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Publisher's Letter

Search For Alternative Approach Shows Light

When globally scientists are busy with tackling challenges such as minimising energy consumption in freezing agro produces (fruits, vegetable crops etc.), finding the most environment-friendly refrigerant and so on, biomedical engineers from the Tufts University have demonstrated that fruits can stay fresh for more than a week without refrigeration – if they are coated in an odourless, biocompatible silk solution so thin as to be virtually invisible. According to the researchers, the approach is a promising alternative for preservation of delicate foods using a naturally derived material and a water-based manufacturing process.

Silk's unique crystalline structure makes it one of nature's toughest materials. Fibroin, an insoluble protein found in silk, has a remarkable ability to stabilise and protect other materials while being fully biocompatible and biodegradable. Tests showed that the silk coating prolonged the freshness of the fruits by slowing fruit respiration, extending fruit firmness and preventing decay.

"The beta-sheet content of the edible silk fibroin coatings made the strawberries less permeable to carbon dioxide and oxygen. We saw a statistically significant delay in the decay of the fruit," said senior and corresponding study author Fiorenzo G. Omenetto, Ph.D. Omenetto is the Frank C. Doble Professor in the Department of Biomedical Engineering and also has appointments in the Department of Electrical Engineering and in the Department of Physics in the School of Arts and Sciences.

Similar experiments were performed on bananas, which, unlike strawberries, are able to ripen after they are harvested. The silk coating decreased the bananas' ripening rate compared with uncoated controls and added firmness to the fruit by preventing softening of the peel. The thin, odourless silk coating did not affect fruit texture. Taste was not studied.

The Tufts University research-engineers' work is significant from different angles. First of all, it may lead to an era where need for refrigeration for fruits and vegetables for short-time preservation and/or short-distance transportation will drastically reduce leading to lowering of the carbon footprints in those processes. From the commercial angle too, it may radically change the cost structure of the consumable fruits and vegetables. However, today's refrigeration service providers need not worry as they will always have an expanding open ground to play in home, public arena and workplace comfort space.

Please send your comments at pravita@charypublications.in

Pravita Iyer
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FROM THE EDITOR

A Top Priority

Beside today's common topics like Energy Savings through Emerging Technologies, Transportation Trends and Claims, Cold Chain to Reduce Food Losses, Worker Health and Safety; this year the participants in the 19th annual European Cold Chain Conference, especially discussed the huge skill gap in the HVACR industry and the steps to improve that. Corey Rosenbusch, President & CEO of Global Cold Chain Alliance (GCCA) said, "The 'Next Gen' panel of future industry leaders was a favourite amongst the delegates and mine as well. I continue to hear from members around the world that talent management is a top priority for them – and facilitating discussions with young professionals currently working in the industry gives us tremendous insight into how to attract and retain their peers."

The HVACR Workforce Development Foundation (US) is dedicated to leading an industry effort to develop and promote educational projects, programs and partnerships to attract committed and skilled employees to a career in HVACR. Several researches were conducted by them on the supply and demand of the employment and skills gap for HVACR technicians and installers in the U.S. and Canada. One such report concisely lays out the immediate need for post-secondary schools to ramp up their recruitment processes and for high schools, counselors and parents to encourage students to pursue these mid-skill jobs.

In the US, the Bureau of Labor Statistics (BLS) estimates that the number of HVACR mechanic and installer jobs will increase by 21% through 2022, nearly twice the growth of employment overall. Likewise, there the Social Security Administration estimates 22% of the U.S. workforce will retire during this time. As demand heats up, the supply of trained HVACR talent is not keeping pace and may even be shrinking. As per BLS there are currently 267,600 HVACR mechanics and installers in the U.S. But a new study estimates that 115,000 new HVACR workers must be trained by 2022 to meet the anticipated demand.

In India too; with fast growth of food processing and pharmaceutical sector, ambitious advancement of the cold chain segment, rising requirement for home, office and car cooling etc.; the demand for skilled HVACR mechanics is rising rapidly. So, we need to stringently focus on developing HVACR skill in the country to avoid any future shortfall.

"The demand for skilled HVACR mechanics is rising rapidly. So, we need to stringently focus on developing HVACR skill in the country to avoid any future shortfall...

Pl. send your views at pkchatterjee@charypublications.in

P. K. Chatterjee

Directors
Mahadevan Iyer
Pravita Iyer

Publisher
Pravita Iyer

Editor
P K Chatterjee
pkchatterjee@charypublications.in

Editorial Coordinator
Nafisa Kaisar
nafisa@charypublications.in

Advertising Department
Jigar Padachh
advt@coolingindia.in

Design
Nilesh Nimkar
charydesign@charypublications.in

Subscription Department
Nafisa Khan
sub@charypublications.in

Accounts
Dattakumar Barge
accounts@charypublications.in

Response Department
Sonali Pugaonkar
mktg@charypublications.in

Cooling India is also available online on www.coolingindia.in. For online enquiries contact: Priya Dubey dgmarketing@charypublicaitons.in

Chary Publications Pvt Ltd
Editorial, Subscription & Advt. Office:
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Opp. Telecom Factory, Deonar, Mumbai - 400 088.
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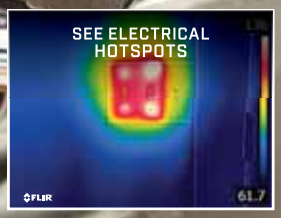

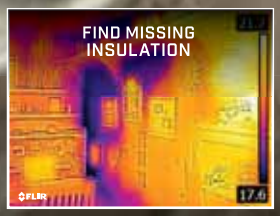

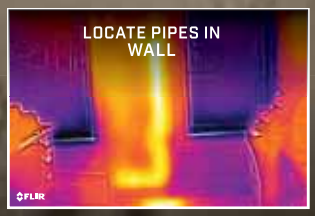

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For more details call us on : +91-11-4560 3555
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HVACR parts manufacturer DiversiTech buys mount firm Quick-Sling

HVACR parts and accessories supplier DiversiTech has purchased Quick-Sling, the United States manufacturer of mounting products.

Founded in 2011 and based in Massachusetts, Quick-Sling offers a suite of products that simplify the installation of air conditioning units and air handlers.

"Quick-Sling and its approach to serving the HVAC community perfectly matches our own. With this new partnership, DiversiTech adds another industry leading product group to DiversiTech's broad consolidated offering in an effort to better serve our customers," said DiversiTech CEO Jim Prescott.

"DiversiTech's reputation and distribution advantages will enable Quick-Sling products to reach a wider range of wholesale customers and contractors, which can provide multiple advantages, not the least of which is to help them grow their businesses," said Quick-Sling founder and CEO Bill Crowley.

Manufactured in the USA, and rigorously engineered as well as tested, all Quick-Sling products come 80% pre-assembled.

DiversiTech's acquisition of Quick-Sling is the company's third acquisition in the past five months. The company is currently offering more than 7,000 product items in over 200 product categories. ■

ASHRAE updates its standard for indoor air quality

Requirements regarding multi-family dwellings, tobacco smoke, and operations and maintenance were among changes to American Society of Heating, Refrigerating, and Air-Conditioning Engineers' (ASHRAE) Indoor Air Quality standard, which was published recently.

ANSI/ASHRAE Standard 62.1-2016, Ventilation for Acceptable Indoor Air Quality, has set minimum ventilation rates and other requirements for commercial and institutional buildings.

The latest version of the standard contains changes that affect high-rise residential spaces, the indoor air quality procedure, laboratory exhaust and demand control ventilation.

"Designers and users of the standards who are involved with those spaces or processes will benefit from using these up-to-date requirements," said Hoy Bohanon, Chair of the Standard 62.1 committee. ■

Toshiba VRF attains awards hat-trick

Toshiba has completed a unique hat-trick recently after its SMMS-e VRF air conditioning system won a third major UK award this year.

The top performing VRF system, introduced last year, followed up earlier wins by taking the Building Services Product of the Year – HVAC Supply title at the recent H&V News Awards.

Already this year, the SMMS-e has been named Product of the Year at both the National ACR & Heat Pump Awards as well as the ACR News Awards.

H&V News awards at The Grosvenor Hotel in London also saw Cool-Therm win the Building Services Project of the Year, for its involvement in an energy efficient replacement of the cooling and heating system in one of the iconic buildings in London's Canary Wharf.

They employed six Clima Tech air handling units linked to six Geoclima water-to-air heat pumps. ■

Alfa Laval hits out at duty 'adjustments'

Alfa Laval, a well known HVACR manufacturer, has hit out at what it says are common industry practices to 'adjust' plate heat exchanger heat duties in order to win contracts.

In a hard-hitting statement, the company has said that it is committed to raising awareness of the problem of manufacturers using large sizing tolerances while designing plate heat exchangers.

In what it sees as the biggest problem facing the plate heat exchanger industry, Alfa Laval states, "For many years it has been a common, albeit hidden, practice in the industry for suppliers of plate heat exchangers to 'adjust' or tweak heat duty calculations when sizing the heat exchangers."

"This creates uncertainty about heat exchanger performance and leads to higher operating costs for the end customer," the Swedish manufacturer claims.

These 'adjusted' calculations have become a weapon of deception in the battle to win contracts, Alfa Laval maintains.

"Manufacturers manipulate calculations so that component costs can be minimised and a smaller plate heat exchanger can be offered at an attractive price. However, the result is that end customers get under-dimensioned heat exchangers, leading to higher system-wide energy use, higher operating costs and compromised environmental performance."

"The widespread practice of 'recalculation' is a big problem for everyone in the industry. It makes it harder to choose a heat exchanger that will provide the required performance and increase the risk that it will underperform."

Alfa Laval categorically claims that the only way to create a level playing field is to adopt the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) certification programme – "the only independent third-party organisation that certifies performance of plate heat exchangers worldwide." ■

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US$3 million to be spent to keep away summer sickness in NY

New York Governor Andrew M Cuomo has announced that US $3 million would be made available to help New Yorkers with medical conditions which are likely to be aggravated by extreme heat, so that they may purchase and install air conditioning equipment at home.

Households found to be eligible would be able to apply for cooling assistance through the New York State Office of Temporary and Disability Assistance's Home Energy Assistance Programme.

"Heat and humidity during the summer can be uncomfortable for some, but potentially life-threatening to others with medical conditions exacerbated by high temperatures. This programme will ensure that some of the most vulnerable New Yorkers can remain safe and cool in their homes when the summer weather is at its worst," Governor Cuomo said.

Cooling assistance through the Home Energy Assistance Programme would be available only to those households, which meet the programme's income guidelines and include a member who suffers from a documented medical condition exacerbated by extreme heat.

New York State Office of Temporary and Disability Assistance Commissioner Samuel D Roberts said, "It's important that anyone who may be eligible applies soon, so that their air conditioning unit can be safely installed before the hot weather arrives. There's no reason for someone whose medical condition can be worsened by the heat to suffer through the summer when this help is available."

Income eligibility will be determined by a sliding scale based on how many people live in a home. For example, a four-person household must make less than US $4,316 a month to be eligible. ■

US International Trade Commission gives nod to R134a probe

Investigations into the alleged dumping of cheap R134a refrigerant in the US market are to continue after US trade commissioners decided that US industry could be damaged.

The United States International Trade Commission (USITC) has determined that there is a reasonable indication that the US industry is materially injured by reason of imports of R134a from China, which are allegedly sold in the United States at less than fair value.

As a result of the affirmative vote by all six commissioners, the US Department of Commerce will continue to conduct its investigation on imports of R134a from China, with its preliminary anti-dumping duty determination due on or by August 10. The investigation began after a US industry coalition claimed that large and increasing volumes of low-priced imports from China were causing material injury to the US fluorochemicals industry. Chinese R134a imports are said to have increased by more than 35% from 2013 to 2015, and continue to steadily increase.

The petitioners are the American HFC Coalition and its individual members, and District Lodge 154 of the International Association of Machinists and Aerospace Workers. ■

Thai air-conditioner firm Saijo Denki switches to R32

Assistance from the Montreal Protocol Multilateral Fund has enabled Saijo Denki to become the first Thai manufacturer to produce air conditioners using the lower GWP refrigerant R32. In a push to move away from ozone-depleting R22, but mindful of the high GWP of alternative refrigerant R410A, Thailand has been promoting the adoption of R32 under its HCFC Phase-out Project, after Thailand's Ministry of Finance and the World Bank signed a US$23.9 million funding deal in November 2014.

Japanese manufacturer, and R32 pioneer, Daikin has also been providing technical assistance to Saijo Denki and 11 other Thai air conditioning equipment manufacturers to convert production from R22 to R32. Daikin's involvement was backed by the Japanese Ministry of Economy, Trade and Industry (METI).

Thailand earlier announced a policy to complete conversion from R22 to R32 by 2017. ■

Daikin's R32 split air-conditioner gets environmental certification

Daikin's high ambient R32 inverter air conditioner, introduced in the Middle East last year, has received further environmental certification in the region. In a presentation ceremony recently, Daikin received the Abu Dhabi Quality Conformity Council (QCC) Trustmark for Environmental Performance for its high ambient R32 split air conditioner. The latest award follows certifications to the UAE's ESMA standard and Saudi Arabia's Conformity Assessment Programme.

The Trustmark was acquired by Daikin achieving conformance to Abu Dhabi's recently introduced Unitary Air Conditioners Certification Scheme. This defines minimum energy performance standards and technical requirements for unitary air conditioners in domestic and commercial buildings in Abu Dhabi.

Congratulating Daikin on receiving the certification, Mohammed Helal Al Balooshi, QCC's Director of Marketing and Communications said, "QCC is delighted to collaborate with manufacturers, suppliers and distributors of unitary air conditioners to obtain voluntary certification of products that meet our quality, safety and performance specifications. We launched the Unitary Air Conditioners Certification Scheme as part of our priority to promote the use of safe, high quality and energy efficient air conditioning equipment with zero impact on the ozone layer and minimal power consumption."

"The unique combination of R32 and inverter technology in the new Daikin air-conditioner range offers end-users the opportunity to benefit from class-leading energy efficiencies that can provide up to 40% power savings versus conventional non-inverter systems, with excellent cooling capacity and high indoor climate comfort, while lowering the environmental impact," said Sana Hamdani, Product Marketing Manager of Daikin Middle East & Africa.

Built in Thailand, Daikin's high ambient units are said to offer the best nominal and seasonal efficiencies in line with real-life Middle East operating conditions. ■

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Sainsbury's takes delivery of new CO_2 trailer

UK supermarket chain Sainsbury's has become the first customer to take delivery of Carrier Transicold's prototype CO_2 refrigerant trailer unit. The delivery marks the first of three units to join the Sainsbury's fleet this year as part of a 3-year technology field trial. It builds on the success of a 2013 pilot project, which saw the supermarket operate a modified road version of Carrier Transicold's NaturaLine refrigeration system for ocean containers – making it the first naturally refrigerated trailer operating anywhere in the world.

The new prototype system uses advanced technology from the NaturaLine refrigeration system, assembled inside a traditional Carrier Vector unit chassis and powered by the same patented E-Drive all-electric technology as Carrier Transicold's existing Vector range.

"Delivering the first dedicated natural refrigerant trailer prototype into service marks a huge milestone in the development of over-the-road refrigeration using CO_2," said David Appel, President, Carrier Transicold & Refrigeration Systems.

"Our ultimate vision is to see temperature-controlled units running on natural refrigerant in mainstream production. Today, with the support of one of our largest European customers, we are one step closer," he said.

"We're thrilled to be working closely with Carrier Transicold as they spearhead this innovation," added Gary King, Operations Support Manager, Sainsbury's. "The beauty of Carrier Transicold's prototype trailer unit is it delivers a massive reduction in F-gases by using natural refrigerant. This will directly help us achieve our ambitious environmental and sustainability goals, whilst delivering a seismic leap forward in terms of sustainability within the cold chain."

Sainsbury's has taken a leading position in testing the new Carrier Transicold innovation in a real-life trial, with the trailers being used for everyday store deliveries. ■

Dawson Rentals to switch over to Dearman's LiqN_2 engine trucks

UK truck rental company Dawson Rentals is all set to make refrigerated vehicles using Dearman's Liquid Nitrogen (Liq N_2) engine available to fleet operators. In a deal struck with Dearman and Hubbard Products, Dawson Rentals will support early commercial demonstrations by making state-of-the-art refrigerated vehicles available to operators, to use the technology, while lending extensive industry expertise. The zero-emission technology uses the Dearman Engine, which is powered by Liq N_2, to deliver efficient, quiet and cost effective transport refrigeration, without any emissions of NO_x or particulate matter. The first demonstration of the technology is planned to begin with a major UK commercial operator shortly. An expanded second phase of demonstrations will then commence later in the year.

