Volume 30 - Issue 9 – May 2024

BOA Building Operators Association of Canada

Official Publication of the Building Operators Association (Calgary)

May 2024

What's Inside?

Important Phone Numbers

Emergency	911
Alberta Boiler 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

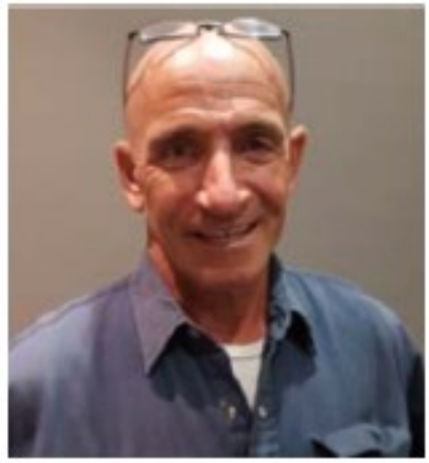
Executive & Committees

President Les Anderson	president@boacalgary.com C: 403 921 0648
Vice President Mark Arton	chairman@boacalgary.com (c) 403-305-7029
Associate VP Vacant	associate.vice.president@boacalgary.com
Chairman Mark Arton	chairman@boacalgary.com (c) 403-305-7029
Treasurer Carrissa Speager	treasurer@boacalgary.com (c) 403-969-0329
Secretary Monika Bhandari	secretary@boacalgary.com (c) 403-470-4169
Education Committee Vacant	education@boacalgary.com
Membership Committee VACANT	membership@boacalgary.com
Promotions Committee VACANT	promotions@boacalgary.com
Activities Committee Samson Isowode	403-874-0850
Technical Concerns Kyle D'Agostino	chairman@boacalgary.com
Webmaster Les Anderson	webmaster@boacalgary.com

Volume 30 - Issue 9 – May 2024

President's Message

BOA
Building Operators Association of
Canada



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

We are still trying to work out the logistics for our trade show this year. The time and people required to do this is more than we have at the moment. If you are interested in assisting in this, we are looking for volunteers and are looking to have it in the fall. We are hoping for it to be at the Danish Canadian club but are open to other venues. Please reach out to me if you have an interest in participating in the organization of the trade show. I am best reached at lesa@telus.net.

I had the pleasure to have coffee with the Casey Kok and Mark Arton recently. Casey is a member who has served over the years in many positions within BOA. He was our Webmaster for many of those years and led the groups welcoming committee. He is still holding a position as Co-Chairman for BOA Canada. He is a retired Building Operator but still keeps interest in what is happening in our industry. I have had Monika place a picture of the three of us in this issue.

I heard that Trent Brolund of James Electric had taken a spill on his bicycle and is taking it easy from work while recovering. I wish him well and a speedy recovery.

SMILES))

With kind regards,

Les Anderson PE, RPA


BGE
Indoor Air Quality Solutions
Clean Air Matters
We spend about 90% of our time indoors, and it has never been more important to ensure we have clean, healthy indoor environments.
For over 50 years, BGE's approach has focused on people, as we strive to provide optimal air quality through proactive, integrative advisory services and quality products you can trust.
BGECleanAir.com
Edmonton Calgary Vancouver Fort McMurray Prince George Regina Saskatoon Winnipeg


CPG
CUSTOM POWER GENERATION
CANADA'S LARGEST
BLUE STAR
POWER SYSTEMS DISTRIBUTOR
Western Canada's Premier Supplier of Stand-by, Prime & CHP systems
24/7 Parts and Service Support
Emergency Generator Repair
Planned Generator Maintenance Programs
On Site Fuel Testing & Polishing
100% CANADIAN OWNED AND OPERATED!
CALGARY - EDMONTON - VANCOUVER
24HR: 855-948-8810 / CUSTOMPOWER.CA


SURE
PRINT & COPY CENTRE AVENIDA
WE PRINT EVERYTHING!
SIGNS
RETRACTABLE BANNERS
X-BANNERS
SANDWICH BOARDS
& MUCH MORE!
DESIGN
NCR FORMS
MAGAZINES
BUSINESS CARDS
POSTCARDS
CALENDARS
LARGE FORMAT PRINT
LARGE FORMAT SCANS
BLUEPRINTS
501 - 12445 Lake Fraser Drive SE, Calgary, AB T2J 7A4
Phone: 403.254.6922 Email: sure20@surecopy.com
www.sureprintavenida.ca

Volume 30 - Issue 9 – May 2024

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 25*

11. A chemical dot placed under the glass lens of a sight glass so that it is exposed to the liquid refrigerant in order to monitor the:

a) liquid flow
b) refrigerant levels
c) presence of moisture
d) presence of foreign particles
e) pressure levels

2. A direct expansion type evaporator that has more than one refrigerant circuit in it requires a:

a) stop valve
b) purge valve
c) distributor
d) purge valve
e) thermal regulator

3. A pressure relief device on a refrigeration system shall have sufficient capacity to prevent the pressure in the pressure vessel from rising more than ___________ above the setting of the pressure relief device.

a) 10 percent
b) 15 percent
c) 20 percent
d) 25 percent
e) 50 percent

4. A simple trap located in the suction line before the compressor that collects liquid, where it evaporates and returns to the compressor as a gas, is called:

a) an oil separator
b) a strainer-drier
c) a distributor
d) an accumulator
e) a stop valve

5. An emergency discharge line is used to deal with which of the following problems?

a) dangerously low system pressures
b) toxic refrigerant leaks
c) combustion of flammable refrigerants
d) dangerously high system pressures
e) all of the above

6. Moisture in a refrigeration system can result in which of the following?

a) formation of ice
b) acid formation
c) corrosion
d) deterioration of motor insulation
e) all of the above

CAN OLD BUILDINGS BE GREEN TOO?

intellimeter

Innovative Metering Systems

Surprisingly, many old buildings already have sustainable features. The oldest structures were built during a time when climate control technology didn't exist, which means they were constructed with materials and features that effectively circulated air and released or trapped heat depending on the season. We also need to recognize the cultural relevance of preserving old structures such as old homes, schools, offices, and buildings with historical significance; for which adding an exterior wall is not a solution.

Old buildings may not have the same technology to conserve energy, manage waste, or recycle water that many newly constructed structures do. However, while new buildings are more energy-efficient than old buildings once they've been built, constructing them demands a lot of raw materials, energy, and resources. This is precisely why we should also be exploring how to make existing buildings more sustainable, rather than demolishing old structures.

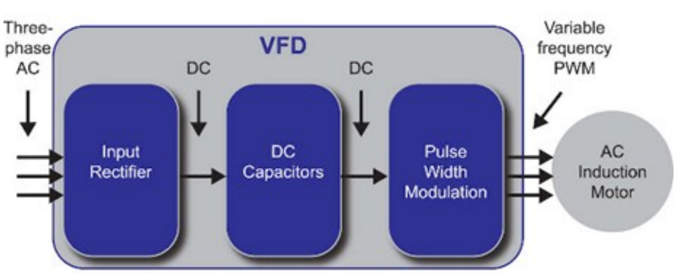
HOW RETROFITS AND ENERGY-EFFICIENCY STRATEGIES CAN TRANSFORM OLD BUILDINGS

Having recognized that tearing down old buildings and replacing them with new structures isn't necessarily a sustainable practice, we can explore other options such as retrofitting. Retrofitting an existing structure can be more cost-effective than constructing a new building.

