feeds information to the central controller. But as the number of data gathering panels increases, the ability of the central processor to deal with each one decreases.

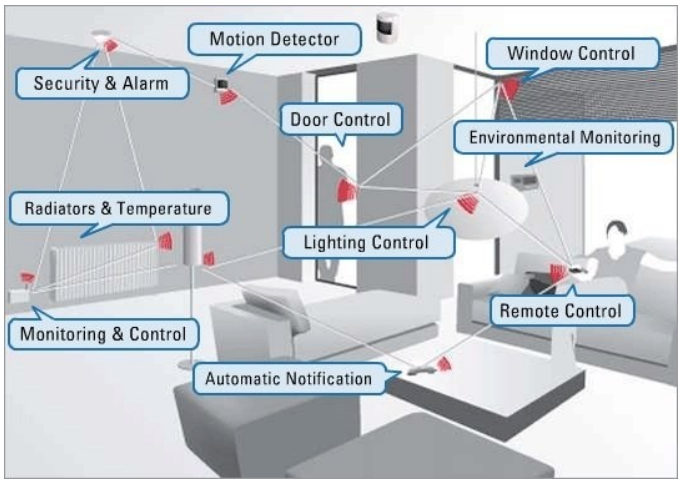
At some point, direct digital control (DDC) becomes a viable option. DDCs are typically used in complexes of several buildings, such as colleges and universities. Two things set DDCs apart from other types of control systems: two-way communications and distributed control. Two-way communication with the systems under control means that a DDC records data including outside and indoor air temperature, supply air volume, and temperature of various zones. Then, it calculates the required settings of the HVAC components to achieve optimal conditions.

Distributed control means that there is more than one computer involved. While the central processing unit acts as a hub, satellite processing units can stand alone and control zones of the system. If the central computer fails, the whole system doesn't have to go down, too.

DDCs are easily expandable to control more buildings or more systems. For instance, you could implement a DDC just for the HVAC system, then later add controls for lighting or security.

Tying it all together

What allows direct digital control systems to work, or any other kind of building automation system, is a network to tie together the components including chillers and boiler and valves, as well as the computers, switches and sensors. While there are many different networks available, from Ethernet to TCP/IP, the special needs of the HVAC industry have led to the creation of specialized building automation networks.



Three different building automation networks dominate the market, although each has its own specific niche: Building Automation and Control network, or BACnet; LonWorks; and Consumer Electronics Bus, or CE Bus.

Where is HVAC control heading?

Whether LonWorks or BACnet - or another, newer standard will eventually dominate HVAC controls is still a toss-up. Both are viable choices that can deliver better control over HVAC and other building systems, reduce costs and make a more comfortable and productive environment for the occupants.

It's time to look carefully at automating HVAC controls.