Discussing the announcement, J Fletcher, MD, Dawson Rentals said, "There is an ever stronger focus on the environment and the need to cut emissions and boost drive efficiencies throughout the logistics sector. We are working hard to provide customers with access to the latest technologies to help their businesses, while also benefiting the wider community." ■

BESA calls for F-gas venting clampdown


Tim Rook

UK-based contractors' association Building Engineering Service Association (BESA) has called for more investment to allow the Environment Agency to step up investigations of incidents of illegal F-gas venting. Responding to the recent fine meted out to Schneider Electric for failing to recover 15kg of sulphur hexafluoride (SF_6), BESA Technical Director Tim Rook said, "This episode reminds us of the importance of remaining vigilant, and it is reassuring to see that the government agency charged with enforcing the F-gas regulations is able to follow up reports of wrong doing with punitive action."

However, he added that policing of F-Gas Regulations is 'woefully under-resourced.'

Rook also pointed out, "Govt needs to take another look. We can't always depend on companies to do the right thing and Schneider should be given some credit for reporting it themselves." ■

Glen Dimplex Group acquires Ability Projects

Poole-based fan coil manufacturer Ability Projects has been acquired by the Glen Dimplex Group, UK.

Established in 2001, Ability Projects is a specialist in the design, manufacture and supply of fan coil units and digital control technology. It also has a range of heat recovery units and twin/single fan units.

Although best known as a manufacturer of electric heating and domestic appliances, Glen Dimplex also has commercial refrigeration and industrial process cooling interests.

Described as a perfect acquisition, Glen Dimplex Heating CEO Neil Stewart said, "We are delighted to have acquired Ability Projects which is at the forefront of technological development in their field – using the very latest design and manufacturing techniques."

Peter Lowther, Managing Director of Ability Projects, said, "This really is a fantastic opportunity for all of us, including our customers – who I would like to re-assure – will continue to receive the exceptional products and services that they have enjoyed in the past but now with the enhanced support of an international group."

Ability Projects is currently in the process of extending its facilities in Poole with additional office space, besides new manufacturing as well as storage capabilities. When it is over, it will bring the total site close to 40,000ft² (3,700m²).

Backed by a dedicated showroom in London, Ability Projects also exports products to New Zealand, the UAE, Australia and Hong Kong. It also has manufacturers representatives in the USA and Canada. ■

Carrier Rental Systems expands chiller hire offering in the UK

Carrier Rental Systems (CRS) has invested in a new fleet of high-performance chillers for hire in the United Kingdom, in order to cater to the increasing demand for temporary cooling plants.

Carrier has made additions to its medium- and high-capacity machines, spanning 220 to over 400kW of cooling, and new model sizes at the small end of the range to cater to applications with modest cooling requirements.

The air-cooled packaged chillers are all from Carrier's AquaSnap scroll-based range. Importantly, the new chillers are encased in a custom-built steel frame to protect them during transportation to and from site and enable high density stocking at CRS distribution centres.

"Our newly enlarged chiller fleet has even greater resilience, enabling it be deployed quickly and safely, and to withstand the often arduous conditions of temporary cooling duties in the field," said Marc White, director, Carrier Rental Systems.

He further added, "It is in the nature of hire projects that the cooling plant sometimes has to be located in situations which are not ideal. In particular, a temporary chiller may have to be positioned on an existing base-frame; the integrated high strength steel cage helps stabilise the chiller plant and spread the weight, reducing point loading." ■

Mexichem increases prices of high GWP refrigerants

The European F-gas quota system introduced at the beginning of the year has prompted Mexichem to increase prices on its high GWP refrigerants by up to 15%.

Mexichem prices increased by 10% on April 1 on its KLEA brand of refrigerants R134a, R407A, R407C and R410A, and by 15% on R404A and R507.

The reducing quota system based on CO_2 equivalents, introduced as part of the HFC phase-down under the F-gas regulations, is expected to bring increasing price pressures on the high GWP gases.

Mexichem insists that the latest price increases have been made in order to maintain its development work in reduced GWP refrigerants and to support the transition away from higher GWP products.

"The move comes as reductions in the amount of CO_2 equivalent tonnes from HFCs available to the market under the EU F-gas regulation – that has increased demand for Mexichem's quota," the company informed. ■

Toshiba to launch R32 based air-conditioner in the UK

Toshiba is all set to launch its first R32 based air conditioner in the UK, offering the lower GWP refrigerant as an alternative to R410A based products.

Previewed at the recent Mostra Convegno Exhibition in Milan, Toshiba UK has said that it will launch an R32 version of its MIRAI entry-level split air-conditioner during the second quarter of this year.

The high-wall residential inverter heat pump will be available in two versions – R410A and R32.

Boasting of an A+ class in cooling and heating, the MIRAI is expected to be available in five sizes from 1.5 to 5 kW.

Featuring a specially-coated aluminium fin coil to repel dust and improve efficiency, it is said to enable cooling operation down to -15ºC ambient and is suitable for server-room applications.

Performance is further boosted by using Toshiba's twin rotary compressor technology.■

FG Eurofred's name reverts to Fujitsu General Air Conditioning UK Ltd

FG Eurofred, the UK distributor of Fujitsu air conditioning, has changed its name back to Fujitsu General Air Conditioning (UK) Ltd.

The decision reverses the name change made in 2007 when the Japanese manufacturer controversially formed the UK joint venture with its largest European distributor, the Spain-based Eurofred Group.

Eurofred had entered the UK market the previous year in direct competition with Fujitsu's established UK distributor network.

Announcing the decision to revert to the original name, Ian Carroll, Sales and Marketing Director, Fujitsu, said, "This decision removes any confusion about our name and reaffirms our commitment to the UK as it has become clear that not having the highly recognisable name 'Fujitsu' in our company title has not made the most of an extremely strong world-wide brand".

"The new name gives us the opportunity to underline what's important to our customers. Brand recognition backed by renowned Fujitsu quality. We have so much to shout about this year which happens to coincide with the 30th anniversary of Fujitsu General starting its air conditioning business in the UK." ■

Cold Chain Centre Of Excellence

Emerson Climate Technologies, a business segment of Emerson, is the world's leading provider of heating, air conditioning and refrigeration solutions for residential, industrial and commercial applications. The group combines best-in-class technology with proven engineering, design, distribution, educational and monitoring services to provide customized, integrated climate-control solutions for customers worldwide.

Emerson Climate Technologies India, a business segment of Emerson (NYSE: EMR)has been living up to the mantle of thought-leader and innovator to the Heating, Ventilation, Air conditioning & Refrigeration (HVAC&R) industry. A sterling example of this is the Emerson Academia outreach program. Recently, under the aegis of this initiative, the faculty and the Master of Technology students of SPCE were invited to visit the Emerson Cold Chain Centre of Excellence, Pune in April 2016. Emerson's Academia outreach program is a one-of-its-kind initiative in the HVAC&R industry, which aims to provide students with crucial industry exposure to help make them industry ready.

At the center, students were taken on a plant tour and provided an overview on the latest compressor technologies and emerging refrigerant trends. The students thoroughly appreciated the in-depth knowledge imparted to them - visiting various laboratories and being privy to demonstrations that widened their scope and understanding of the subject.

The Emerson Cold Chain Center of Excellence offers a comprehensive range of technology and service solutions for the HVAC&R industry including custom-built products like condensing units and multi compressor packs as well as value added services such as **project design**, **educational** and **training services** for the cold chain sector. The center, with its range of new technologies already serving the industry, has further added a dimension to this service, by helping prepare a new breed of professionals for the future. ■

About Emerson

Emerson (NYSE: EMR), based in St. Louis, Missouri (USA), is a global leader in bringing technology and engineering together to provide innovative solutions for customers in industrial, commercial, and consumer markets around the world. The company is comprised of five business segments: Process Management, Industrial Automation, Network Power, Climate Technologies, and Commercial & Residential Solutions. Sales in fiscal 2015 were $22.3 billion.

For more information, visit Emerson.com

ACCA Offers New Tool For Its Members

The self-assessment tool is broken into three major categories to help contractors come up with a baseline of what they want and need from a software program...

Kevin Holland

The Indoor Environment & Energy Efficiency Association, Air Conditioning Contractors of America Association, Inc. (ACCA) is a non-profit association serving more than 60,000 professionals and 4,000 businesses in the indoor environment and energy services community.

The association has recently published a Software Self-Assessment tool to help its contractor members looking to purchase new software for their businesses.

The self-assessment tool is broken into three major categories to help contractors come up with a baseline of what they want and need from a software program. The three categories are: Company Demographics; Company Forecast; and Needs Assessment. Along with the self-assessment tool, ACCA has provided information about why each question is on the assessment to further help contractors as they are filling out the form.

"Almost every day, contractors use ACCA's Contractor Forum to ask their fellow members about contracting operational software. There are a lot of great software vendors in this market. The self-assessment is a starting point, to help contractors focus on understanding their needs before they start evaluating different programs. This document is not going to choose the software for you, or implement it for you. Instead, recognising that each contracting business is different, use this document to organise your company's individual priorities. This will help you compare proposals from different software companies," said Kevin Holland, ACCA's Senior Vice President of Business Operations & Membership.

"We developed the document in concert with several contractor members who have undergone software transitions recently. This is the document they wish they had when they were beginning the process," he added further. ■

Andrea Belloni takes over as Güntner's Global Head of Sales EPC

Andrea Belloni

He intends to focus on the strategic expansion of sales activities in the area of EPC as well as in all Asian markets...

Germany-based Güntner GmbH & Co KG has appointed Andrea Belloni, who has many years of experience in the cooling industry, as Global Head of Sales EPC (Energy & Process Cooling) as well as Sales Director for East Asia.

He intends to focus on the strategic expansion of sales activities in the area of EPC as well as in all Asian markets.

After completing his studies of electrical engineering in Milan, Andrea Belloni worked as sales manager for various companies within the cooling industry.

He was responsible for a number of regions in Europe and the Americas, developing and expanding the sales and distribution structures.

Güntner has been a leader in refrigeration as well as air conditioning technology, besides being a leading manufacturer in the fields of condensers and dry coolers.

The company manufactures its products at its own plants located in Europe, Asia and the Americas. Its manufacturing network includes plants located in Germany, Hungary, Indonesia and Mexico. ■

Seeley International appoints Hamilton as GM for Commercial Sales

Mike Hamilton

His strong technical background, combined with an impressive track record in business growth, made him the perfect candidate...

Australia-based Seeley International has announced the appointment of Michael Hamilton as its new General Manager (GM) for Commercial Sales.

Seeley International Founder and Executive Chair, Frank Seeley AM said that Hamilton's strong technical background, combined with an impressive track record in business growth, made him the perfect candidate to lead the growth of the organisation's commercial and industrial business within the Australian market.

"His unique skill set includes trade qualifications in refrigeration and air conditioning, and his experience as Business Development Manager at Mayfield Industries and more than 14 years working in senior roles with Daikin Australia means he is a valuable addition to the Seeley International team," Seeley said.

In welcoming the appointment, Group Managing Director, Jon Seeley, said that the company is committed to remaining a market leader, and that success is achieved by attracting and retaining the very best people, and an unwavering commitment to developing innovative and high-quality products using cost-effective automation. "It is critical to have a high-performing professional sales network of expert individuals who are passionate about customer service and offer unrivalled product knowledge, and by these criteria he is ideally suited to lead our commercial sales team," he said. ■

Robert Wassmer becomes the new CEO of Kelvion Holding GmbH

Robert Wassmer

Beside his various international executive management positions, Wassmer has a PhD in engineering from the University Karlsruhe (TH)...

Germany-based industrial heat exchanger manufacturer Kelvion Holding GmBH has appointed Robert Wassmer as its CEO.

Wassmer is an experienced CEO with extensive national and international experience. He has a strong track record of creating significant value, in particular during his time as Chairman of the Executive Board at Knorr-Bremse Schienenfahrzeuge GmbH, the European rail equipment sub-group of Knorr-Bremse.

Before that, he was Executive Vice President of DEMAG Cranes AG as well as CEO of Gottwald Port Technology, President of MAG Industrial Automation Systems Europe and President of Bombardier Transportation's bogies division.

In addition to his various international executive management positions, Wassmer has a PhD in engineering from the University Karlsruhe (TH).

Kelvion (formerly GEA Heat Exchangers) has a product portfolio, which includes plate, finned-tube, and shell-and-tube heat exchangers.

It has continued to develop its product portfolio for various applications. Areas of application include, for example, heat recovery from exhaust gas or steam, supply of district heat from cogen plants, steam condensation, preheating of air and feed water, cooling systems for generators and transformers, as well as oil cooling and heat extraction for diesel power plants as well as the double tube safety technology for gas pre-heating.

The Kelvion portfolio also includes oil coolers for power plant turbines and coolers for closed water cycles. ■

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NÜRNBERG MESSE

US VRF Commercial AC Systems Market To Grow

Image Courtesy: Johnson Controls

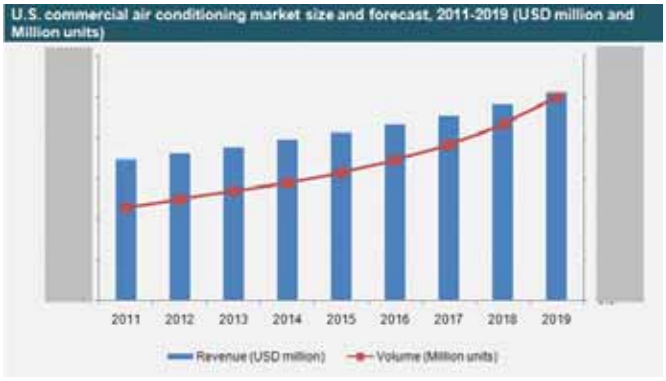
VRF outdoor unit heat recovery (6 to 30 tons system)...

VRFs are installed along with an air conditioner inverter for adding a Direct Current (DC) inverter to the compressor for supporting the variable motor speed and the variable refrigerant flow...

Air conditioning is a process that alters properties of air to more comfortable conditions with the aim of distributing conditioned air into an occupied space – such as a vehicle or a building for enhancing the indoor air quality and thermal comfort. Air conditioning systems are installed to perform these functions. These systems are available in numerous types such as individual systems, split systems, Variable Refrigerant Flow (VRF) systems, centralised chilled water systems, and water-cooled packaged systems, among others. Amongst these, the VRF commercial air conditioning systems are majorly being used in the U.S. due to the rising demand from the commercial sector.

VRF commercial air conditioning systems is a Heating, Ventilating, And Air Conditioning Technology (HVAC) technology, which utilises refrigerant as a heating and cooling medium. A single outdoor condensing unit is utilised for conditioning this refrigerant and is circulated inside a building to a number of Fan-Coil Units (FCUs). VRFs are installed along with an air conditioner inverter for adding a Direct Current (DC) inverter to the compressor for supporting the variable motor speed and the variable refrigerant flow.

A recent Transparency Market Research report states that the U.S. commercial air conditioning systems (VRF) market stood at US$7,251.7 mn in 2012, and is anticipated to reach US$10,251.3 mn by 2019, expanding at a CAGR of 5.20% from 2013 to 2019. The report is titled, "Commercial Air Conditioning Systems (VRF) Market - U.S. Industry Analysis, Size, Share, Growth, Trends and Forecast, 2013 - 2019."



Source: Company Annual Reports, Industrial Journals, Technical Publications, KOLs, and TMR Analysis

According to the report, the rising preference for VRF commercial air conditioning systems in North America – and the stringent regulations posed by the government in the U.S. are amongst the prime factors supporting the growth of the market in the U.S. In addition, benefits such as cost reduction and energy-efficiency provided by VRF commercial air conditioning systems also impact the market positively. Furthermore, the changing climate within the U.S is also driving the demand for these systems, hence propelling the market's growth. On the other hand, factors such as the complex installation procedure involved in these systems and the low awareness amongst individuals on their benefits may pose a negative impact on the development of the market in the U.S. ■

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- Non Contact Voltage
- Data Hold & Max Function

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VER:052016

Prodmash Holod Upak 2016 Minsk – Belarus

07 – 11 June 2016 | Fair for food processing, refrigerating and packaging technologies

Prodmash Holod Upak is an international exhibtion for food processing, cooling and ventilation as well as packaging and labeling. The trade fair will cover technologies and equipment concerning these sectors like food processing machines, measuring and laboratory equipment, transportation and storage systems, freezers, coolers, ice machines, air conditioners, ventilation equipment and packaging machines. Seminars, conferences, round tables and presentations will be conducted within the framework of Prodmash. Holod. Upak.