Retrofits can transform old buildings, making them more energy and water efficient, reducing the consumption of fossil fuels. Energy conservation retrofits can make old buildings green by reducing the consumption of all utilities. Here are some retrofits that can help transform old buildings:

HVAC AND SMART SENSORS

HVAC and smart sensors can help reduce energy waste in most locations. heat pumps, whether air-to-air or air-to-water are more efficient than electric heaters and water tanks. Some advanced smart HVAC sensor technology comes with features such as occupancy-based wireless thermostats, demand-controlled ventilation sensors, and programmable smart solar film. A typical retrofit is substituting fan motors across-the-line starters with Variable Frequency drives that modulate energy use in ventilation. Variable Frequency drives, when combined with demand or zone control, drastically reduce energy



consumption. Condensate recovery is also one more way to reuse water, particularly if there is a system for harvesting rainwater for secondary use. These options are worth considering as these features help minimize energy costs and conserve water.

REPLACE OLD WINDOWS

Replacing old windows with double or triple-pane insulated high-performance windows can help ensure that heating and cooling don't escape and make the HVAC system work harder than it should.

SUBMETERING

If the building is not already metered, it would be worthwhile to develop a plan for submetering electricity, water, gas, and other utilities. Submetering helps old buildings become greener by providing real-time data that can help measure and identify in detail where and when the consumption takes place and assist in managing and reducing consumption. Smart submeters also help increase tenant or occupant accountability by monitoring their energy usage. Submetering also allows property managers to make informed decisions related to energy conservation and efficiency.

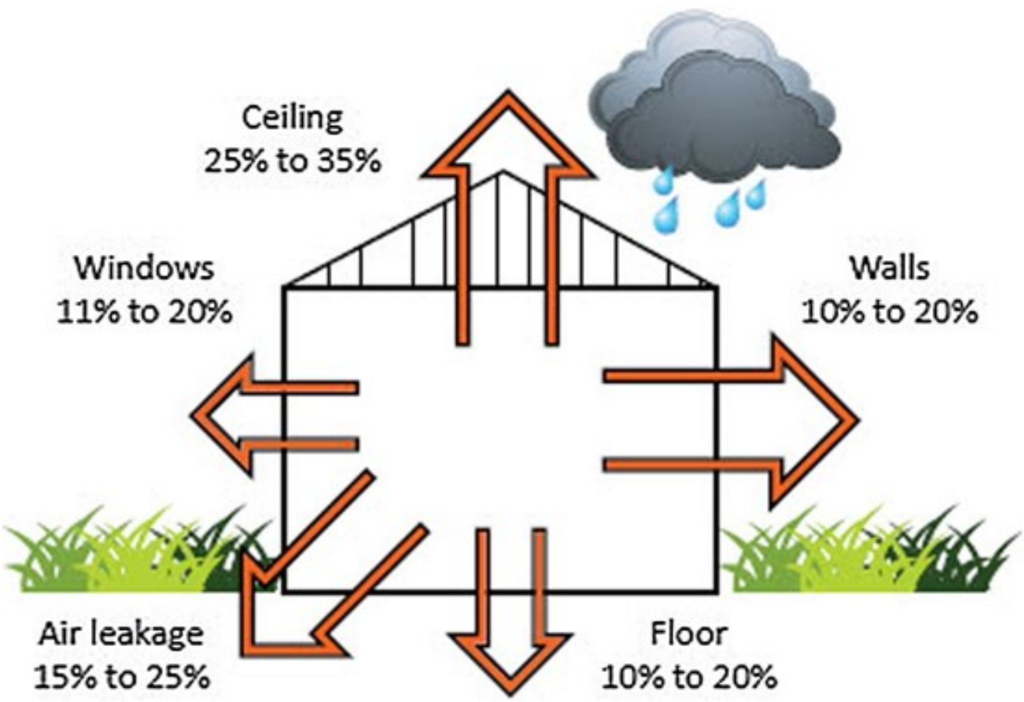
WATER CONSERVATION

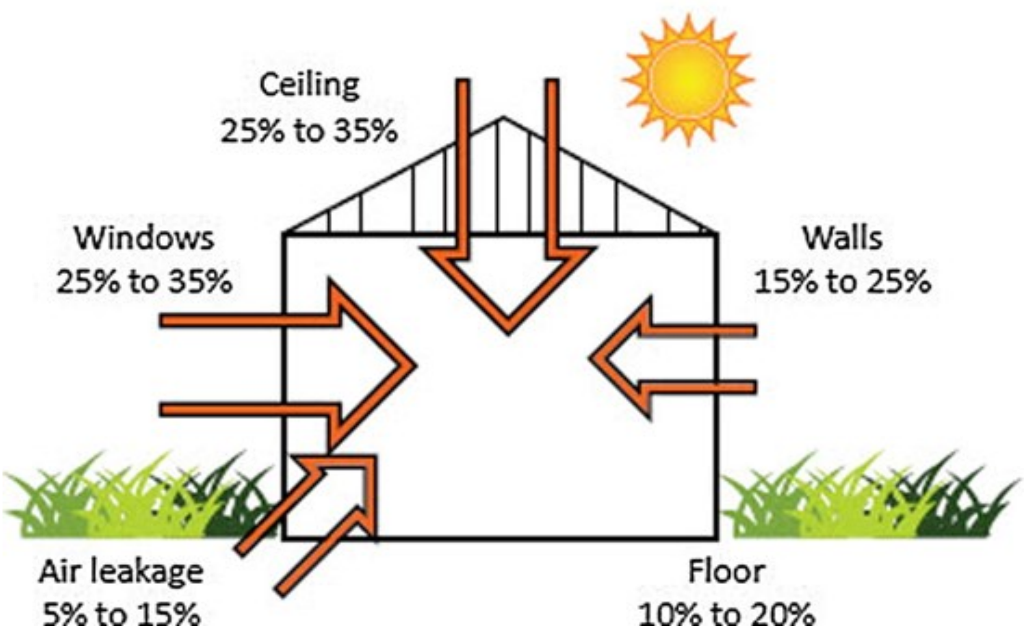
There are also plenty of sustainability and energy-efficiency strategies that can help old buildings minimize water consumption. Older buildings tend to waste more water because of old fixtures such as leaking faucets or running toilets. A good place to start would be understanding consumption patterns. Accurate water meters in the low flow range can identify odd consumption patterns and help identify and address all the problematic leaks. Water systems can always be upgraded and optimized.

BUILDING ENVELOPE

Envelope retrofitting may not be easy as it depends on the type of exterior wall. Some exterior brick walls may only be improved by the addition of another layer of insulation, something that may not be allowed on historic buildings. Some of the measures used in envelope retrofitting include solar shading, window glazing, external walls, and infiltration or improving the building's air tightness. All these measures help achieve energy efficiency and improve thermal comfort.