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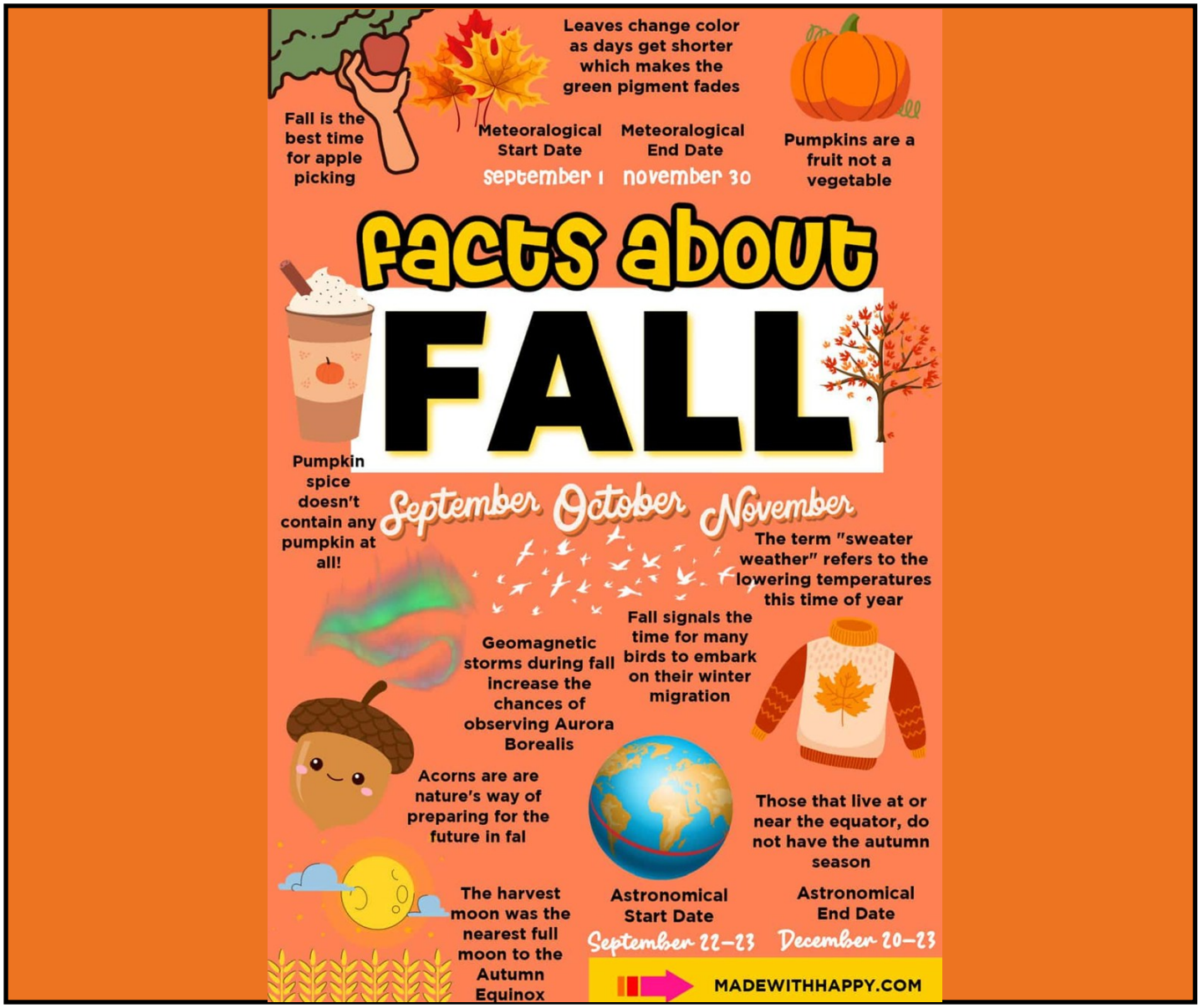
KenKen Puzzle

How to solve the Kenken puzzle:

(Answers on page 31)

- Fill in the numbers from 1 –6
- Do not repeat the number in any row or column
- The numbers in each heavily outlined set of squares, called cages, must combine (in any order) to produce the target number in the top corner using the mathematical operation indicated
- Cages with just one square should be filled in with the target number in the top corner
- A number can be repeated within a cage as long as it in the same or column

8		5	2					9
	1	9			4		7	6
	4		8		1		5	
	7		9					
5		1	7	6		2	9	
9				1			8	3
	9	4						8
			6	4			3	
7	6	8	3		9	4	1	



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Kenken Puzzle Answer

8	3	5	2	7	6	1	4	9
2	1	9	5	3	4	8	7	6
6	4	7	8	9	1	3	5	2
4	7	3	9	8	2	5	6	1
5	8	1	7	6	3	2	9	4
9	2	6	4	1	5	7	8	3
3	9	4	1	5	7	6	2	8
1	5	2	6	4	8	9	3	7
7	6	8	3	2	9	4	1	5

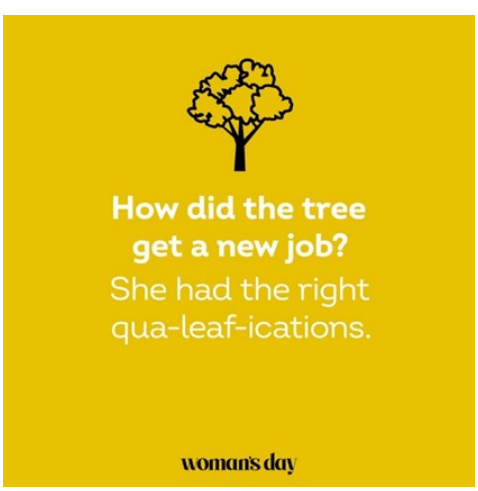
TEST YOUR OPERATOR IQ ANSWERS

Answers: 1)d 2) c 3) c 4) e 5) e

STEAM TRAP LOCATION ANSWERS:

Answers: 1)F 2)E 3)H 4)A 5)K 6)G 7)J 8)D 9)I 10)B 11)C

Just for laughs!



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