The Prodmash Holod Upak will take place on 5 days from Tuesday, 07 June to Saturday, 11 June 2016, in Minsk. ■

Fair organiser: Minskexpo Timiryazev Street, 65 220035 Minsk, Belarus.

Asia Cold Chain Show, Nonthaburi, Thailand

06 - 08 July 2016 | Trade fair for refrigeration plants and processing, packaging and storing of frozen food

The Asia Cold Chain Show is one of the world's leading trade fairs for the refrigeration and processing, packaging and storage of frozen food. The fair takes place annually in Nonthaburi. It offers a wide range of well-known and new products that reflect the most important developments in the industry. Cold storage facilities, temperature control, IT solutions, material handling and cold chain of companies are presented here. Asia Cold Chain Show is an ideal marketplace for companies which want to introduce new products and technologies and establish business contacts. Top decision makers from the industry Agro Products, Food & Beverage, fruit and vegetables, FMCG, Pharma, meat and poultry, dairy products and processed foods, seeds, retail, refrigerators, chemicals, hotels and restaurants, and other areas are expected to attend this fair. In particular, buyers from Thailand, Myanmar, Vietnam, Malaysia, Indonesia and the Indian subcontinent (India, Pakistan, Sri Lanka, Bangladesh and Nepal) are welcome.

The Asia Cold Chain Show will take place on 3 days from Wednesday, 06 July to Friday, 08, July 2016 in Nonthaburi. ■

Fair organiser: Manch Communications Pvt. Ltd. D 20, 3rd Floor, Lajpat Nagar-II 110024 New Delhi, India.

RAC Africa Cape Town

13 – 15 July 2016 | The Refrigeration, Air Conditioning, Heating and Ventilation Africa Exhibition

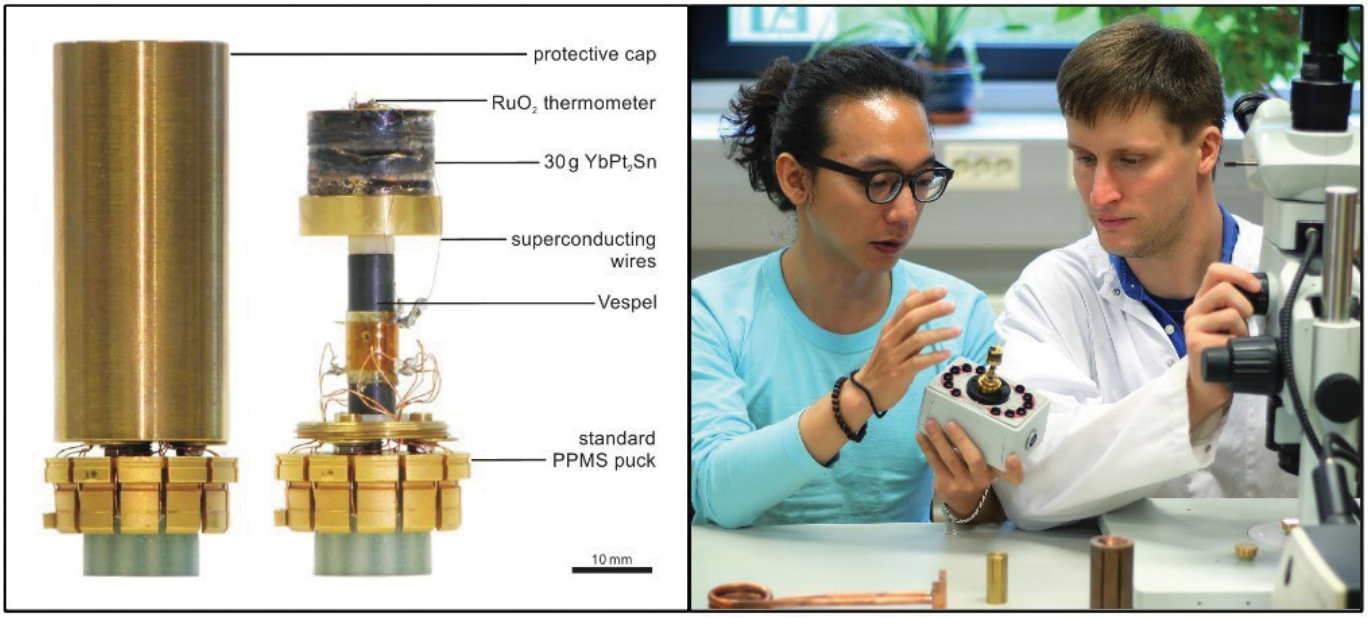
Within Africa Cape Town is a main hub for goods where the cold chain occupies an important position, especially for frozen and chilled food. In this context, the city is the ideal venue for the RAC Africa, an international exhibition in terms of refrigeration, air conditioning, heating and ventilation systems. This exhibition takes place every two years at the Cape Town International Convention Centre. Over 100 exhibitors present the latest trends of the industry on this high-profile event to a qualified audience and take the opportunity to build up important new business relationships. The visitors also have the possibility to become acquainted with the matter by means of seminars and lectures, in particular regarding the challenges of the future. The Cape Town International Convention Centre (CTICC) is a multipurpose conference and exhibition centre in hub of Cape Town's business and entertainment centre.

The RAC Africa will take place on 3 days from Wednesday, 13 July to Friday, 15 July 2016 in Cape Town. ■

Fair organiser: Exhibition Management Services

74 Eleventh Street, Parkmore Sandton 2010 Johannesburg, SA.

Achieving Very Low Temperature



The set-up is made up of a PPMS puck, a vespel tube, a brass plate which holds a single ingot pillar (30 g) of $YbPt_2Sn$. The protective cap can be screwed on the puck...

Six scientists in Dresden – Dongjin Jang, Thomas Gruner, Alexander Steppke, Keisuke Mitsumoto, Christoph Geibel and Manuel Brando have discovered a new material with which temperatures close to absolute zero can be achieved...

In material science, studies often require low temperatures, sometimes near absolute zero (-273.15 °C). Quantum fluids like the two isotopes of the noble gas helium, ^4He and ^3He, are needed to reach such low temperatures. Especially for temperatures below 2 K (-271.15 °C), the extremely rare ^3He is essential. Pure ^3He is currently in limited supply on a market that can no longer satisfy the demand for its many various uses, and costs are extremely high. Low-temperature physicists required only 1.3% of the available ^3He between 2004 and 2010.

The Adiabatic Demagnetization Refrigerator (ADR) is a smart alternative. This device does not require ^3He, but makes use of the entropy change in MagnetoCaloric Materials (MCM), which are essentially paramagnetic compounds. While gas-handling for refrigerators containing ^3He can be rather complicated, ADRs provide far easier use: to cool down the system, a heat-switch is operated while controlling the magnetic field. This technique is also used at room temperature, as an alternative to standard domestic refrigerators or in space projects where zero-gravity cryostats are required.

The most popular MCMs at low temperatures are paramagnetic salts that were first introduced 80 years ago. But the use of salts has significant disadvantages. They are unstable when exposed to humidity; in order to ensure constant cooling for a sufficiently long time-period, it is necessary to use sealed containers. Thermal insulation is also very high in salts at low temperature. They can only absorb enough heat if they are implanted in complex metallic structures, which occupy space and therefore reduce the total entropy density within the container.

Up to now, metals were thought to be poor MCMs because of their tendency to leave the paramagnetic state during magnetic or superconducting phase transitions. Recently it has been discovered that a remarkable exception from this behaviour is $YbPt_2Sn$. Although it is a good conductor, it has the extraordinary quality to remain paramagnetic down to 0.25 K.

Its volumetric entropy capacity is three times larger than that of common paramagnetic salts. An ADR has been built which is in fact powerful enough to cool 30g of metallic brass structure down to 0.2 K, starting from 2 K, with only 10g of $YbPt_2Sn$. This material can easily be cast into rods that can, for instance, be used in ordinary commercial PPMS cryostats (see Figure above). The discovery provides a new, practicable alternative to ^3He-based refrigerators and could trigger the search for new and better metallic MCMs. ■

Zebronics Forays Into The Air Cooler Market

The air cooler available in 45 and 70 L has a powerful air delivery of 3200 and 3500 m³ per hour at peak speeds and 33 and 35ft of air throw...

Zebronics is entering the consumer durables market with 'Desert Coolers.' The company is exclusively launching a range of coolers, which offers intelligent air cooling experience with the least manual operations. Wearing the state-of-the-art sturdy design, the Desert Coolers, 45L – ZEB 45DS and 70L – ZEB 70DS are bringing the best cooling performance to even larger spaces, both at office or at home.

As per the company, with several advanced features; maximising cooling efficiency, utilising a honeycomb design cooling medium and wood wool pads, both the coolers are highly advanced and specially designed to give very high performance in economical price.

Crafted and constructed with highly effective wooden wool pads and Honeycomb pads, it offers better evaporation of water, making coolers highly effective and less prone to clogging thus assuring longer life. The air cooler available in 45L and 70L has a powerful air delivery of 3200m³ and 3500m³ per hour at peak speed and 33ft and 35ft of air throw. With motorised airflow control, cooling large spaces in a short time will no longer be difficult for you.

Both the coolers sport castor wheels with improved mobility, which can be shifted from room to room with ease. The air coolers also have a water tank capacity of 45L and 70L respectively which help in efficient cooling.

The 70L Zebronics Cooler also displays the water level indication reminding you about timely refilling the air cooler. Also, the body of the cooler is made of good quality plastic that is resistant to corrosion and high impact, therefore, durable. Easily run on inverters, Zebronics Air Coolers promises air cooling even during power cuts.

Commenting on the launch Snow Series, Pradeep Doshi, Director, Zebronics, says, "We are thrilled to expand our consumer durable space with the launch of new air coolers that will cater to consumer needs and convenience this summer. Powered by the best of Zebronics' technology the latest Snow Series offers the premium cooling performance at an appealing price."

As per Zebronics, the launching price of ZEB-45DS is Rs.10,990, and that of ZEB-70DS is Rs.11,490. The air cooler range is already available with leading retail stores across India. ■

Landmark Irish Hospital Installs Mechanical Pipe Joining Solution

Safe, quick, clean and cost-efficient pipe joining helps the hospital meet construction schedule and earn green credentials...

A full range of pipe-joining solutions can be found in healthcare facilities across India and globally – including welding, flanging and mechanical grooved systems.

Welding pipe work is potentially hazardous, creates toxic fumes and is a fire risk. Entire systems are required to be drained and dried prior to performing maintenance work – because a pipe could burst when flames come into contact with liquid. For example, if a welder accidentally opened the wrong pipe or if a system is not fully drained, the worker can suffer from molten metal splatter. An area where work is being carried out needs to be evacuated and costly fire-watch is necessary.

Grooved piping system assembly requires no hot work and eliminates many of the risks traditionally associated with joining pipes, as well as allows healthcare or other activities to carry on unhampered in surrounding areas of a facility. For instance, work can continue safely with patients still in beds, and only nearby wards have to be vacated.

Other inherent benefits of installing a mechanical pipe joining system include accommodation of noise and vibration as well as movement within the system, without the need for periodic product repair or

replacement. Vibration in a piping system could result in noise that becomes cyclical and droning or something that arrives in sudden bursts when equipment is switched on. Increased noise levels increase patient anxiety and stress, which may lead to slower healing times or even lead to additional ailments.

Normal operations

The prestigious Mater Adult Hospital built in Dublin for Ireland´s Health Services Executive is a national landmark. Equipped with state-of-the-art facilities including 12 operating theatres, extensive emergency and outpatient departments and 120 individual en-suite rooms for inpatients, the hospital is the largest healthcare project undertaken in Ireland in the last two decades. It is also the greenest and most technologically driven hospital in Ireland.

Safety was a major consideration according to Leo Lynch's Director-in-charge, Brian Sterling. "The hospital occupies an area of 67,000 square metres over ten floors and was handed over in phases, so parts of the hospital were live while construction work was still going on elsewhere. Because of that, avoiding hot work to eliminate fire risk was our first concern," he explained.

Without hot work, hospital departments were able to function normally and other trades operated safely alongside, when the HVAC installation process was on.

Familiar with the quality of Victaulic products and the advantages of using the company's grooved-end mechanical method for joining pipes, mechanical contractor Leo Lynch selected the Victaulic system for HVAC services of the project. The company's couplings, valves and fittings were used on 50mm – 300mm (2" – 12") pipe for the hospital's chilled water and low pressure hot water services as well as in the plant room.

Time savings

Keeping labour costs down was another factor. "Using mechanical pipe joining is a lot quicker than welding. That's a major labour-saving benefit. The biggest cost of any job is predominantly labour, and that's where you very often lose. Materials can be bought at the right price but you can run over on labour cost and it kills the job," Sterling said.

The fire watch requirement during the welding process has additional cost implications – not only is there the cost of having someone to check that there are no sparks at the end of the welding operation but productivity is also reduced, since welding has to stop an hour earlier in order to allow for this.

Victaulic check valves, butterfly valves and strainers were used in the hospital's plant room...

To speed up the job further, Victaulic QuickVic™ rigid and flexible couplings were used. These special installation-ready couplings are simple to install without the need to disassemble the bolts, nuts, gasket and housings and do not require an impact gun. This meant installation was faster, easier and safer than using welded systems or standard grooved couplings.

"Using QuickVic makes a difference of probably 15% per joint in terms of time and labour savings," Sterling said. The absence of loose components likely to drop or get misplaced also made for a more efficient jobsite.

Cleaner system

Choosing grooved pipe joining rather than welding was also much cleaner. Sterling said: "When you weld, the inner coating of the pipe normally comes away localised to the weld and creates a lot of slag and dirt in the piping system. With a lot of small-bore pipework, that leads to potential problems like blocking up strainers and control valves. With Victaulic, it's a lot cleaner. You're just grooving and pressing down the pipe so it doesn't flake or descale and you get much cleaner water."

The HVAC installation for the hospital was completed on time and on budget. Not only did Leo Lynch reap the benefits of safety, speed, labour saving and cleanliness, but the contractor also took advantage of the support on offer.

The Victaulic Construction Piping Services department added value on the technical side by providing calculations of thermal expansion for the risers and distribution piping to maximise the efficiency

Case Study: Ruby Hall Hospital, Hinjewadi

India's renowned hospital brand, Ruby Hall Clinic (RHC), chalked out plans to start four new multi-specialty hospitals in and around Pune. Engineers and contractors working on the new unit of the multi-specialty hospital in Hinjewadi required systems that could be installed quickly to reduce downtimes and interruptions in hospital operations. They also required systems that were extremely easy to maintain in the long run.

Victaulic couplings, valves and fittings were used to join the hot and chilled water piping systems, thus providing fast, clean and safe installation in the mechanical room. Flexible couplings were installed to accommodate expansion and contraction on pumps and chillers. With no noxious fumes or flames to consider, Victaulic provided a major advantage over other joining methods such as welding.

Victaulic QuickVic Installation-Ready couplings, with no need to disassemble and no loose parts, installed twice as fast as standard couplings, resulting in a drastic increase in productivity on the job site. ■

Avoiding pipe flaking and descaling caused by welding means cleaner water runs through the hospital's piping systems...

of the system. A local Victaulic representative delivered product training to installers and ongoing jobsite support.

Environmentally friendly

The Mater Adult Hospital was designed at the outset to reduce the environmental impact and minimise waste during construction. This, alongwith efforts of sub contractors working to implement waste minimisation strategies onsite, resulted in an award for environmental excellence from the Chartered Institution of Wastes Management for the project. Victaulic contributed to reducing the carbon footprint.

The task of joining pipes itself produces no harmful emissions and requires zero electrical energy compared with welding, while reducing rework and its associated wastes. In addition, Victaulic's principles of lean and sustainable manufacture chimed well with the design and build objectives for the hospital.