Article reprinted with permission





Choosing the correct UPS battery

Selecting the right battery for a UPS (Uninterruptible Power Supply) involves considering various technical parameters to ensure compatibility, reliability, and optimal performance. Here are the key technical parameters to keep in mind:

1. **Battery Type:**
UPS batteries are commonly Valve Regulated Lead Acid (VRLA) or Lithium-ion. Choose a battery type based on factors such as cost, maintenance requirements, and expected lifespan. VRLA batteries are often more cost-effective, while lithium-ion batteries may offer longer life and higher energy density.

2. **Nominal Voltage and float voltage:**
Verify that the battery voltage aligns with the UPS requirements. Common voltage ratings for UPS batteries range from 12V to 480VDC, contingent on the size of the unit. Additionally, it is crucial that the UPS system supports the specified float voltage configuration of the chosen batteries; otherwise, proper charging may be compromised.

3. **Capacity (Ah):**
Battery capacity is measured in ampere-hours (Ah). Select batteries with sufficient capacity to meet the runtime requirements of your UPS. Calculate the required capacity based on the power consumption of your connected devices and the desired backup time during a power outage.

4. **Number of Batteries:**
Consider the configuration of the batteries in the UPS. This includes the number of batteries and whether they are connected in series or parallel. Ensure that the UPS can support the specified battery configuration.

5. **Physical Size and Form Factor:**
Check the physical dimensions of the batteries to ensure they fit into the UPS enclosure or external battery cabinet. Consider the form factor, such as rack-mounted or tower batteries, depending on

your UPS installation.

6. **Internal or External Batteries:**
Some UPS systems allow for the connection of external battery packs to extend runtime. Determine whether you may need to add external batteries in the future and if the UPS supports this option.

7. **Self-Discharge Rate:**
The self-discharge rate indicates how quickly a battery loses its charge when not in use or floating voltage. Lower self-discharge rates are desirable for UPS batteries to ensure they remain charged during periods of inactivity.

8. **Cycle Life:**
Cycle life refers to the number of charge and discharge cycles a battery can undergo before its capacity significantly degrades. Choose batteries with a cycle life that meets your expected usage patterns.

9. **Temperature Range:**
Check the operating temperature range of the batteries. Ensure that the UPS and battery system can operate within the specified temperature limits of your environment.

10. **Charging Current:**
Consider the charging current supported by the batteries. Faster charging can be advantageous, especially in situations where the batteries need to recharge quickly after a power outage.

11. **Compatibility with UPS Charging System:**
Verify that the batteries are compatible with the charging system of the UPS. Some UPS models may have specific charging requirements for optimal

battery performance.

12. **Monitoring and Management:**
Batteries with monitoring features provide information about their health, status, and remaining capacity. This data can be crucial for proactive maintenance and ensuring the reliability of the UPS system.

By considering these technical parameters, you can select batteries that are compatible with your UPS system and provide reliable backup power when needed.

Article reprinted with permission

KenKen Puzzle

How to solve the Kenken puzzle:

(Answers on page 25)

- 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

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

BOA Building Operators Association of Canada

The 'Three BOA Oldtimers' had a chance this month to get together for a coffee.

(L to R) Casey Kok Mark Arton, and Les Anderson.

Getting a Grip on Green Products

by David Kozlowski

Knowing what makes an interior product Green rather than greenwashed is a key step toward environmentally sound facilities.

Talk of green buildings and products seems to be everywhere, creating a swirl of information that is causing some confusion over what green means. Varying definitions abound. And facility executives looking for "the" answer are likely to be frustrated.

This is a particular problem for green interiors because of the large number of green products that make up the interior — everything from wallboard to desktops. Even though their numbers have diminished, pseudo-green products and greenwash marketing claims do exist.

Because there is no simple test for what is green, facility executives often have to use their own judgment on which products might be greener

than others. To do this most effectively, they need to understand some basic underpinnings of just what makes green green.

Defining Green

From the broadest perspective, sustainability means meeting the needs of the current generation without compromising the needs of future generations, says David Mueller, vice president of marketing for Interface Architectural Resources. "To accomplish this, we need to be creating more sustainable workplaces."

What does that mean? Mueller says that means to use products manufactured in the most sustainable way possible and to design workplaces that deliver value for the customer for last the longest possible time and support the well being of the occupants.

The first question that usually comes to mind for green experts is what is the product made of. But what makes a product green is not the presence or absence of a single item, such as recycled content or volatile organic compounds (VOCs). But what makes a product green is often more than just recycled content and VOCs. It's also a combination of attributes, including the source of the raw materials, the energy to manufacturer and deliver the product, and the durability of the product.

"You can create something with no emissions and completely recyclable, but it may last only one day," Mueller says. "How sustainable

is that? If you're not working on all the fronts and still call yourself sustainable, then you don't know what you're talking about."
To illustrate the complexity of specifying green products, consider the issues of recycled product content and recyclability.

Typically, products containing the highest amount of post-consumer and post-industrial recycled content generally fall into the category of green products. Products that can be recycled back into the same or similar product also can be considered green.

Recycled content will range in today's green products from much less than half to 100 percent, says Paul Murray, corporate environmental manager for Herman Miller. "The content is one attribute to consider," he says, "but so is ease of disassembly. This can make it easier to recycle."
"If a manufacturer is using the by-products of another industry rather than virgin material, it shows not only good environmental awareness but also good economic sense, especially when the by-product or waste is identical to virgin material," says Chris Beyer, national marketing manager for Georgia Pacific Gypsum.

But the issue of recycled content isn't clear cut. Even if a product uses virgin material, the manufacturer may produce it in a way that is no more environmentally harmful than another manufacturer using recycled material.

Making Green, Green
But attributes, such as low VOCs and recycled content, are really just part of the big green picture. How a product is made can be as important from a green perspective as the product itself. The process involves everything from the raw materials to getting the product to the market.

Carpet and Rug Institute (CRI) President Werner Braun says that carpet mills have improved their manufacturing process. He says 85 percent of post-industrial waste is recycled back into the process; greenhouse gas emissions from manufacturing have been capped at 1990 levels, despite a 40 percent production increase; and 46 percent less water is used per square yard now than in 1990. "The industry has met the requirements of the Kyoto Protocol," he says.

The greening of the manufacturing processes is evolving into a science and is growing in importance among suppliers and specifiers. Finding a way to accurately and easily document a product's life cycle has become a major goal of the industry, says Penny Bonda, chair of the U.S. Green Building Council's committee on LEED (Leadership in Energy and Environmental Design) for Commercial Interiors, or LEED CI, and director of communications for EnviroDesign Works. This process of documentation, called the life-cycle analysis (LCA), is a difficult one. The LCA involves an investigation of what the product is made of, how much energy is used to produce it and the impact of obtaining the raw materials. Those issues just scratch the surface. Getting a complete picture of a product's environmental impact over its entire life cycle is difficult, time-consuming and expensive. Determining an LCA rating also requires making value judgments. Is it better to use more energy and create more pollution by transporting environmentally benign materials or to use locally available but less benign materials? Is a material that lasts longer but can't be easily recycled better than a material that doesn't last as long but can be recycled?