Natural elements – water, fire, metal and sand – are used in the manufacture and products are made from 90% recycled materials. More than 95% of couplings and fittings are dip coated rather than spray painted to reduce wasted paint as well as avoid hazardous air pollution risks. ■

Pankaj Soni
Victaulic Country Manager
India

A Novel Solar Powered Rankine Engine for Multi-Effect Cooling

More than 50% of power generated in the Gulf region is used for refrigeration and air conditioning. Since solar energy happens to be abundant in this region, it could be utilised for heating as well as cooling...

Solar powered cooling is regarded as a promising technology due to very high demand for air-conditioning as well as refrigeration at peak summers, when there is maximum availability of solar energy.

This offers an excellent opportunity to meet increasing the energy demand for cooling in various countries of the Gulf region where more than 50% of the power produced is used for refrigeration and air-conditioning purposes.

Proposed here, is a multi-mode thermodynamic cycle for solar powered cooling, which could produce refrigeration output of various magnitudes at different levels of temperature simultaneously.

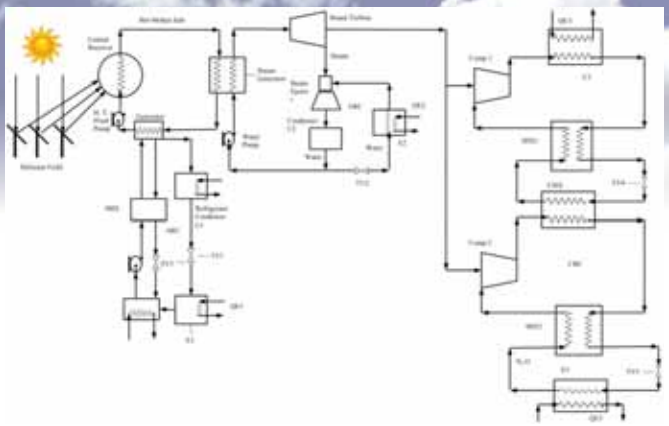
The cycle can meet the demand for air conditioning (15°C – 22°C), refrigeration for food preservation (2°C – 8°C), deep freezing for vaccine preservation and pharmaceutical plants (-50°C to -80°C).

Such a cycle could employ solar power tower technology to use molten salt as a heat transfer fluid and integrate the heliostat field as well as central receiver with the Steam Rankine Cycle (SRC), Ejector Refrigeration Cycle (ERC), Absorption Refrigeration Cycle (ARC), and Cascaded Refrigeration Cycle (CRC).

Water which has zero ODP and GWP will be used as a working fluid in SRC, and as a refrigerant in ERC and ARC, respectively, while N_2O which has zero ODP and moderate GWP will be used as a refrigerant in the CRC to produce cooling in the deep freezing range.

Working performance of the proposed cycle can be theoretically predicted by using various thermodynamic tools. Both exergy destruction due to entropy generation and exergy losses via energy transfers may be determined to identify the causes and locations of thermodynamic imperfection.

A computational analysis may be performed to investigate the effects of several design parameters – such as direct normal irradiation (DNI), steam turbine inlet pressure, compressor delivery pressure, ERC evaporator temperature, and generator temperature of ARC on both energetic and exergetic performance of the cycle.



Configuration of the proposed novel solar powered Rankine engine for multi-effect cooling...

Optimum values of all these design parameters determined based on the concept of minimum exergy destruction and losses obtained through present research on multi-mode refrigeration cycle could contribute towards improving utilisation efficiency of solar energy in hot and humid regions of the world. ■

Dr ABDUL KHALIQ
Professor
Mechanical Engineering Department
King Fahd University of Petroleum and Minerals
(KFUPM), Dhahran-31261, Saudi Arabia

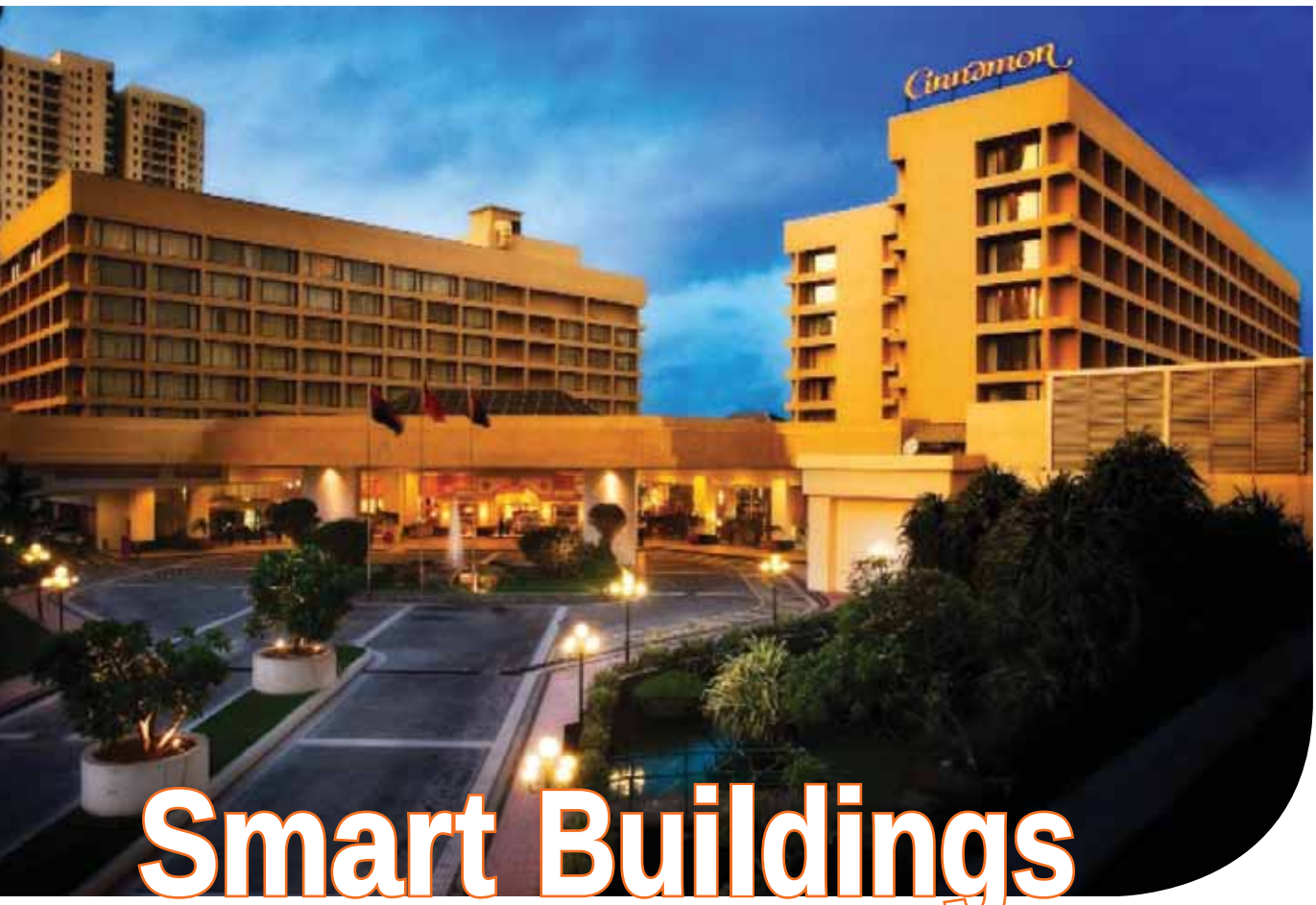


Image Courtesy: www.greenglobe.com

Smart Buildings for Smart Cities

India's Building Automation & Control Systems market has been witnessing double digit growth and it has the potential to reduce costs significantly by controlling HVAC systems of buildings...

The country is witnessing an immense pressure on traditional energy resources due to rising demand arising out of rapid industrialisation, significant shift of rural population to urban areas as well as population growth.

According to the International Energy Agency (IEA), India's energy demand will double by 2030, creating significant challenges for the country. Amid sharp focus on growth through sustainable development, there is an increase in growth of Green and Smart Buildings.

Building Automation Systems simply means providing comfort and energy efficiency in residential as well as non-residential buildings through centralised control of a building's heating, ventilation, air-conditioning (HVAC), lighting and security, with the help of a building management system. This helps in operational efficiency, cost effectiveness and energy optimisation.

Technically put, Building Automation Systems are centralised, connected networks of hardware and software through which one can monitor as well as control the environment in various buildings, be it residential apartments or commercial facilities like hospitals, hotels, shopping complexes or offices.

India is witnessing double-digit growth in Building Automation & Control System markets. According to a recently published TechSci

Research report called 'India Building Automation & Control Systems Market Forecast & Opportunities, 2019,' there is a bright future for companies operating across the entire building automation value chain.

The report estimates the Indian Building Automation & Control Systems market to grow by three folds, in revenue terms, by 2019, registering a strong CAGR of around 21.7% during 2014-19.

Image Courtesy: Tisch Hospital

Healthcare

Healthcare facilities are the second most energy-intensive buildings, using more energy per square metre than any other type of building, except food services. Because of this, energy efficiency is the key towards unlocking capital trapped in conventional hospital infrastructure.

Building Automation Control Systems can be applied in areas such as heating, ventilation and air-conditioning (HVAC), lighting systems and control, as well as construction materials.

Imagine that there is a sudden power outage in a hospital in the midst of a surgery. Detection of the reason for power failure takes a lot of time which could be life threatening for the patient undergoing surgery.

However, with technologically advanced Building Automation System, the patient's safety defences could be integrated with the facility system in order to prevent adverse events, including infant abductions or unexpected patient departure. A holistic hospital management system is the key to effective management.

LED lighting industry

Let's look at smart automation technology present in LEDs, allowing one to use light as per requirement. Lights can sense motion of a person and act accordingly. These lights are used in lounges, passages, parking lots, washrooms and other similar areas. The lights get turned on to the required level of intensity only if they sense a person's presence or his motion and save energy when the place is unoccupied.

Such kind of automation technology could be beneficial in the hotel industry, where there are more cases of electricity wastage. Thus, integrated energy management systems form an integral part of building management systems. Integration of these systems will significantly reduce total life cycle costs of a building, allowing superior management at minimal cost.

Other benefits

Automation in buildings also provides multiple benefits, such as conservation of energy resources and lower CO_2 emissions. Although there is requirement for high initial investments, which is a major challenge, the concept of green and smart buildings is being adopted by commercial as well as residential segments.

Building automation components from Schneider Electric facilitates comfort and energy efficiency in non-residential buildings through automation and security systems. This includes heating, ventilation, air conditioning, controllers, sensors, valves, actuators, programmable regulators, centralised building management systems, space optimisation solutions, access control, video cameras and security monitoring equipment.

SmartStruxure solution enables users to monitor, measure, and optimise a building's performance throughout its lifecycle – saving money. It is impossible to control what cannot be measured. SmartStruxure solution, powered by StruxureWare Building Operation software, facilitates exchange and analysis of data from energy, lighting, fire safety, and HVAC.

There is SmartStruxure Lite solution, which is a fast and easy way to future-fit small to medium-sized buildings using Web and wireless technology to control HVAC, lighting and metering. This helps in saving energy as well as time, and improve comfort with minimal impact on operations.

Due to increased requirement and adoption of energy efficient mechanisms, building automation has witnessed an unprecedented growth in the past one year. These can truly bring about a transformational change in Building Management Systems. ■

Image Courtesy: www.jackiebarrie.com

Thanik B
Director, Strategy & Business Development, Buildings Business, Schneider Electric

Attic Air Movement Reduces Industrial Air Conditioning Costs

Solar heat ingress has to be reduced in stages, first by primary prevention as well as insulation – and then by secondary air circulation, in addition to ventilation. It costs lesser to prevent solar heat ingress than to spend money reducing such heat after it has already been allowed to enter buildings...

Industries have to improve comfort of workers, machines, and working environment in stages, especially during extended dry weather summer conditions in India and other tropical regions of the world.

This can be achieved by concentrating on attic air circulation as well as ventilation – so that solar heat load at industrial premises can be reduced. Most of the heat load on an industrial plant is mainly due to equipment, while the rest of it is due to ambient dry weather conditions during sunny days. Heat has to be reduced in stages, first by primary prevention as well as insulation and then by secondary air circulation in addition to ventilation.

Industrial Infrastructure

Industrial buildings have passive cement roof vents on their inverted 'V' rooftops which are not at all effective at present.

Roof vents were provided on rooftops, but in many industrial buildings, air supply points at the bottom of the roof were ignored and there was no provision made for air suction to the attic area.

It was forgotten that only if air reaches the attic could the same be exhausted through such roof vents.

Turbo powerless roof vents were directly mounted on slope of roofs, which stopped working after a few months or years due to increased friction due to uneven load on ventilator bearings.

Turbo vents need to have mandatory guide chambers so that a turbo vent is fixed exactly parallel to the ground level, to ensure that turbo vents rotate smoothly without friction for years together.

To cite a practical example of how these dynamics work, solar heat is allowed to enter the premises from above and a false ceiling is provided to suppress that heat.

This is like differing comfort levels when a person stands under the sun, walks under the sun, or rides a two-wheeler under the sun. The impact is felt least when the person rides a two-wheeler, because of the breeze.

Similarly, the roof or the attic is made well circulated so as to provide ventilation through lateral high volume low pressure exhaust fans or by self propelled roof extractors.

This tends to bring down temperature under the roof, by say 5 to 10 degrees or more. The existing attic hot stale air is forced out and heat is not felt in false ceiling as well supply ducts due to air handling units.

Generally, the rooftop solar radiation causes 50% of the heat load in any premises. Though in some industries, false ceilings tend to avoid the same, the plant premises still needs to be insulated from climate extremes during day and night; in summer as well as winter.

Primary Prevention

There are several methods to prevent heat from creeping in.

Ridge type ventilators could be provided so that the top layer roof reduces the heat load to the bottom layer of the roof. Acrylic-based reflective paints with a minimum 5 years' life could be used to paint roofs.

Pucca weatherproof tiling could be used if the roof is terraced. Powerless or turbo vent roof extractors could be placed on the top of the roof.

Under deck insulation could be provided by polyester material which is a one-time investment.

Another eco-friendly idea is growing tall lean trees around conditioned premises. Green plants could be placed over the roofing if the area is small and if suits the ambience.

Open-terraced buildings could provide slope metal / cement sheet at a height of say two metres from the terrace, leaving all sides open on parapet walls. This would also reduce the building's heat load instantly. Also, a half cut-across PVC pipe at the bottom of the slope to collect roof water and harvest the same would help.

Some industries cool their roofs with evaporation of water over their roof. However, water has become precious now, though water soaked hessian cloth, water sprinkling during peak hours of day and other such methods were tried earlier. But if water could be re-used, similar methods could still be tried out.

These may be tried out over production sheds, utility sheds like the MCC, compressor house, DG house as well as reinforced concrete terraces.

Secondary Ventilation

Previously, industrial buildings incorporated 'N' type attic ventilator due to an assumption that air movement would occur in the attic area.

However, it is a well known fact today that hot and stale air does not move out of the attic through such ventilators.

In fact, positive cross ventilation has to be forced inside the attic using fresh air suction fans, besides using high volume, low static HP fans for lateral air circulation and ventilation.

Attic fans definitely do help remove stale hot air under the ceiling as well as insulate false ceilings from the solar heat load by effecting air changes and air movement at a fraction of the cost of power used to run air handling units working inside.

This method of attic ventilation and cross ventilation inside industrial premises is a low cost one that saves energy, as compared to high cost cooling of equipment and premises below false celings.

Attic fans can be provided with a 'V' type pre-filters as done in textile spinning mill humidification plants, and they can easily be cleaned from outside to prevent birds and insects from entering the attic.

It must be ensured that air handling units, air supply ducts and supply air plenums are well insulated.

It should also be remembered that a drop in the temperature of air inside the duct, and outside the duct, due to attic ventilation, is easy to achieve and consumes less power, as compared to the power required to reduce temperature inside the premises, which is more difficult to achieve.

Pointers To Industry

So far, the industry has looked only at stopping solar heat ingress from rooftops, but this single point agenda can reduce heat

ingress – only by a few percentage points. Such a method could involve use of heat reflective paint, or powerless roof vents, obsolete passive cement exhausts or 'N' type ventilators, but such a step by itself is unlikely to solve the problem of heat ingress.

So, additionally, it is better to introduce forced air movement inside the attic area. This could be lateral high volume low pressure axial flow fans placed above, but gives lakhs of cubic metres per hour (CMH) at the cost of low static pressure.

In textile humidification plant, positive supply air CFM which is 20% more than exhaust CFM is provided.

Similarly, fresh air suction fans are provided at one end of the attic, with exhaust fans at the opposite direction of the attic area, taking care of wind direction in the area. This increases air movement in the attic and heat ingress to the false ceiling comes down by some percentage points.

Stage wise reduction in solar heat ingress could be achieved by forcing positive air movement, without expecting hot stale air to move out automatically. This may happen but it will be partial and gradual. When ambient temperatures are above 40°C, it is better to concentrate on attic comfort – and force more air change there to achieve better heat reduction.

Such an application would suit many textile spinning mills and industries – where solar heat is retained at the attic for longer hours until the next day morning. The above method of implementation will effectively reduce heat ingress at the attic.

Conclusion

Solar heat ingress can be reduced by using inverted 'V' type roofs or building open terraces. That is why energy conscious people prefer to put a simple ridge type ventilator on their domestic split AC outdoor open terrace units.

It would come as a surprise that massive LED bulbs movement hit a barrier and fail more often, and brightness reduces quickly in LED-based municipal street lighting, because LED heat emitting outer junction also needs a tiny top ridge ventilator on its top.

Since the same is exposed to the sun throughout the day, this results in accelerated ageing of LED-based street lighting.

In short, it costs lesser to prevent solar heat ingress to industrial buildings in the first place, rather than allow it to enter premises, after which it becomes necessary to spend more money to reduce that heat. ■

S Ashok
Energy Auditor
Bureau of Energy Efficiency

Reduction Of Vehicle Pollution

The Linde Group, a technology company, has taken an important step on the road to zero-emissions hydrogen (H_2) mobility...

According to Air Resources Board of California Environmental Protection Agency, "Air pollution from vehicles can harm human health whether it is vehicle exhaust that enters a vehicle from outside or pollutants off-gassing inside the vehicle. Pollutants from vehicle exhaust include carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter (PM) such as PM 2.5 and ultrafine particles (UFP), and Volatile Organic Compounds (VOCs). Health effects from vehicle pollution can include respiratory and cardiovascular diseases, as well as increased risk of cancer." Apparently, there are two ways to reduce this harmful effect, namely by reducing the number of on-road vehicles and introducing non-polluting fleets of vehicles.

With a view to combating this menace, The Linde Group, a technology company, has taken an important step on the road to zero-emissions hydrogen (H_2) mobility. Under the BeeZero brand name the group's newly founded subsidiary, Linde Hydrogen Concepts, has recently launched the world's first car sharing service to exclusively use hydrogen-powered fuel-cell cars. Dr Christian Bruch, Member of the Executive Board of Linde AG, has symbolically unveiled the first BeeZero car in Munich.

These fuel-cell vehicles can travel over 400 kilometres on a single tank. This means that – unlike battery-powered electric cars – the hydrogen vehicles are also ideal for medium-distance journeys. Unless the customer chooses otherwise, the cars will be refuelled by BeeZero employees. The hydrogen fuel is sourced exclusively from sustainable production processes, making it completely carbon neutral.

Linde is applying for project funding to the National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP II), an initiative run by Germany's Federal Ministry of Transport & Digital Infra-structure. This co-funding would enable the project's range and scope to be substantially enlarged.

BeeZero: the world's first car sharing service to exclusively use hydrogen-powered fuel-cell cars...

Linde has a wealth of expertise and many years of experience in the hydrogen sector. The company has been producing hydrogen on a large scale for its industrial customers for over a century now. Around 25 years ago, Linde was also one of the first companies to recognise hydrogen's potential as a clean fuel and to invest in developing the necessary technology to capitalise on this opportunity. Today, the company is the leading supplier of hydrogen refuelling solutions and boasts a number of unique selling propositions such as its robust, low-maintenance ionic compressor and its cryopump.

As a founding member of influential initiatives such as the Clean Energy Partnership (CEP) and H2MOBILITY Deutschland, Linde is committed to commercialising hydrogen as an environmentally-friendly energy carrier. The company has also shown that it is willing to explore new and unusual paths, for example by unveiling a prototype for an electric bicycle powered by a fuel cell in October 2015.

Can't we think of replicating such initiatives in Indian metros where vehicular pollution is a major source of indoor air pollutants? ■

Merits and Demerits
Of Building Management Systems

The worth of automated systems is often debated in terms of their advantages and disadvantages. On one hand, it is agreed that such systems ensure more efficiency in operations, while on the other hand, it is often said that automation takes away jobs from people...

It is often asked whether Building Management Systems (automation) are 'good' or 'bad'. There are arguments which support both views.

On one hand, there are obvious benefits, but on the other hand, it is often argued that automation takes away jobs from people.

Human beings have been making things for many thousands of years. Originally, most products were made on an individual 'as-needed' basis.

If a tool was required, it was fashioned by hand and in turn, it was used to make more tools. As time passed, more complex techniques were developed to help people accomplish fabrication and production.

Metalworking technology, weaving looms, water-driven grinding mills and development of steam as well as petrol engines all contributed to a greater ability to make various products, but things were still generally made one at a time by craftspeople skilled in various techniques.

It was only after the industrial revolution and common use of electrical energy that large scale manufacturing of products became commonplace.

Advantages

Building Management System (automation) has its advantages. Some of these are:

- Replacing human operators in tasks that involve hard physical or monotonous work
- Replacing humans in tasks performed in dangerous environments such as those with temperature extremes or radioactive and toxic atmospheres
- Making tasks that are beyond human capabilities easier. Handling heavy or large loads, manipulating tiny objects or the requirement to make products very quickly or slowly are examples of this
- Production is often faster and labour costs less on a per product basis than the equivalent manual operations
- Automation systems can easily incorporate quality checks and verifications to reduce the number of out-of-tolerance parts being produced while allowing for statistical process control that will allow for a more consistent and uniform product
- Economic improvement. Automation can serve as the catalyst to improve economies of enterprises. For example, the gross national income and standard of living in Germany and Japan improved drastically in the 20th century, largely because of embracing BMS (automation) for production of hazardous materials, weapons, automobiles, textiles and other goods for export.

If you are in a retrofit application, tremendous energy savings could be achieved and sometimes replacement of older systems is incentivised.

Central workstations enable users to view an entire campus from a single location and know the operating conditions of all systems tied back to the BMS.

With the Internet of Things taking off, many companies are creating higher level of products that help users understand occupancy, temp and productivity as well as allow control of a system to optimise energy/ and productivity.

Extended equipment life

BMS systems have the capability to not only extend the life of equipment by reducing start/ stop stages or demand limiting, but also function as a device which can predict failure.

Imagine being able to predict that a piece of equipment would fail even before it actually did! It would become possible to look at operating energy and output as well as trends to know that imminent failure is on the cards.

Disadvantages

There are also some disadvantages of automation. Some of these are:

- **Technological limitations**. Current technology is unable to automate all desired tasks. Some tasks cannot be easily automated, such as the production or assembly of products with inconsistent component sizes or in tasks where manual dexterity is required. There are some things that are best left to human assembly and manipulation.
- **Economic limits**. Certain tasks would cost more to automate than to perform manually. Automation is typically best suited to processes that are repeatable, consistent and high volume.
- **Unpredictable development costs**. The Research and Development (R&D) cost of automating a process is difficult to predict accurately beforehand. Since this cost can have a large impact on profitability, it is possible to finish automating a process only to discover that there is no economic advantage in doing so. With the advent and continued growth of different types of production lines, however, more accurate estimates based on previous projects can be made.
- **Initial costs are relatively high**. The automation of a new product or the construction of a new plant requires a huge initial investment compared to the unit cost of the product. Even machinery for which the development cost has already been recovered is expensive in terms of hardware and labour. The cost can be prohibitive for custom production

lines where product handling and tooling must be developed.

- A skilled maintenance department is often required to service and maintain the automation system in proper working order. Failure to maintain the automation system will ultimately result in lost production and/or bad parts being produced.

Disadvantages like high upfront costs could be bigger problems if not designed and/ installed/configured correctly. Therefore, users and maintenance crew need to be more technologically savvy than in the past.

The initial cost of an installed system could be high if not correctly specified or reviewed.

The operation of systems and their end users have to be understood properly in order to identify the level of automation required. Users could end up with a Rs 300-lakh system when what was needed was merely a Rs 66-lakh system.

Building Management System is like a smart phone with several features, which may never be used and hence users have to be judicious in selecting what is needed.

Once installed, users are generally locked into a long term service contract, depending on the system or brand.

It's sure that the users could maintain the system by themselves, but with software patches releasing every year and proper operation which is required to get energy savings, somebody would be needed to review the system.

So, it is advisable for users to look at merely the upfront cost of installation, but find out what a 3 to 7 year service contract would cost.

Serviceability would be an issue unless users have a trained technician on the staff. Users should not be the mercy of whoever the contractor sends to the premises when things don't go according to plan.

Besides, these systems are growing in functionality and complexity.

The advantages of using these systems are obvious because they help users have full control over building infrastructure.

Gone are the days of having to run around the building to turn things on/off or to check the status.

These systems also help reduce operating and maintenance costs, as well as alert users to impending problems before they result in an expensive repairs or worse.

There are also obvious disadvantages like high upfront installation costs, especially if systems are not designed and/ installed/ configured correctly.

Overall, the advantages would seem to outweigh the disadvantages, and it can be safely said that countries that have embraced automation enjoy a higher standard of living than those which have not.

At the same time, there are concerns that automating tasks takes away jobs from people. However, regardless of social implications, there is no doubt that productivity increases with the proper application of automation techniques. ■

V Sridhar
Enervac Engineering Consultants

Green Buildings & Energy Conservation

The residential building sector is one of the largest consumers of electricity and water. Constructing and operating buildings require enormous amounts of energy, water and materials, which create large amounts of waste. Green building technique could help conserve energy and save the environment...

Human beings reside, work and play in buildings which protect them from nature's extremes like cold, heat, wind, rain and snow. However, constructing and operating buildings require enormous amounts of energy, water, and materials that tend to create large amounts of waste. Position, place and pattern of buildings affect ecosystems in countless ways, and these constructions themselves create new indoor environments that present new environmental problems as well as challenges.

As their environmental impact became apparent, the concept of 'green buildings' has gained popularity. Green buildings use less water, optimise energy efficiency, conserve natural resources, generate less waste and provide healthier spaces for occupants, as compared to conventional buildings.

Desert areas like Rajasthan face an energy crisis during summer. Therefore, there is a need to design building – especially for desert areas, in order to solve this inconvenience.

To undertake such projects, it is mandatory to have good knowledge about the following issues:

1. Architecture design
2. Electrical power generation by solar system
3. Efficient cooling and ventilation mechanism
4. Proper illumination at the work place.

Some key points have to be taken into consideration while choosing construction material to construct green buildings.

Sustainable construction materials have to be chosen keeping in mind various characteristics like zero toxicity or low toxicity, high recyclability, zero or low off gassing of harmful air emissions, durability, reused and recycled content, sustainably harvested material.

Construction and demolition material should be reused and recycled e.g., inert demolition material could be used as base course for landfills. Proper planning has to be done to manage materials through deconstruction, demolition and construction.

Rapidly renewable materials such as bamboo flooring, wool carpets, strawboard, cotton ball insulation (made from denim scrap), genuine linoleum flooring, or Oriented Strand Board (OSB) must be used. Use of such rapid renewables help reduce depletion of finite raw materials.

Design features of green buildings differ from those of conventional buildings. In a green building design, windows, walls, and floors are made to collect, store and distribute solar energy in the form of heat in the winter as well as reject solar heat during the summer.

This is called a 'passive solar design' or 'climatic design,' because unlike active solar heating systems, it doesn't involve the use of mechanical or electrical devices. There are other such design features which are popularly used to design green buildings.

Hyperbolic Shell Roof

Such a design can be used for cafeteria and sitting places for visitors. This design admits daylight without glare and heat coupled with defused lighting through glass to glass solar panels. The roof is supported with very light weight space frame structure.

Cavity Walls

A cavity wall is made up of two walls with a gap in between, known as the cavity. The outer leaf is usually made of brick, and the inner layer of brick or concrete block. Cavity walls facing south and west are filled with further insulation material for efficient thermal effect.

Unique Floating Slab System

The system of floating and overlapping slabs with interpenetrating vertical cutouts allow free and quick movement of natural air reducing any suffocating effect.

Insulated Roofing

Roofs are insulated with double insulation systems to avoid penetration of heat through the ceiling.

Green Buildings In India

The green building movement in India was triggered off when the Confederation of Indian Industry's Sohrabji Godrej Green Business Centre building in Hyderabad was awarded the first and prestigious platinum rated green building rating in India.

Since then, the green building movement in India has gained tremendous impetus.

Presently, more than 3,570 green building projects are coming up, with a footprint of more than 3.59 billion square feet, are registered with the Indian Green Building Council (IGBC), out of which 789 green building projects have been certified and fully functional in India.

This growth has been possible due to the participation of all stakeholders in the green building movement, including that of the IGBC.

The other major supporters of this mission are the government, infotech parks, offices, residential, banks, airports, convention centres, institutions, hospitals, hotels, factories, Special Economic Zones (SEZs), townships and schools.

Common Awareness Points

Some points are described (as under) could be followed in daily routine. Ceiling fan or table fan could be used as a first line of protection against summer heat. Shade could be provided to a home's windows and walls by planting trees and shrubs to keep sunrays away.

Ceiling fans or room fans allows residents to set thermostats higher because the air movement will cool their rooms. A good air conditioner will cool and dehumidify a room in about 30 minutes, and so it is advisable to use a timer and leave the unit off for some time as well as clean the air-conditioner filter every month.

A dirty air filter reduces airflow and may damage the unit, while clean filters enable the unit to cool down quickly and use less energy.

Many automatic devices could help save energy used in lighting. Residents must consider employing infrared sensors, motion sensors, automatic timers, dimmers and solar cells wherever applicable, to switch on/off lighting circuits.

Task lighting, which focuses light where it is needed, could be used. A reading lamp, for example, lights only reading material rather than the whole room.

Dirty tube lights and bulbs reflect less light and can absorb 50% of the light; dust your tube lights and lamps regularly. So, washing of outer parts of illumination rods at regular intervals is recommended.

Fluorescent tube lights and CFLs convert electricity to visible light up to 5 times more efficiently than ordinary bulbs, and thus save about 70% of electricity for the same level of lighting, while LEDs consume up to 80% less electricity than incandescent lamps.

Approximately, 60% of energy consumption could be saved with better energy management and planning.

With the help of hyperbolic roof shells, around 80% energy in illumination could be reduced.

It is estimated that 15,000 MWh of energy and 45,000 kl of water could be saved by 2025 – just through better practices. ■

Kapil Samar
Department of Renewable Energy Engineering
College of Technology and Engineering
MPUAT, Udaipur

Are Green Buildings Really Expensive?

It is often assumed that green building construction techniques are more expensive than conventional methods of construction. Besides, the relative novelty of green technologies can make designers, architects and clients conservative while using them...

There has been a widespread perception in the real-estate industry that building green is significantly more expensive than traditional methods of construction. The perception that green design is more expensive is pervasive among developers and inhibiting green design is a perception that 'green' costs more and does not have an economically attractive payback.

Determining a precise 'green premium' for a given project is often very difficult for several reasons.

Some green buildings being built today are showcase projects, which may include additional and sometimes costlier materials and finishes that are unrelated to 'greenness', but are nonetheless included as increasing the cost of a green building.

The design and construction process for the first green building of a client or design/ architectural firm is often characterised by significant learning curve costs, and design schedule problems such as late and costly change orders.

The relative novelty of green technologies and systems can make designers, architects and clients conservative while using them. They may oversize green building systems and not fully integrate them into the building, thereby reducing cost savings and many other benefits.