While an LCA for every product is not achievable now, and may never be, the discussion of these analyses are moving manufacturers in a green direction, says Anita Snader, marketing manager for the environmental program for Armstrong.

A result of this discussion has been to spur the creation of tools that can help facility executives make tough decisions on green products.

There are catalogs of green products that have simplified the process for users. "Green Spec" may be the most respected among them. BuildingGreen Inc., which puts out the catalog, relies on several well-established green criteria and assembled some of the greenest products available.

There also is a free software program from the federal government, called Building for Environmental and Economic Sustainability (BEES), that measures the environmental performance of building products by using the life-cycle assessment approach specified in the International Organization for Standardization's ISO-14000 standards.

Economic performance also is measured to develop an overall performance measure.

BEES is a good start but does not include an exhaustive database of materials and products.

An LCA stamp of approval for all green products would be "the Holy Grail of sustainability," says Karen Rowe, public relations manager for Amtico International. LCA should be the definition for all products. "But we are only dreaming of that now."

In the interim, Herman Miller's Murray says, facility executives should be doing "life-cycle thinking," making their own judgments based on the information that is available.

Believability

A step toward an LCA stamp of approval is a third-party certification. These labels on a product offer a degree of transparency in how a product was manufactured.

Green Seal, Forest Stewardship Council and Scientific Certification Systems (SCS) are three popular organizations that provide such stamps of approval.

The criteria these organizations use rely on established standards, such as ISO-14000, the U.S. Environmental Protection Agency guidelines for environmentally preferable products and the U.S. Federal Trade Commission guidelines for green marketing. The organizations verify that a product or manufacturer meets these criteria.

The third-party certifier system works, says Jeff Stephens, vice president of marketing for SCS,

only if the process has credibility.

"Success rides on the quality of the standards," he says. These certifications have become important because of the amount of greenwash on the market, says Marc Ahrens, corporate segment marketing manager for DuPont Antron. "Ask for certification; it's the closest thing we have right now of a UL label for green products," he says.

Third-party certifiers aren't the only one selling credibility, however. Manufacturers are too.

Industries are trying to build consumer trust, Amtico's Rowe says. Some manufacturers are making their processes more transparent without the incentive certification offers.

"An owner can't know whether all the products they are looking at are green," she says. "They have to rely on the supplier. Unfortunately, there is some confusion due to companies that have not been responsible. So look for those who can substantiate their claims."

"Look at a company for four simple things," Herman Miller's Murray says. "Management support for sustainability. The company's sustainability goals. Whether there is a structure to support those goals. And the results — the products."

A number of big corporations are leading the way in developing a trust in their green products and processes, says Michael Italiano, CEO of the Sustainable Products Corp., a consulting and training company, and head of the Institute for Market Transformation to Sustainability (MTS).

"The market leaders have disclosed their life-cycle processes, and now the competitors are starting to do the same," he says. This is changing the way building owners view manufacturers' pronouncements. It is offering trust but with verification.

Driven To Success

Growing interest in green buildings is helping manufacturers see green. For instance, the growth of membership and registered projects for certification with the U.S. Green Building Council has more than doubled every year in the past three years. In response to this demand, the council has been expanding its platform of rating systems to include interiors.

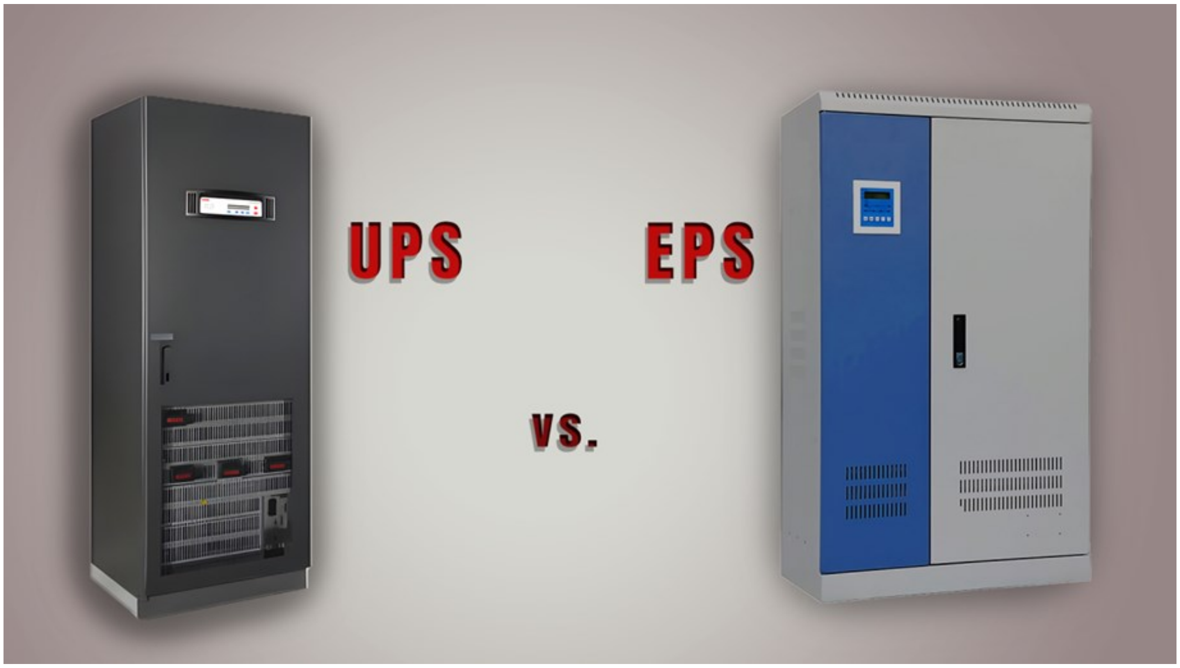
LEED CI is currently in its pilot stage, but interest in the rating system has been very strong, says Bonda.

LEED CI addresses green performance areas such as efficient water use, energy-efficient lighting and indoor environmental quality measures that recognize the set of products and materials used in interior spaces. Credits are accrued for meeting certain parameters and one of four levels of achievement is awarded, from certified to platinum certified.

Is green a phase? Bonda doesn't think so. "It's popping up on more owners' radar screens. Soon, Class A buildings will mean green buildings. We're not there yet, but that's the direction we're heading."