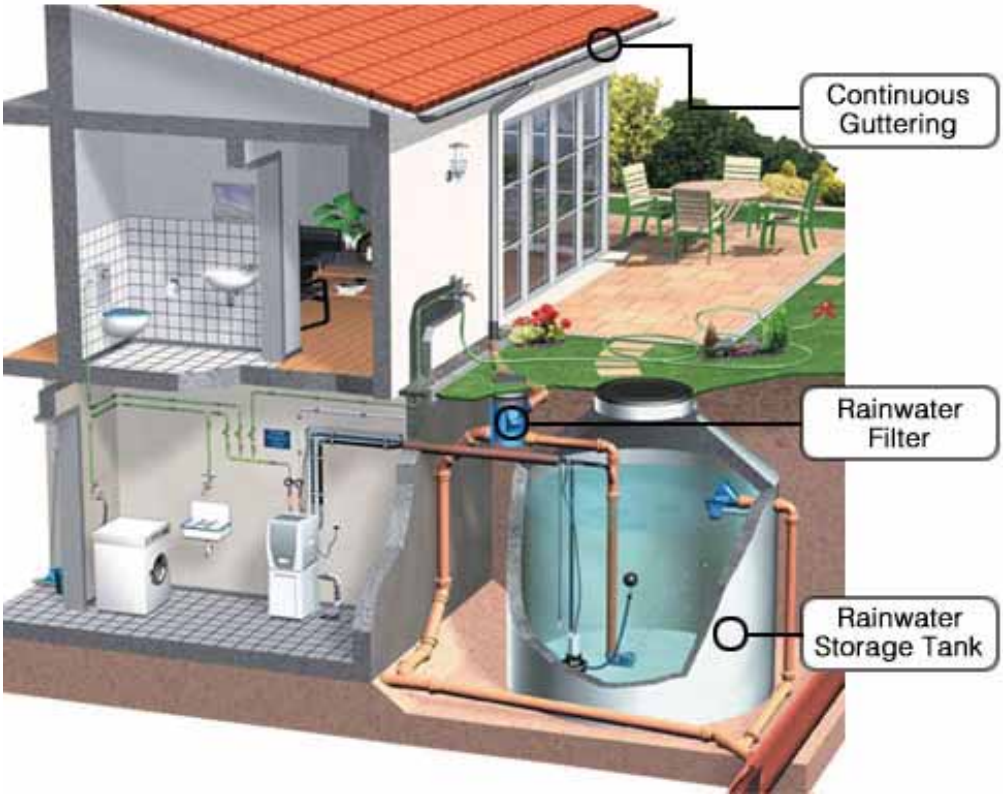
Similarly, cost estimators may add uncertainty factors for new green technologies they are not familiar with, and these could compound, further inflating cost estimates.

Moreover, adding green concepts as add-ons to a completed design leads to redesign and thereby, change the project economics pertaining to green buildings.

Cost benefits of green buildings

A detailed research report prepared by Davis Langdon cites that "There is no significant difference in average costs for green buildings as compared to non-green buildings. Many project teams are building green buildings with little or no added cost, and with budgets well within the cost range of non-green buildings with similar programs."

It is worthy to note that by complying with the requirements of the Ministry of Environment and Forests (MoEF) and Energy Conservation Building Code of India, many green building requirements are automatically met in the projects including the following:



- Incorporation of rainwater collection system and/ or rainwater harvesting to better manage the storm water runoffs and recharge ground aquifer
- Installation of sewage treatment plant and reuse of treated water
- Installation of Solar Hot water systems to meet a part of total hot water demand
- Efficient building envelope to reduce the heat loads and thereby reducing the HVAC system sizing and in turn achieving energy and cost savings

Passive design is an approach to building design that uses the building architecture to minimise energy consumption. Through properly applied passive design principles, it is possible to greatly reduce building energy requirements before even considering mechanical systems.

Though it may not achieve the ultimate passive design vision on every building due to site limitations, implementing a passive design approach to the fullest extent possible will lower building energy use to a great extent.

Building shape, orientation and composition would only improve energy performance of a building but also improve occupant comfort. Thereby, incorporation of passive design strategies right at the initial concept stage removes inefficiencies of the overall design leading to reduced capital and operating costs of the project.

Contrary to the perception that green construction costs more, it would be interesting to note that many green building requirements are rather cost saving strategies.

Take these instances

- Reusing construction waste generated at site leads to reducing the cost of purchasing fresh materials for site management
- Usage of locally available materials allows reducing the transportation costs associated with procurement of the building materials
- Usage of salvaged materials enabling the project to procure cheaper materials
- Top soil preservation and its reuse leads to saving cost in buying soil for landscaping

- Implementing construction indoor air quality management strategies leads to scheduled interior construction activities and avoids the damage of costlier furnishings materials
- Selecting sites closer or in the middle of previously developed urban areas

The advantage lies in terms of less site clearing activities and removing less vegetation. Additionally, such sites are likely to be closer to public transportation and basic amenities which are also requirements of green buildings.

Many green building requires either low or no cost. Strategies include:

- Adequate sizing of parking spaces
- Providing preferred parking spaces for alternate fuel vehicles, carpools and differently able people
- Using reflective paints on roof to reflect the heat and reduce surface temperatures
- Using low VOC paints for interior spaces to maintain healthy indoor environment
- Providing electric and water meters for specific end-uses
- Using energy star rated appliances
- Installing low flow water fixtures
- Using native/adaptive species for landscape to reduce irrigation water demand
- Using pervious pavers for pathways and parking lots
- Using CFC free refrigerant in air-conditioning systems etc

Incorporating above mentioned strategies form a considerable part of overall requirements of specified under different green building rating systems.

Combining these strategies with conscious passive architectural design strategies viz. optimum building orientation, form and shapes of the buildings enable projects to not only attain green building certifications – but also achieve reasonable operational savings at almost no or negligible cost premium.

Incremental cost and paybacks

Additional measures including the installation of onsite renewable energy generation like solar photovoltaic; incorporation of advanced technologies in the design of building's mechanical, electrical and plumbing systems;

Installation of sensing devices for light, carbon dioxide, carbon monoxide, occupancy etc., though add to the project's incremental costs, provide operational savings in terms of reduced utility bills and maintenance costs and thereby additional cost spent in implementing those can be recovered within a reasonable period.

Incorporation of these measures also enables the projects achieving higher levels of rating like 'platinum' or 'super platinum,' which as a subtle advantage, provides a higher brand image to corporate owners and other stakeholders.

Considering the economic, social and environmental benefits associated with the green buildings, local regulatory bodies have also started providing supplementary benefits for constructing green buildings.

The prime example is the Noida Authority offering 5% extra buildable FAR to developers if they construct buildings to achieve minimum 'gold' rating. Similar incentives are now been offered in many cities of Punjab, Kolkata, UP and Rajasthan.

Through this, the green building movement has considerably accelerated and the question of incremental cost has faded away due to the simple fact of having increased saleable area. In fact, developers are now expecting increased revenues by constructing green buildings.

In addition, a number of other studies document measurable benefits for enhanced day lighting, natural ventilation, and improved indoor air quality in buildings. Benefits associated with these 'green' features include enhanced worker and student productivity as well as reduced absenteeism and illness. A study at Herman-Miller showed up to a 7% increase in worker productivity following a move to a green, day-lit facility.

Project teams continue to conceive sustainable design as a separate feature. This leads to the notion that green design is something that gets added to a project – therefore they must add cost.

This tendency is especially true for less experienced teams that are confronting higher levels of certifications (gold and platinum). Until design teams understand that green design is not an additional feature, it would be difficult to overcome the notion that green costs more, especially in an era of rapid cost escalation.

Moreover, in this age of climate change, going green should not be conceived as a choice, but a responsibility to create a better future for ourselves. ■

Ashish K Jain
Director
AEON Integrated Building Design Consultants LLP

Trane Launches Interactive Smart AC

The interactive SmartAC supports multiple connectivity powered by industry leading technology...

Trane has recently launched its Interactive SmartAC Web-gateway & Mobile App. Interactive SmartAC is a next generation smart gateway featured with multi functions. It gives ease of control to every registered individual Trane Interactive AC enabling the control from anywhere through Interactive SmartAC App installed on a Smart Phone. The Interactive SmartAC application enables user to manage all functions, modes of operation and view various types of reports. Interactive SmartAC feature can also be retrofitted in all existing Trane Interactive AC lineup.

Interactive SmartAC supports multiple connectivity powered by industry leading technology. Features like Plug & Play style permits user to connect to network just by Powering ON the gateway with no efforts for configurations. The app will be available on Android and iOS platform. A single gateway will be able to connect 18 Trane Interactive ACs through Internet.

Sudarshan Ananth, Vice President and Territory Leader – HVAC & Transport, API Climate SBU, Ingersoll Rand plc said, "We at Ingersoll Rand are focused on building products to make lives comfortable, safe and efficient. Today, customers are looking for comfort-centric systems and solutions that are energy efficient, reliable, easy to maintain and with modern designs that match their lifestyle. Our new launch is keeping in sync with enhanced needs of our customers."

The Interactive SmartAC Web gateway comes with loads of exciting features and advanced connectivity:

- **Trane Interactive Remote with you all the time**
  Get all the features of the interactive remote on your Android & iOS mobile phone or tablet through the App.
- **Smart Plug and Play**
  As the name suggests, the device is smart to connect to available network just by power ON. This reduces the efforts of configuration and makes it easy for use.
- **Control up to 18 Trane ACs with Energymeter**
  Allows to name and control 18 ACs from the App and optimise their performance by Energymeter.
- **High Security**
  Communications via all interfaces are encrypted with industrial standards to protect it from network threats and ensure the data security.
- **Track Performance of your AC**
  One can see and track the power consumption pattern of their AC on a daily, weekly, monthly basis – and improve on efficient energy usage. One can also generate reports based on the parameters of the AC.
- **Future Ready with the past in mind**
  The app and the gateway work completely well with the past and future range of Trane Interactive Air Conditioners. It can be retrofit with the earlier interactive models. ■

interview

"Indian customers are open for new technologies and products..."

For the past 10 years, LTi has developed and produced fans globally. Over the years, several assembly plants were established across the globe. In an exclusive interview with Cooling India, Gaurav Vasudev, Managing Director, Lti Ventilatoren (India) P. Ltd., is explaining their business strategy in the Indian market to P K Chatterjee. Excerpts...

How is the global ventilation fans' market fairing?

We all have felt the global slow-down, which is impacting the overall growth of business. This slow-down has also been seen in global ventilation product markets. Lti business has seen the stagnated growth in our sales last year globally. We are keeping low expectation from global markets in this year. But, we are having better hopes from the Indian market for this FY 16-17. The new draft of NBC with focus on safe building design for ventilation & smoke evacuation will improve the business of special products for both new projects under design & ongoing projects. Lti will support the market with special product range in this demand in market.

Do you see a vast business potential in the Indian market?

Indian market has been growing, and will continue to grow in the coming years. India has a lot of potential in infrastructure development compared to rest of the world. The vision of Indian government has been seen towards that. The projects are gaining better pace than last FY 15-16. Lti is looking at 70% growth in business in FY 16-17. The expectation of our growth has been backed by the revised NBC standard and strict government norms for fire & life safe buildings in the Indian subcontinent.

> Our team works closely with designers and customers to suggest the right type of product. The appropriate product selection keeps the SFP as low as possible to save the energy consumed on the project...

What are the emerging sectors or segments where ventilation fans will witness more demand in the next (say) five years?

Fire & life safety ventilation products are going to be in demand in the coming years. The buildings are becoming more air-tight, indoor air quality is a big challenge, which will boost the demand for ventilation in the buildings. The more awareness of IAQ (Indoor Air Quality) will raise the demand of ventilation products to improve indoor air environment. Industrial ventilation is also looking at ventilation product suppliers to provide better and energy efficient products to support their needs. Lti is prepared to deal with the increasing needs of the products in the market to provide a proper support to the Indian market.

What types of technological innovations are entering into the ventilation fans' industry?

Indian customers are open for new technologies and products these days. Their exposure to international designs, products & technologies has given fair room for supplier's like Lti to come up with their energy efficient products and technologies. As an example, HVLS (High Volume Low Speed) fans. Industrial ventilation is showing an interest in HVLS technology. A single product can handle a mass volume of 160m^3/s & serve approx 1750m^2 area. This product gives a substantial energy saving compared to traditional ventilation systems.

The product, when used in combination with evaporative cooling, can provide very good results in industrial sectors. This product can be used in areas like public areas e.g., metro stations, hospitals, auditoriums and cinema halls etc., with or without cooling to save energy.

What are you doing to reduce energy consumption in your ventilation fans?

Lti believes in improving the product quality, efficiency and standards. We are having axial fans with better efficiency impellers for all types of applications. Our products are coming with high and super efficiency motors for lowest energy consumption. In HVLS series, we have an option to use permanent magnet motors to improve the energy used by the product. The use of permanent magnet motors will further increase the energy savings in its application.

In addition to products, we look at type of product used for a given application. The design of the building for right air volume and static pressure also has an impact on energy used by the products. Our team works closely with designers and customers to suggest the right type of product. The appropriate product selection keeps the SFP as low as possible to save the energy consumed on the project.

Are the customers now demanding a complete ventilation project partnership or most of them are just interested in buying ventilation fans only?

Indian customers over the years have changed the approach towards the ventilation project execution. Our customers now are more demanding, not only for efficient products but also they want to have turn-key executions. This brings them to a single point contact like Lti – to pass on the complete responsibility of their projects from designing to execution, and then after sales support. Lti has PAN India associates to provide such support to market as an edge to its competition.

How is the industry going to reshape itself in the coming years?

Improving living standard, revised codes and strict government norms are changing the needs or demands of Indian building segment. The buildings are NET zero in demand these days, which is demanding energy efficient products. The designers are looking at fire and life safe buildings. This will be further strengthen by the codes under review and revisions.

What kind of strategy are you adopting to gain over your competitors?

India is a very competitive market both on products as well as pricing. Customers are very smart to expect the best quality products with best prices. Our edge over our competitors is not only for our products but also for our approach of providing solution to ventilation challenges as one point contact.

Different products have different strategies. We have a basket of products. A standard product is sold off the shelves and other products are designed based on the project requirement. We believe in solutions and provide support to our customer at the time of installation, as right installation of the product will lead to its proper efficiency. We will be looking at AMC of high-end installations where our customer can't afford to have breakdowns.

What is your message to the potential buyers of the ventilation fans?

We at Lti look at India as a growing market with a great potential for ventilation products. Our vision to India at the time we started three years back was based to start, grow and stay. We are on right track of our vision to stay and support the market. We have penetrated to Indian ventilation market with good number of project executions during these years. We've been into commercial ventilation segment so far and now getting into industrial projects with diversified product range. 'Make in India' will be the next step to strengthen our vision towards the Indian market. Our management has been patient, and will support the Indian company to grow in Indian ventilation industry with support from our wide customer base here. ■

Integrated Building Management System In Green Buildings

The time required for any retail or shopping mall to become a landmark is nearly five years. Considering the huge amount of energy bills, sustenance in that period is a big challenge. IBMS helps in getting up to 35% of energy saving compared to a normal building without it...

Retailer Industry in India has gone through different types of experience in last few years since it started. In big cities it works as a crowd puller and brings new brands into the country – but in small cities it also show cast local brands in a fancy look. The time required for any retail or shopping mall to become a land mark is nearly 5 years. For example Center One in Vashi, Navi Mumbai was well known to all – and even featured in so many movies. Same like DLF Shopping Center in NCR, Express Avenue Mall in Chennai.

But at the same time, the center has to run in full capacity of its utilities so that it sustains in this period. It is also observed that so many shopping malls have closed down within this period – and some have converted into school or offices. The basic reason for this is more expense on the running cost , operation staff salary , non-availability of operations staffs and power bills

Majore equipments in a shopping mall

In any shopping mall building there are number of Mechanical Equipments such as Chillers, AHU, Pumps, Valve, Electrical Equipments such as switch gears, Generators, panels, Transformers, PHE equipment such as Pumps, STP, Boilers, Treatment plants can be seen in any building along with measuring devices such as Btu meters, DB meters and Energy meters. When these equipments get connected with one central point for a common goal, it will be known as Integrated Building Management system. Integrated Building management system – IBMS takes care at each equipment for saving energy as below:

- LED fixtures
- Proper DG Back up
- Water and power efficient chillers
- VFD in pumps, AHUs
- Temperature sensor for conditioned area
- Water saving fittings
- STPs with sensors
- CO and CO_2 sensors
- Oil Indicators

There are lot many mechanical and electrical equipment not listed above which are found in any building and have optimized by design engineer in terms of power and water saving. But the main object will full fill only with the help proper and adequate IBMS.