Article reprinted with permission

Comparison of UPS and EPS Systems' Applications



UPS (Uninterruptible Power Supply) and EPS (Emergency Power System) serve different purposes and are used in different contexts, but both are related to providing power backup in case of electrical disruptions. Let's explore the applications of UPS and EPS:

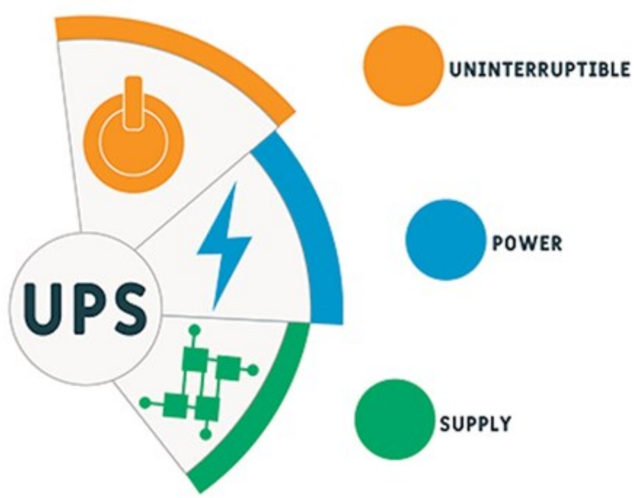
1. UPS (Uninterruptible Power Supply):

Main Function: Online UPS systems are designed to provide a continuous and uninterrupted power supply to connected electronic devices in the event of power outages, fluctuations, or disturbances.

Applications:

- **Computers and IT Equipment:** UPS is commonly used to protect computers, servers, and networking equipment from sudden power loss, preventing data loss and system shutdowns.
- **Data Centers:** Large-scale UPS systems are employed in data centers to ensure continuous power to critical servers and infrastructure.
- **Telecommunications:** UPS is utilized in the telecommunications industry to maintain connectivity during power interruptions.
- **Critical Industrial Equipment:** Critical industrial processes and equipment may use UPS to prevent disruptions due to power fluctuations.

Maintenance Challenges: UPS units are primarily designed for backup power for electronic equipment. So, Emergency lights may have different maintenance and requirements. Using a UPS for emergency lighting might not align with the specific needs and standards of emergency lighting systems.



2. EPS (Emergency Power System):

Main Function: EPS refers to a broader category of power backup systems designed to provide emergency power during unexpected failures or outages. In scenarios where the load typically runs on city power but switches to an inverter during outages, a significant advantage emerges. In this case, loads characterized by low power factor and induced harmonics do not need to rely on the inverter continuously. This selective usage enhances overall efficiency and prolongs the lifespan of our backup power unit. Moreover, it allows us to power a wide range of loads, including

those that UPS systems may struggle to handle.

Applications:

- **Life Safety Systems:** EPS is crucial in facilities such as hospitals, where it powers life safety systems like emergency lighting, alarms, and medical equipment during power outages.
- **Code Compliance:** Emergency lighting systems are subject to building and safety codes that dictate their design and performance standards. Therefore, an EPS unit must be used. Using a UPS for emergency lighting may not comply with these codes, potentially posing safety and regulatory issues.
- **Elevators:** In buildings, EPS can be used to power elevators and ensure the safe evacuation of people during power failures.
- **Emergency Lighting:** Public spaces, offices, casino game or slot machines and other critical areas use EPS to maintain emergency lighting for evacuation purposes.
- **Critical Infrastructure:** Any facility with critical systems requiring continuous power, such as control rooms or security systems, may implement EPS.

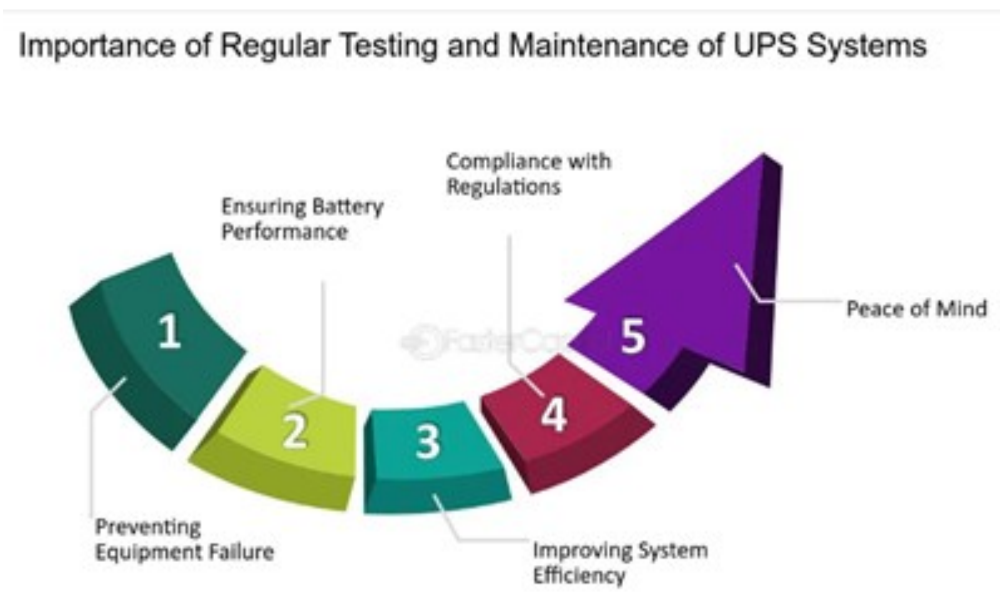
Comparison:

Commonality: Both UPS (Uninterruptible Power Supply) and EPS (Emergency Power System) share the common objective of furnishing backup power; however, they are typically tailored for distinct applications. Online UPS ensures continuous operation by keeping the load consistently powered by the inverter, whereas EPS functions by activating the inverter solely during power outages to sustain the load.

Scope: UPS is more focused on providing a seamless transition during short power disruptions to prevent data loss and equipment damage, while EPS has a broader application in ensuring power for critical life safety systems and essential infrastructure during emergencies.

In summary, UPS is more common in settings where the continuity of electronic systems is critical, while EPS is employed in a wider range of applications, emphasizing emergency power for various essential systems beyond electronic devices

Article reprinted with permission



Overview of Modern Energy Conversion Technologies

Bill Henderson

Energy is the linchpin of modern technology, vital for powering devices, machines, and systems that shape daily life. From turning on a light switch to driving cars, energy conversion is a fundamental process that transforms energy from one form to another, making it usable for a variety of applications. The methods of energy conversion are diverse, each with unique mechanisms and applications. One common example is the use of steam turbines, where thermal energy from steam is converted into mechanical energy to generate electricity, a principle that lies at the heart of many power plants.

Current technologies harness various forms of energy such as chemical, nuclear, and radiant energies, and convert these into electrical, mechanical, or thermal energy. For instance, chemical energy stored in batteries is transformed into electrical energy to power mobile devices. Similarly, the energy within atomic nuclei is released during nuclear fission or fusion to produce heat, subsequently used for electricity generation. Moreover, innovations in materials science have led to the development of topological materials that can efficiently convert waste heat into electricity, improving energy efficiency across different industries.

In the world of renewable energy, solar panels utilize photovoltaic cells to convert sunlight directly into electricity, while wind turbines convert kinetic energy from the wind into mechanical power, illustrating the versatility and advancement of energy conversion technologies. As the global demand for energy grows, these methods of energy conversion are continually refined and optimized, paving the way for more sustainable and efficient energy usage.

Mechanical Energy Conversion

Mechanical energy conversion encompasses methods that transform kinetic or potential energy into electrical energy. Technologies in this field capitalize on natural forces such as falling water, wind, and ocean waves. Consider that this type of energy can be stored via pumped water storage reservoirs, stretched elastics and compressed springs.