HVAC Points taken for IBMS

Following points of Chiller to be connected with the IBMS

Sr. No.	DESCRIPTION	QTY	AI	AO	DI	DO	REMARK
A	CHILLER PLANT						
A1	Water cooled screw chiiler	1					
1	Chiller ON/OFF command.					1	Command from PC/DDC to the chiller MCC panel.
2	Chiller ON/OFF status.				1		signal from potential free contact.
3	Chiller Flow status				1		Paddle Type Flow switch.
4	Chiller trip status.				1		Signal from potential free contact.
5	Chiller Auto / Manual status.				1		Signal from A/M switch.
6	Common chiller Supply / Return header temperature.		2				Imm type temp sensor.
7	Chiller isolation Motorised valves ON/OFF command & status.				2	2	ON/OFF motorised butter fly valve with limit switch for position status.

Following points of Cooling tower to be connected with the IBMS

Sr. No.	DESCRIPTION	QTY	AI	AO	DI	DO	REMARK
A2	Cooling Towers	1					
1	Cooling Tower ON/OFF command.					1	Command from PC/DDC to the chiller MCC panel.
2	Cooling Tower ON/OFF status.				1		Signal from potential free contact.
3	Cooling Tower trip status.				1		Signal from potential free contact.
4	Cooling TowerAuto / Manual status.				1		Signal from A/M switch.
5	Common Cooling Tower Supply / Return header temperature.		2				Imm type temp sensor.

Following points of Pumps to be connected with the IBMS

Sr. No.	DESCRIPTION	QTY	AI	AO	DI	DO	REMARK
A3	Condenser Water Pumps	1					
1	Chilled water pump ON / OFF Command.					1	Command from PC/DDC to the primary CHW Pumps panel.
2	Chilled water pump ON / OFF status.				1		Differential pressure switch across the CHW pumps for ON/OFF status.
3	Chilled water pump Auto / Manual status.				1		Signal from A/M switch.
4	Chilled water pump trip status.				1		Signal from potential free contact.
A4	Primary chilled water pumps	1					
1	Chilled water pump ON / OFF Command.					1	Command from PC/DDC to the primary CHW Pumps panel.
2	Chilled water pump ON / OFF status.				1		Differential pressure switch across the CHW pumps for ON/OFF status.
3	Chilled water pump Auto / Manual status.				1		Signal from A/M switch.
4	Chilled water pump trip status.				1		Signal from potential free contact.
A5	Secondary Chilled Water Pumps	1					
1	Chilled water pump ON / OFF Command.					1	Command from PC/DDC to the primary CHW Pumps panel.
2	Chilled water pump ON / OFF status.				1		Differential pressure switch across the CHW pumps for ON/OFF status.
3	Chilled water pump Auto / Manual status.				1		Signal from A/M switch.
4	Chilled water pump trip status.				1		Signal from potential free contact.

Following points of AHU to be connected with the IBMS

B	Air Handling Units /FCU						
B1	Air Handling Units Shops Floor	1					
1	AHU ON/OFF Command.					1	Command from PC/DDC to the AHU panel.
2	AHU ON/OFF Status.				1		Signal from potential free contact.
3	AHU Auto/Manual status				1		Command from PC/DDC to the AHU panel.
4	AHU VFD Control			1			Command from PC/DDC to the VFD panel.
5	Filter status.				1		Air differential pressure switch across the filter.
6	Return air Temperature sensor		1				Temperature sensor
7	Supply air Temperrature sensor		1				Temperature sensor
8	CHW 2-Way Valve Control			1			Two way CHW valve control.
9	Fire trip status				0		Signal from potential free contact.
10	Fire Damper output					0	Signal from DDC to Fire Damper

Along with the above plumbing, STP, Electrical system also needs to get connected with the IBMS

E	Electrical System						
E1	Substation Area, Panels	1					
1	HT Panel - Breaker ON/OFF Status.				1		Signal from potential free contact.
2	LT Panel I/c breaker ON/OFF Status.				1		Signal from potential free contact.
3	Synchronizing Panel I/c & OG breakers ON/OFF Status.				1		Signal from potential free contact.
4	Capacitor Panel - I/c breaker				1		Signal from potential free contact.
5	Capacitor Panel - PF meter				1		Signal from potential free contact.
E2	Transformer - 2 MVA	2			4		
	Transformer ON / OFF Status				8		Winding temperature has to be monitored. Signal from WTO
	Transformer oil level monitoring				8		Signal from potential free contact.

For water management system following points to be considered

G	Water Management system						
G1	Domestic Water Pumping System(UGT)	1					
1	Domestic tank High/ Low monitoring				2		Signal from level switch.
2	Domestic water pump ON/OFF command.					1	Command from PC/DDC to the pump panel.
3	Domestic water pump ON/OFF status.				1		Signal from potential free contact.
4	Domestic water pump trip status.				1		Signal from potential free contact.
5	Domestic water pump Auto / Manual status.				1		Signal from potential free contact.
G2	Flushing Water Pumping System	1					
1	Flushing tank High/ Low monitoring				2		Signal from level switch.
2	Flushing water pump ON/OFF command.					1	Command from PC/DDC to the pump panel.
3	Flushing water pump ON/OFF status.				1		Signal from potential free contact.
4	Flushing water pump trip status.				1		Signal from potential free contact.
5	Flushing water pump Auto / Manual status.				1		Signal from potential free contact.

The above list can be added and added so that, each and every system except the firefighting system gets controlled by IBMS. Firefighting system should work directly with fire alarm system.

Conclusion

Shopping Malls are the present requirement of the market. Any Shopping Mall building can run for a longer time if its energy bill is minimum and its maintenance cost is less.

This can only be possible with proper installation of Integrated Building Management System. Again IBMS helps in getting 35% of energy saving compared to a normal building without IBMS. ■

Firoj Jena
Chief Executive Officer
Clancy Global Consulting
Engineers, Mumbai

Clean Energies Development & Built Environment

This article presents a comprehensive review including energy efficiency systems, energy saving techniques and other mitigation measures that are necessary to reduce climate change...

Over millions of years ago, plants have covered the earth converting the energy of sunlight into living plants and animals, some of which was buried in the depths of the earth to produce deposits of coal, oil and natural gas. The past few decades, however, have experienced many valuable uses for these complex chemical substances and manufacturing from them plastics, textiles, fertiliser and the various end products of the petrochemical industry. Indeed, each decade sees increasing uses for these products. Coal, oil and gas, which will certainly be of great value to future generations, as they are to ours, are however non-renewable natural resources. The rapid depletion of these non-renewable fossil resources need not continue. This is particularly true now as it is, or soon will be, technically and economically feasible to supply all of man's needs from the most abundant energy source of all, the sun. The sunlight is not only inexhaustible, but, moreover, it is the only energy source, which is completely non-polluting.

Industry's use of fossil fuels has been largely blamed for warming the climate. When coal, gas and oil are burnt, they release harmful gases,

which trap heat in the atmosphere and cause global warming. However, there had been an ongoing debate on this subject, as scientists have struggled to distinguish between changes, which are human induced, and those, which could be put down to natural climate variability. Notably, human activities that emit carbon dioxide (CO_2), the most significant contributor to potential climate change, occur primarily from fossil fuel production. Consequently, efforts to control CO_2 emissions could have serious, negative consequences for economic growth, employment, investment, trade and the standard of living of individuals everywhere.

Energy sources and use

Scientifically, it is difficult to predict the relationship between global temperature and Greenhouse Gas (GHG) concentrations. The climate system contains many processes that will change if warming occurs. Critical processes include heat transfer by winds and tides, the hydrological cycle involving evaporation, precipitation, runoff and groundwater and the formation of clouds, snow, and ice, all of which display enormous natural variability. The equipment and infrastructure for energy supply and use are designed with long lifetimes, and the premature turnover of capital stock involves significant costs. Economic benefits occur if capital stock is replaced with more efficient equipment in step with its normal replacement cycle. Likewise, if opportunities to reduce future emissions are taken in a timely manner, they should be less costly. Such a flexible approach would allow society to take account of evolving scientific and technological knowledge, while gaining experience in designing policies to address climate change.

The World Summit on Sustainable Development in Johannesburg in 2002 committed itself to ''encourage and promote the development of renewable energy sources to accelerate the shift towards sustainable consumption and production.'' Accordingly, it aimed at breaking the link between resource use and productivity. This can be achieved by the following:

- Trying to ensure economic growth does not cause environmental pollution
- Improving resource efficiency
- Examining the whole life-cycle of a product
- Enabling consumers to receive more information on products and services
- Examining how taxes, voluntary agreements, subsidies, regulation and information campaigns, can best stimulate innovation and investment to provide cleaner technology.

The energy conservation scenarios include rational use of energy policies in all economy sectors and the use of combined heat and power systems, which are able to add to energy savings from the autonomous power plants. Electricity from renewable energy sources is by definition the environmental green product. Hence, a renewable energy certificate system, as recommended by the World Summit, is an essential basis for all policy systems, independent of the renewable energy support scheme. It is, therefore, important that all parties involved support the renewable energy certificate system in place if it is to work as planned. Moreover, existing Renewable Energy Technologies (RETs) could play a significant mitigating role, but the economic and political climate will have to change first. It is now universally accepted that climate change is real. It is happening now, and GHGs produced by human activities are significantly contributing to it. The predicted global temperature increase of between 1.5 and 4.5^{o}C could lead to potentially catastrophic environmental impacts. These include sea level rise, increased frequency of extreme weather events, floods, droughts, disease migration from various places and possible stalling of the Gulf Stream. This has led scientists to argue that climate change issues are not ones that politicians can afford to ignore, and policy makers tend to agree. However, reaching international agreements on climate change policies is no trivial task as the difficulty in ratifying the Kyoto Protocol and reaching agreement at Copenhagen have proved.

Therefore, the use of renewable energy sources and the rational use of energy, in general, are the fundamental inputs for any responsible energy policy. However, the energy sector is encountering difficulties because increased production and consumption levels entail higher levels of pollution and eventually climate change, with possibly disastrous consequences. At the same time, it is important to secure energy at an acceptable cost in order to avoid negative impacts on economic growth. To date, renewable energy contributes only as much as 20% of the global energy supplies worldwide. Over two thirds of this comes from biomass use, mostly in developing countries, and some of this is unsustainable. However, the potential for energy from sustainable technologies is huge. On the technological side, renewables have an obvious role to play. In general, there is no problem in terms of the technical potential of renewables to deliver energy. Moreover, there are very good opportunities for RETs to play an important role in reducing emissions of GHGs into the atmosphere, certainly far more than have been exploited so far. However, there are still some technical issues to address in order to cope with the intermittency of some renewables, particularly wind and solar. Nevertheless, the biggest problem with relying on renewables to deliver the necessary cuts in GHG emissions is more to do with politics and policy issues than with technical ones. For example, the single most important step governments could take to promote and increase the use of renewables is to improve access for renewables to the energy market. This access to the market needs to be under favourable conditions and, possibly, under favourable economic rates as well. One move that could help, or at least justify, better market access would be to acknowledge that there are environmental costs associated with other energy supply options and that these costs are not currently internalised within the market price of electricity or fuels. This could make a significant difference, particularly if appropriate subsidies were applied to renewable energy in recognition of the environmental benefits it offers. Similarly, cutting energy consumption through end-use efficiency is absolutely essential. This suggests that issues of end-use consumption of energy will have to come into the discussion in the foreseeable future.

However, RETs have the benefit of being environmentally benign when developed in a sensitive and appropriate way with the full involvement of local communities. In addition, they are diverse, secure, locally based and abundant. In spite of the enormous potential and the multiple benefits, the contribution from renewable energy still lags behind the ambitious claims for it due to the initially high development costs, concerns about local impacts, lack of research funding and poor institutional and economic arrangements. Hence, an approach is needed to integrate renewable energies in a way that meets the rising demand in a cost-effective way.

Role of energy efficiency system

The prospects for development in power engineering are, at present, closely related to ecological problems. Power engineering has harmful effects on the environment, as it discharges toxic gases into atmosphere and also oil-contaminated and saline waters into rivers, as well as polluting the soil with ash and slag and having adverse effects on living things on account of electromagnetic fields and so on. Thus, there is an

urgent need for new approaches to provide an ecologically safe strategy. Substantial economic and ecological effects for thermal power projects (TPPs) can be achieved by improvement, upgrading the efficiency of the existing equipment, reduction of electricity loss, saving of fuel, and optimisation of its operating conditions and service life leading to improved access for rural and urban low-income areas in developing countries through energy efficiency and renewable energies.

Sustainable energy is a prerequisite for development. Energy-based living standards in developing countries, however, are clearly below standards in developed countries. Low levels of access to affordable and environmentally sound energy in both rural and urban low-income areas are therefore a predominant issue in developing countries. In recent years many programmes for development aid or technical assistance have been focusing on improving access to sustainable energy, many of them with impressive results. Apart from success stories, however, experience also shows that positive appraisals of many projects evaporate after completion and vanishing of the implementation expert team.

Altogether, the diffusion of sustainable technologies such as energy efficiency and renewable energy for cooking, heating, lighting, electrical appliances and building insulation in developing countries has been slow. Energy efficiency and renewable energy programmes could be more sustainable and pilot studies more effective and pulse releasing if the entire policy and implementation process was considered and redesigned from the outset. New financing and implementation processes, which allow reallocating financial resources and thus enabling countries themselves to achieve a sustainable energy infrastructure, are also needed. The links between the energy policy framework, financing and implementation of renewable energy and energy efficiency projects have to be strengthened and as well as efforts made to increase people's knowledge through training.

Energy use in buildings

Buildings consume energy mainly for cooling, heating and lighting. The energy consumption was based on the assumption that the building operates within ASHRAE-thermal comfort zone during the cooling and heating periods. Most of the buildings incorporate energy efficient passive cooling, solar control, photovoltaic, lighting and day lighting, and integrated energy systems. It is well known that thermal mass with night ventilation can reduce the maximum indoor temperature in buildings in summer. Hence, comfort temperatures may be achieved by proper application of passive cooling systems. However, energy can also be saved if an air conditioning unit is used. The reason for this is that in summer, heavy external walls delay the heat transfer from the outside into the inside spaces. Moreover, if the building has a lot of internal mass the increase in the air temperature is slow. This is because the penetrating heat raises the air temperature as well as the temperature of the heavy thermal mass. The result is a slow heating of the building in summer as the maximal inside temperature is reached only during the late hours when the outside air temperature is already low. The heat flowing from the inside heavy walls could be reduced with good ventilation in the evening and night.

The capacity to store energy also helps in winter, since energy can be stored in walls from one sunny winter day to the next cloudy one. However, the admission of daylight into buildings alone does not guarantee that the design will be energy efficient in terms of lighting. In fact, the design for increased daylight can often raise concerns relating to visual comfort (glare) and thermal comfort (increased solar gain in the summer and heat losses in the winter from larger apertures). Such issues will clearly need to be addressed in the design of the window openings, blinds, shading devices, heating system, etc. In order for a building to benefit from daylight energy terms, it is a prerequisite that lights are switched off when sufficient daylight is available. The nature of the switching regime; manual or automated, centralised or local, switched, stepped or dimmed, will determine the energy performance. Simple techniques can be implemented to increase the probability that lights are switched off. These include:

- Making switches conspicuous and switching banks of lights independently
- Loading switches appropriately in relation to the lights
- Switching banks of lights parallel to the main window wall.

There are also a number of methods, which help reduce the lighting energy use, which, in turn, relate to the type of occupancy pattern of the building. The light switching options include:

- Centralised timed off (or stepped)/manual on
- Photoelectric off (or stepped)/manual on
- Photoelectric and on (or stepped), photoelectric dimming
- Occupant sensor (stepped) on/off (movement or noise sensor).

Likewise, energy savings from the avoidance of air conditioning can be very substantial. Whilst day-lighting strategies need to be integrated with artificial lighting systems in order to become beneficial in terms of energy use, reductions in overall energy consumption levels by employment of a sustained programme of energy consumption strategies and measures would have considerable benefits within the buildings sector. It would perhaps be better to support a climate sensitive design approach that encompasses some elements of the pure conservation strategy together with strategies, which work with the local ambient conditions making use of energy technology systems, such as solar energy, where feasible. In practice, low energy environments are achieved through a combination of measures that include:

- The application of environmental regulations and policy
- The application of environmental science and best practice
- Mathematical modelling and simulation
- Environmental design and engineering
- Construction and commissioning
- Management and modifications of environments in use.