Hydropower

Hydropower utilizes the energy of flowing water to drive turbines connected to generators, producing electricity. It remains one of the most efficient and oldest methods of energy conversion. Examples include the Hoover Dam in the United States and the Three Gorges Dam in China, where massive quantities of water are managed to generate substantial amounts of electricity.

Wind Power

Wind power harnesses air movement to rotate turbine blades which, in turn, drive generators to produce electricity. This method of energy conversion is heavily dependent on weather conditions and geography. Examples comprise onshore wind farms like the Alta Wind Energy Center in California and offshore farms such as the London Array in the United Kingdom.

Wave Power

Wave power converts the energy from ocean surface waves into electricity. This technology exploits the up and down movement of waves to activate generators. While not as widespread as hydropower and wind power, more and more examples_of wave power conversion can be found around the world every year.

Thermal Energy Conversion

Thermal energy conversion is the process of transforming heat into other useful forms of energy, such as mechanical work or electricity. This conversion account for a significant amount of modern energy technology, with applications spanning from power generation to transportation.

Steam Turbines

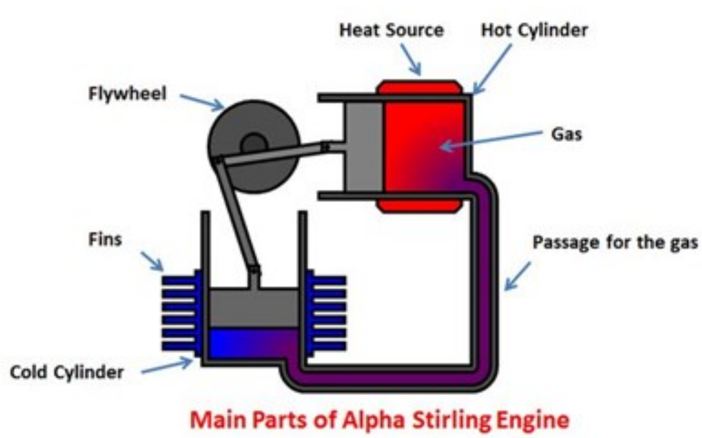
Steam turbines function by harnessing the thermal energy from heated water vapor. The high-pressure steam passes through a series of blades, imparting force and causing the turbine to rotate. This mechanical work is then converted into electrical energy through a generator. Notable examples include nuclear power plants, where nuclear reactions provide the necessary heat, and concentrated solar power facilities, where the sun heats the working fluid.

Internal Combustion Engines

Internal combustion engines convert thermal energy from fuel combustion directly into mechanical energy. They ignite a mixture of air and fuel, creating a high-pressure gas that drives the pistons. This process is integral to the operation of the majority of vehicles on the road today, from small cars to large trucks and buses.

Stirling Engines

Stirling engines are a class of external combustion engines that operate on the expansion and contraction of a gas at different temperatures. Unlike internal combustion engines, they have a fixed amount of gas that cycles between a hot and cold heat exchanger, resulting in a net conversion of heat into work. Stirling engines are known for their high efficiency and have applications in solar power generation and submarines.



Chemical Energy Conversion

Chemical energy conversion involves transforming the energy stored in chemical bonds into other forms of energy that can be utilized by technology. This energy is typically harnessed to generate electricity or power machinery.

Batteries

Batteries operate on electrochemical reactions. They convert chemical energy directly into electrical energy through the movement of electrons between two different materials, usually an anode and a cathode. For example, lithium-ion batteries power everything from smartphones to electric vehicles by shuttling lithium ions between electrodes.

Fuel Cells

Fuel cells generate electricity through a chemical reaction between a fuel, like hydrogen, and an oxidizer. They are similar to batteries but can continuously provide electric power as long as fuel is supplied. Examples include hydrogen fuel cells used in some vehicles and backup power systems.

Combustion

Combustion is a high-temperature exothermic chemical reaction between a fuel and an oxidant, resulting in the production of heat energy. This heat can then be used to produce steam for steam turbines in power plants. An everyday example is the internal combustion engine in automobiles, which converts the chemical energy in fuel into mechanical energy.

Electromagnetic Energy Conversion

Electromagnetic energy conversion encompasses technologies that transform energy into electricity, leveraging physical principles such as electromagnetism. This transformation is pivotal for numerous applications, including renewable energy generation and wireless power solutions.

Photovoltaic Solar Cells
Photovoltaic solar cells operate on the principle of converting sunlight directly into electricity. When photons from sunlight hit the cells, they free electrons in the material, typically silicon, creating an electrical current. For instance, a standard solar panel installed on a home can convert sunlight into electrical energy, which is then used for residential power needs.

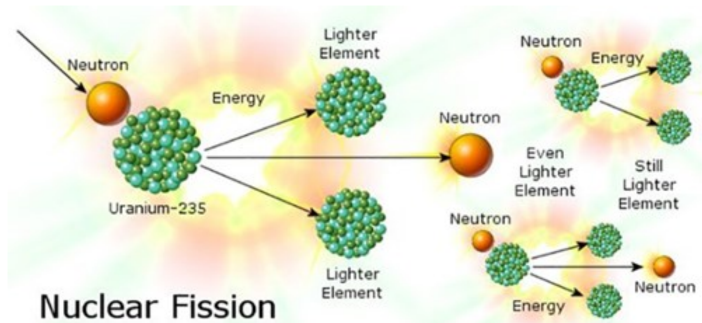
Electromagnetic Generators
Electromagnetic generators produce electricity through the movement of a conductor in a magnetic field. The rotating action within these generators causes electrons to move, therebys generating electric current. A common example is a hydroelectric power plant, where flowing water turns turbines that spin conductors within magnetic fields to create substantial amounts of electrical power.

Inductive Charging
Inductive charging relies on electromagnetic fields to wirelessly transfer energy. This process involves an induction coil in the charging station creating an alternating electromagnetic field, which then induces current in a second coil in the device being charged. One can find this technology in various applications, such as electric toothbrush charging bases or wireless smartphone chargers.

Nuclear Energy Conversion
Nuclear energy conversion encompasses the processes that harness the energy from atomic nuclei. This transformative technology generates significant amounts of electricity, requiring critical safety mechanisms and conversion methodologies.

Fission Reactors
Fission reactors operate on the principle of nuclear fission, where the nucleus of an atom, typically uranium-235, is split into two smaller nuclei, releasing a considerable amount of energy. This energy is primarily released in the form of heat, which is used to produce steam. The steam then drives turbines, which in turn produce electricity. Examples include the pressurized water reactor (PWR) and the boiling water reactor (BWR). Over time, reactor designs have enhanced features aimed at safety, cost-efficiency, and extended operational lifespan, as detailed at Energy Basics.

Fusion Reactors
Unlike fission, fusion reactors aim to replicate the process that powers the sun, combining light atomic nuclei like hydrogen to form a heavier nucleus, typically helium. This reaction releases a vast amount of energy. Although still in the experimental phase, fusion reactors promise a less radioactive and potentially limitless energy source.



The heat produced by the kinetic energy of the fusion products can be converted to electricity with near-perfect efficiency. While no fusion reactors are currently commercially operational, research such as that at the International Thermonuclear Experimental Reactor (ITER) is ongoing, as is further reading at How do we turn nuclear fusion energy into electricity?

Electrochemical Energy Conversion
Electrochemical energy conversion is a process where chemical energy is directly transformed into electrical energy. Electrochemical devices like fuel cells are prominent examples, efficiently generating electricity with heat and water as by-products.

Electrolysis
Through electrolysis, electrical energy is applied to drive a chemical reaction that would not occur spontaneously. This method is crucial in decomposing compounds such as splitting water into hydrogen and oxygen.

- Industrial Application: Large-scale production of hydrogen for fuel cells or chemical manufacturing.
- Environmental Impact: Generates pure gases without direct carbon emissions if the electricity

used is from renewable sources.

Electrolysis serves as the backbone of a variety of green energy solutions, including the generation of hydrogen for fuel cells and advanced energy storage technologies With growing emphasis on sustainability, electrolysis is key in the transition to low-carbon energy systems.

Biological Energy Conversion

Biological energy conversion encompasses processes where organisms convert organic materials into energy. These methods are utilized to produce sustainable forms of energy that can be harnessed for various applications, including heat and electricity generation.

Biofuels

Biofuels are derived from organic matter, commonly plant material that contains stored energy from sunlight. These fuels come in different forms, such as ethanol, produced through the fermentation of crops like corn and sugarcane, and biodiesel, obtained by processing vegetable oils or animal fats. For instance, soybean oil can be converted into a usable fuel for diesel engines.

Biogas

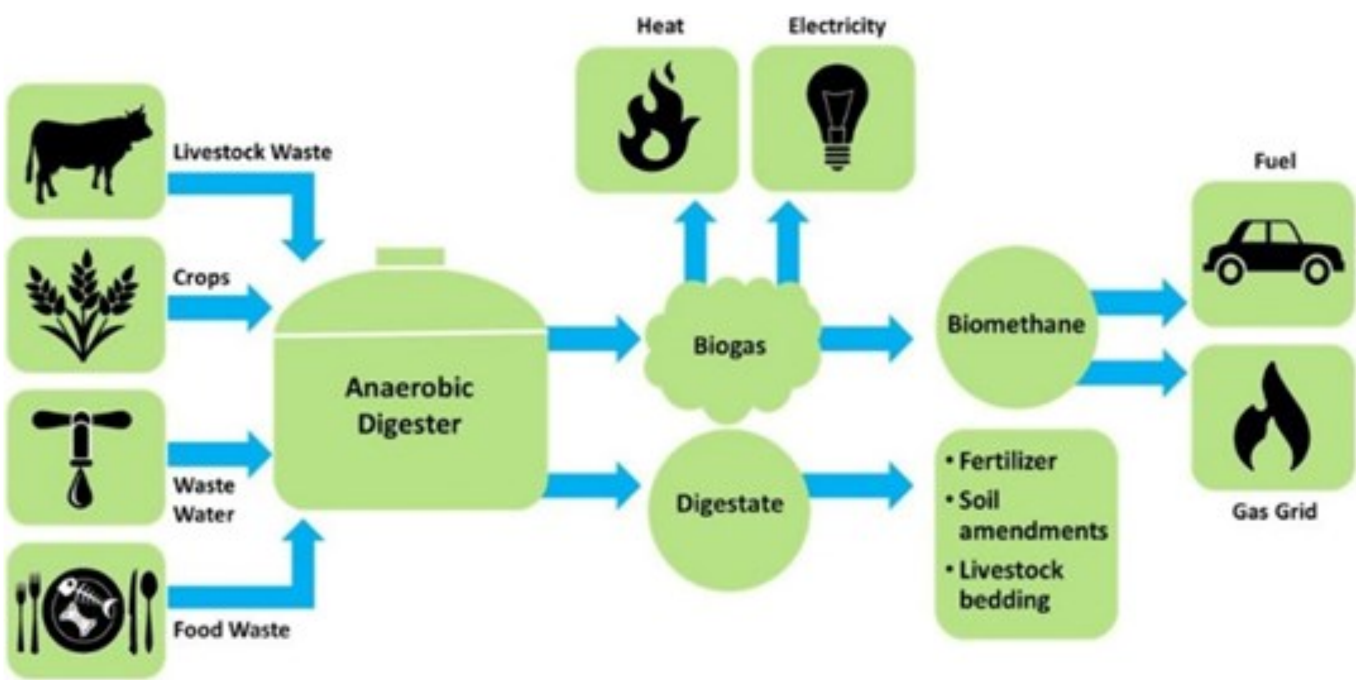
Biogas is mainly composed of methane and carbon dioxide, resulting from the anaerobic digestion, a process where microorganisms break down organic matter in the absence of oxygen. One example is the decay of food waste in landfills, which produces biogas that can be captured and used for generating electricity or as a heat source. Additionally, agricultural waste can be transformed into biogas in a more controlled environment such as a digester.

Energy conversion technologies play a crucial role in modern life, transforming various forms of energy into electricity, mechanical power, and heat to drive the many devices, vehicles, and systems integral to daily activities and industrial processes. From the steam turbines that harness thermal energy in power plants to the innovative materials science developments enabling efficient conversion of waste heat into electricity, the spectrum of energy conversion is broad and impactful.

In the realm of renewable energy, advancements such as photovoltaic cells and wind turbines exemplify the ongoing innovation and adaptation aimed at meeting the growing global energy demand sustainably. As technology progresses, these energy conversion methods continue to evolve, reducing dependency on non-renewable resources and enhancing energy efficiency, which is crucial for environmental sustainability and energy security.

Join me as we explore the many advances of energy conversion toward a more sustainable economy and planet friendly outlook. Each edition going forward will introduce the most promising technologies being imagined and built to move us forward from a parasitic to a symbiotic relationship with nature.

Article reprinted with permission



Kenken Puzzle Answer

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

TEST YOUR OPERATOR IQ ANSWERS

Answers: 1)c 2)c 3)a 4)d 5)c 6)e

JOIN US:
TUESDAY MAY 14, 2024 AT 5PM FOR OUR IN-PERSON MONTHLY MEETING

Title: Cogeneration Systems and their practical uses in commercial, industrial & retail applications

- What is a cogeneration (CHP) system?
- What types of equipment are used for these purposes?
- Examples of installations in Calgary.
- Typical challenges and successes that have come of the numerous installations.
- Specific application considerations.
- General Q&A

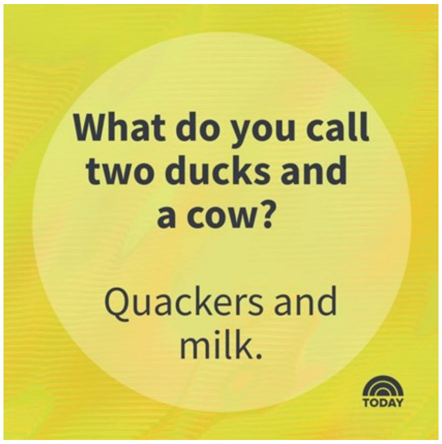
Presenter: **Adam Foneseca, President**
Erik Wathen, Director of Product Support

Location: **Danish Canadian Club, 727 11 Ave SW,**
Calgary, AB T2R 0E3

Bio: **Adam Fonseca** is a multidisciplinary power generation professional from Calgary. His educational background is in mechanical and electrical engineering technology as well as mechanical engineering. 15+ years in the electrical industry where he began his career in generators and transfer equipment in the mid 2000's. He is now one of the owners & executive staff at Point8 Power Systems Ltd. where they focus on power generation systems in the emergency and prime power segments. A specific focus on cogeneration & thermal systems from service, sales & design.

Erik Wathen is a multidisciplinary power generation professional from Calgary. His educational background is in heavy duty technician & electrician trades. Erik has 20 years of experience in the power generation industry having started his career as a generator technician through to service operations, technical support & "train the trainer" roles. Erik is now part of the executive team at Point8 Power Systems as the director of product support.

Just for laughs!



BOA CALGARY OPERATOR MAGAZINE ADVERTISING RATES:

1/8 page	$200	**Premium Locations:**	
1/4 page	$400	1/2 page inside/outside cover	$850
1/2 page	$775	1/2 page outside cover	$900
Full page	$1000		

Deadline for ads is the 10th of each month. For any questions, please email: advertising@boacalgary.com.

Advertisers Directory

Boiler Services **Black & McDonald**	**403-235-0331**
Drain Services Revive Pipes	403-903-4445
Engineering Services Building Envelope Engineering	403-287-0888
Filtration BGE Air Quality Solutions Ltd.	403-243-5941
Fire Protection Services Constant Fire Protection	403-279-7973
HVAC & Electrical Services Black & McDonald	403-235-0331
Indoor Air Quality Services Gasonic Instrument Inc,	403-276-2201
Motor Services James Electric Motor Services	403-252-5477
Power Systems Custom Power Products	855-948-8810
Supply Services DC Sales Corporation	403-253-6808

Support those that support

YOU!

Next time you are looking for a product or a service provider, please consider connecting with one of our advertisers & members of the Building Operators Association of Calgary

Alberta Certified Power Engineers Online Directory

Check to see when your power engineer certificate is due for renewal!

www.absa.ca/directories/alberta-certified-power-engineers-directory/


CONSUMER CHOICE AWARD 2015 SOUTHERN ALBERTA
James Electric
Motor Services Ltd.
ISO 9001:2008 REGISTERED FIRM
Professional Pump & Electric Motor Repair
35,000 Square Foot Service Center and Warehouse
In-House Machine Shop & Fabrication Departments
Fully Equipped Service Vans
Certified Hydronic Designer on Staff
Calgary's Largest Replacement Motor Inventory
Largest Stock of Pumps & Pump Parts in Western Canada
Custom Built Fans and Blowers to Meet Your Specifications
ISO & COR Certified
Consumer Choice Award 8 Years Running
All Service Technicians are Trained in Confined Space Entry
Fire Pump, Booster Pump and Sump Pit Annual Inspections Available
Energy Efficient Audits and Solutions
On Call 24 Hours, 7 Days a Week
Motors
A.O. Smith, Baldor, Century, Emerson, Franklin, Fasco, Lafert, Leeson, Marathon, WEG, Teco-Westinghouse, US Motors
Pumps
Armstrong, Albany, Barnes, Bell & Gossett, Burkes, Darling, Franklin, Goulds, Grundfos, Hydromatic, Liberty, Little Giant, Monarch, Paco, Taco, Tsurumi, Xylem
Fans & Blowers
Airdex, AirKing, Broan, Dayton, Delhi, Fantech, Fasco, Greenheck, Lau, Nederman, Nutone, Schaefer, Tjernlund
Variable Frequency Drives & Motor Controls
ABB, Danfoss, Baldor/Reliance, WEG, Santerno, Teco-Westinghouse, Tornatech
Accessories
Gear Boxes, Pressure Tanks, Gauges, Bearings, Mechanical Seals, Flow Indicators, Filter Housings, Filters, Flanges, V-Belts, Float Switches, Pressure Switches, Pulleys, Sheaves, Relays, Contactors, Pressure Reducing Valves
Are your pumps leaking money?
Booster Audit
We have ability to monitor water useage and power consumption to provide the following:
• A comprehensive pre audit booster inspection
• An energy audit with an estimate of annual energy savings and potential payback.
• The "scope of work" for the installing contractor
• Start-up and commissioning on site
• Yearly maintenance inspections
• On site service 24/7/365
Grundfos BoosterpaQ
• Most efficient cascade control, application optimized software in the industry
• Single source responsibility: One manufacturer for pumps, motors, drives and control
• Plug & Play - Easy to install and commission
• Large, clear, user friendly & advanced controls interface
• Reduced floor space footprint
• Ethernet & BUS communications option
• Drinking water approvals: NSF61/372, Hygenic designed 316SS manifolds
4020 - 8 Avenue S.E, Calgary, Alberta, T2G 3A7 www.jameselectric.ca motors@jameselectric.ca

We look forward to seeing you in-person for our meeting at the Danish Canadian Club (727 11 Ave SW) on Tuesday May 14, 2024 @ 5pm

Please visit the Building Operators Association of Canada YouTube Channel to watch the Speakers.

BOA Building Operators Association of Canada

Need Trained Building Operators?

'Be A Part of the First Training of its Kind'

CCIS OGTP

5th Class Power Engineering 'Building Operator' Training Program

- Our first ever program graduated nineteen 5th Class Power Engineers Building Operators
- 90% secured employment with major companies in town!

If you are a Building Owner/ Manager and would like to:

- know more about this training or
- be a work experience host employer or
- have recruting advantage after completion of training

At no cost to you!

Please contact:
Monika Bhandari
Phone: 403.514.8328
Email: mbhandari@ccisab.ca
1111-11 Ave SW 5th Floor
Calgary, Alberta T2R 0G5
www.ogtp.ca

Black&McDonald

Calgary Office
1071 26 St NE Calgary
403-235-0331

Services

Heating, Ventilation & Air Conditioning
Sheet Metal
Electrical
Building Automation Systems
Plumbing
Refrigeration
Voice & Data Communications
Instrumentation
High Voltage
Process Piping
Millwright & Rigging

Capabilities

Design/Build
Renovation & Upgrade
Fast-track Change-out
Building Commissioning
Infrared Thermography
Facilities Management & Operation
Planned Preventive Maintenance
Sheet Metal Fabrication Pipe
Complete Boiler Services
24-hour Emergency Service

Facilities

Commercial/Office
Industrial
Education & Institutional
Healthcare
Industrial
Telecom & Data Centers
Sports & Assembly
Airport & Transit Stations
Military Bases

Black & McDonald is a leader in quality service, committed to implementing innovative solutions throughout a facility's life cycle.

www.blackandmcdonald.com