While the overriding intention of passive solar energy design of buildings is to achieve a reduction in purchased energy consumption, the attainment of significant savings is in doubt. The non-realisation of potential energy benefits is mainly due to the neglect of the consideration of post-occupancy user and management behaviour by energy scientists and designers alike.

Calculating energy inputs in agricultural production is more difficult in comparison with the industry sector due to the high number of factors affecting agricultural production, as Table 1 shows. However, considerable studies have been conducted in different countries on energy use in agriculture in order to quantify the influence of these factors.

Renewable energy technologies

Sustainable energy is the energy that, in its production or consumption, has minimal negative impacts on human health and the healthy functioning of vital ecological systems, including the global environment. It is an accepted fact that renewable energy is a sustainable form of energy, which has attracted more attention during recent years. Increasing environmental interest, as well as economic consideration of fossil fuel consumption and high emphasis of sustainable development for the future helped to bring the great potential of renewable energy into

focus. Nearly a fifth of all global power is generated by renewable energy sources, according to a new book published by the OECD/IEA. From 1973-2000 renewables grew at 9.3% a year and it is predicted that this will increase by 10.4% a year to 2010. Wind power grew fastest at 52% and will multiply seven times by 2010, overtaking biopower and hence help reducing green house gases, GHGs, emissions to the environment.

Table 2 shows some applications of different renewable energy sources. The challenge is to match leadership in GHG reduction and production of renewable energy with developing a major research and manufacturing capacity in environmental technologies (wind, solar, fuel cells etc.). More than 50% of the world's area is classified as arid, representing the rural and desert part, which lack electricity and water networks. The inhabitants of such areas obtain water from borehole wells by means of water pumps, which are mostly driven by diesel engines. The diesel motors are associated with maintenance problems, high running cost, and environmental pollution. Alternative methods are pumping by PhotoVoltaic (PV) or wind systems. At present, renewable sources of energy are regional and site specific. It has to be integrated in the regional development plans.

Solar energy

The availability of data on solar radiation is a critical problem. Even in developed countries, very few weather stations have been recording detailed solar radiation data for a period of time long enough to have statistical significance. Solar radiation arriving on earth is the most fundamental renewable energy source in nature. It powers the bio-system, the ocean and atmospheric current system and affects the global climate. Reliable radiation information is needed to provide input data in modelling solar energy devices and a good database is required in the work of energy planners, engineers, and agricultural scientists. In general, it is not easy to design solar energy conversion systems when they have to be installed in remote locations. First, in most cases, solar radiation measurements are not available for these sites. Second, the radiation nature of solar radiation makes the computation of the size of such systems difficult. While solar energy data are recognised as very important, their acquisition is by no means straightforward. The measurement of solar radiation requires the use of costly equipment such as pyrheliometers and pyranometers. Consequently, adequate facilities are often not available in developing countries to mount viable monitoring programmes. This is partly due to the equipment cost as well as the cost of technical manpower. Several attempts have, however, been made to estimate solar radiation through the use of meteorological and other physical parameter in order to avoid the use of expensive network of measuring instruments.

Two of the most essential natural resources for all life on the earth and for man's survival are sunlight and water. Sunlight is the driving force behind many of the RETs. The worldwide potential for utilising this resource, both directly by means of the solar technologies and indirectly by means of biofuels, wind and hydro technologies, is vast. During the last decade interest has been refocused on renewable energy sources due to the increasing prices and fore-seeable exhaustion of presently used commercial energy sources. The most promising solar energy technology are related to thermal systems; industrial solar water heaters, solar cookers, solar dryers for peanut crops, solar stills, solar driven cold stores to store fruits and vegetables, solar collectors, solar water desalination, solar ovens, and solar commercial bakers. Solar PV system: solar PV for lighting, solar refrigeration to store vaccines for human and animal use, solar PV for water pumping, solar PV for battery chargers, solar PV for communication network, microwave, receiver stations, radio systems in airports, VHF and beacon radio systems in airports, and educational solar TV posts in villages. Solar pumps are most cost effective for low power requirement (up to 5 kW) in remote places.

Applications include domestic and livestock drinking water supplies, for which the demand is constant throughout the year, and irrigation. However, the suitability of solar pumping for irrigation, though possible, is uncertain because the demand may vary greatly with seasons. Solar systems may be able to provide trickle irrigation for fruit farming, but not usually the large volumes of water needed for wheat growing.

The hydraulic energy required to deliver a volume of water is given by the formula:

$Ew = \rho_w g V H$ (1)

Where E_w is the required hydraulic energy (kWh day^{-1}); ρ_w is the water density (kg m^{-3}); g is the gravitational acceleration (ms^{-2}); V is the required volume of water (m^3 day^{-1}); and H is the head of water (m).

Table 1: Energy equivalent of inputs and outputs

Energy source	Unit	Equivalent energy (MJ)
Input		
1. Human labour	h	2.3
2. Animal labour		
Horse	h	10.10
Mule	h	4.04
Donkey	h	4.04
Cattle	h	5.05
Water buffalo	h	7.58
3. Electricity	kWh	11.93
4. Diesel	Litre	56.31
5. Chemicals fertilisers		
Nitrogen	kg	64.4
P2O5	kg	11.96
K2O	kg	6.7
6. Seed		
Cereals and pulses	kg	25
Oil seed	kg	3.6
Tuber	kg	14.7
Total input	kg	43.3
Output		
7. Major products		
Cereal and pulses	kg	14.7
Sugar beet	kg	5.04
Tobacco	kg	0.8
Cotton	kg	11.8
Oil seed	kg	25
Fruits	kg	1.9
Vegetables	kg	0.8
Water melon	kg	1.9
Onion	kg	1.6
Potatoes	kg	3.6
Olive	kg	11.8
Tea	kg	0.8
8. By products		
Husk	kg	13.8
Straw	kg	12.5
Cob	kg	18.0
Seed cotton	kg	25.0
Total output	kg	**149.04**

Table 2: Sources of renewable energy

Energy source	Technology	Size
Solar energy	Domestic solar water heaters Solar water heating for large demands PV roofs: grid connected systems generating electric energy	Small Medium-large Medium-large
Wind energy	Wind turbines (grid connected)	Medium-large
Hydraulic energy	Hydro plants in derivation schemes Hydro plants in existing water distribution networks	Medium-small Medium-small
Biomass	High efficiency wood boilers CHP plants fed by agricultural wastes or energy crops	Small Medium
Animal manure	CHP plants fed by biogas	Small
CHP	High efficiency lighting High efficiency electric Householders appliances High efficiency boilers Plants coupled with refrigerating absorption machines	Wide Wide Wide Small-medium Medium-large

The solar array power required is given by:

$P_{sa} = E_w / E_{sr}\ \eta\ F$ (2)

Where: P_{sa} is the solar array power (kW_p); E_{sr} is the average daily solar radiation ($kWhm^{-2}\ day^{-1}$); F is the array mismatch factor; and η is the daily subsystem efficiency.

Substituting Eq. (1) in Eq. (2), the following equation is obtained for the amount of water that can be pumped:

$V = P_{sa}\ E_{sr}\ \eta\ F/\ \rho_w\ g\ H$ (3)

P_{sa} = 1.6 kW_p, F = 0.85, η = 40%.

A further increase of PV depends on the ability to improve the durability, performance and the local manufacturing capabilities of PV.

Biomass

The data required to perform the trade-off analysis simulation of bio-energy resources can be classified according to the divisions given in Table 3, namely the overall system or individual plants, and the existing situation or future development. The effective economical utilisations of these resources are shown in Table 4, but their use is hindered by many problems such as those related to harvesting, collection, and transportation, besides the photo-sanitary control regulations. Biomass energy is experiencing a surge in interest stemming from a combination of factors, e.g., greater recognition of its current role and future potential contribution as a modern fuel, global environmental benefits, its development and entrepreneurial opportunities, etc. Possible routes of biomass energy development are shown in Table 5. However, biomass usage and application can generally be divided into the following three categories.

(a) Biomass energy for petroleum substitution driven by the following factors:
   (1) Oil price increase
   (2) Balance of payment problems, and economic crisis
   (3) Fuel-wood plantations and residue utilisation
   (4) Wood based heat and electricity
   (5) Liquid fuels from biomass
   (6) Producer gas technology.

(b) Biomass energy for domestic needs driven by:
   (1) Population increase
   (2) Urbanisation
   (3) Agricultural expansion
   (4) Fuel-wood crisis
   (5) Ecological crisis
   (6) Fuel-wood plantations, agro-forestry
   (7) Community forestry, and residue utilisation
   (8) Improved stoves, and improved charcoal production.

(c) Biomass energy for development driven by
   (1) Electrification
   (2) Irrigation and water supply
   (3) Economic and social development
   (4) Fuel-wood plantations
   (5) Community forestry
   (6) Agro-forestry
   (7) Briquettes
   (8) Producer gas technology.

Table 3: Classifications of data requirements

Criteria	Plant data	System data
Existing data	Size Life Cost (fixed and variation operation and maintenance) Forced outage Maintenance Efficiency Fuel Emissions	Peak load Load shape Capital costs Fuel costs Depreciation Rate of return Taxes
Future data	All of above, plus Capital costs Construction trajectory Date in service	System lead growth Fuel price growth Fuel import limits Inflation

The use of biomass through direct combustion has long been, and still is, the most common mode of biomass utilisation (Table 5). Examples for dry (thermo-chemical) conversion processes are charcoal making from wood (slow pyrolysis), gasification of forest and agricultural residues (fast pyrolysis – this is still in demonstration phase), and of course, direct combustion in stoves, furnaces etc. Wet processes require substantial amount of water to be mixed with the biomass. Biomass include:

Carbonisation and briquetting, Improved stoves, Biogas, Improved charcoal, and Gasification.

Table 4: Effective biomass resource utilisation

Subject	Tools	Constraints
Utilisation and land clearance for agriculture expansion	Stumpage fees Control Extension Conversion Technology	Policy Fuel-wood planning Lack of extension Institutional
Utilisation of agricultural residues	Briquetting Carbonisation Carbonisation and briquetting Fermentation Gasification	Capital Pricing Policy and legislation Social acceptability

Table 5: Agricultural residues routes for development

Source	Process	Product	End use
Agricultural residues	Direct Processing Processing Carbonisation Fermentation	Combustion Briquettes Carbonisation (small scale) Briquettes Carbonised Biogas	Rural poor Urban household Industrial use Industrial use Limited household use Rural household (self sufficiency) Urban fuel Energy services Household, and industry
Agricultural, and animal residues	Direct Briquettes Carbonisation Carbonisation Fermentation	Combustion Direct combustion Carbonised Briquettes Biogas	(Save or less efficiency as wood) (Similar end use devices or improved) Use Briquettes use Use

Briquetting and carbonisation

Briquetting is the formation of a char (an energy-dense solid fuel source) from otherwise wasted agricultural and forestry residues. One of the disadvantages of wood fuel is that it is bulky with a low energy density and therefore requires transport. Briquette formation allows for a more energy-dense fuel to be delivered, thus reducing the transportation cost and making the resource more competitive. It also adds some uniformity, which makes the fuel more compatible with systems that are sensitive to the specific fuel input. Charcoal stoves are very familiar to African societies. As for the stove technology, the present charcoal stove can be used, and can be improved upon for better efficiency. This energy term will be of particular interest to both urban and rural households and all the income groups due to its simplicity, convenience, and lower air polluting characteristics. However, the market price of the fuel together with that of its end-use technology may not enhance its early high market penetration especially in the urban low income and rural households.

Charcoal is produced by slow heating wood (carbonisation) in airtight ovens or retorts, in chambers with various gases, or in kilns supplied with limited and controlled amounts of air. The charcoal yield decreased gradually from 42.6 to 30.7% for the hazelnut shell and from 35.6 to 22.7% for the beech wood with an increase of temperature from 550 to 1,150 ^{o}K while the charcoal yield from the lignin content decreases sharply from 42.5 to 21.7% until it was at 850 ^{o}K during the carbonisation procedures. The charcoal yield decreases as the temperature increases, while the ignition temperature of charcoal increases as the carbonisation temperature increases. The charcoal briquettes that are sold on the commercial market are typically made from a binder and filler.

Improved cook stoves

Traditional wood stoves are commonly used in many rural areas. These can be classified into four types: three stone, metal cylindrical shaped, metal tripod and clay type. Indeed, improvements of traditional cookers and ovens to raise the efficiency of fuel saving can secure rural energy availability, where woody fuels have become scarce. However, planting fast growing trees to provide a constant fuel supply should also be considered. The rural development is essential and economically important since it will eventually lead to a better standard of living, people's settlement, and self-sufficiency.

Biogas

Biogas technology cannot only provide fuel, but is also important for comprehensive utilisation of biomass forestry, animal husbandry, fishery, agricultural economy, protecting the environment, realising agricultural recycling as well as improving the sanitary conditions, in rural areas. However, the introduction of biogas technology on a wide scale has implications for macro planning such as the allocation of government investment and effects on the balance of payments. Hence, factors that determine the rate of acceptance of biogas plants, such as credit facilities and technical backup services, are likely to have to be planned as part of general macro-policy, as do the allocation of research and development funds.

Improved charcoal

Dry cell batteries are a practical but expensive form of mobile fuel that is used by rural people when moving around at night and for powering radios and other small appliances. The high cost of dry cell batteries is financially constraining for rural households, but their popularity gives a good indication of how valuable a versatile fuel like electricity is in rural areas (Table 2.6). However, dry cell batteries can constitute an environmental hazard unless they are recycled in a proper fashion. Tables (6-7) further show that direct burning of fuel-wood and crop residues constitute the main usage of biomass, as is the case with many developing countries. In fact, biomass resources play a significant role in energy supply in all developing countries. However, the direct burning of biomass in an inefficient manner causes economic loss and adversely affects human health. In order to address the problem of inefficiency, research centres around the world, e.g., have investigated the viability of converting the resource to a more useful form of improved charcoal, namely solid briquettes and fuel gas. Accordingly, biomass resources should be divided into residues or dedicated resources, the latter including firewood and charcoal can also be produced from forest residues (Table 7). Whichever form of biomass resource used, its sustainability would primarily depend on improved forest and tree management.

Gasification

Gasification is based on the formation of a fuel gas (mostly CO and H_2) by partially oxidising raw solid fuel at high temperatures in the presence of steam or air. The technology can use wood chips, groundnut

shells, sugar cane bagasse, and other similar fuels to generate capacities from 3 kW to 100 kW. Many types of gasifier designs have been developed to make use of the diversity of fuel inputs and to meet the requirements of the product gas output (degree of cleanliness, composition, heating value, etc.).

Table 6: Energy carrier and energy services in rural areas

Energy carrier	Energy end-use
Fuel-wood	Cooking Water heating Building materials Animal fodder preparation
Kerosene	Lighting Ignition fires
Dry cell batteries	Lighting Small appliances
Animal power	Transport Land preparation for farming Food preparation (threshing)
Human power	Transport Land preparation for farming Food preparation (threshing)

Table 7: Biomass residues and current use

Type of residue	Current use
Wood industry waste	Residues available
Vegetable crop residues	Animal feed
Food processing residue	Energy needs
Sorghum, millet, wheat residues	Fodder, and building materials
Groundnut shells	Fodder, brick making, direct fining oil mills
Cotton stalks	Domestic fuel considerable amounts available for short period
Sugar, bagasse, molasses	Fodder, energy need, ethanol production (surplus available)
Manure	Fertiliser, brick making, plastering

Biomass and sustainability

A sustainable energy system includes energy efficiency, energy reliability, energy flexibility, fuel poverty and environmental impacts. A sustainable biofuel has two favourable properties, which are availability from renewable raw material, and its lower negative environmental impact than that of fossil fuels. Global warming, caused by CO_2 and other substances, has become an international concern in recent years. To protect forestry resources, which act as major absorbers of CO_2, by controlling the ever-increasing deforestation and the increase in the consumption of wood fuels, such as firewood and charcoal, is therefore an urgent issue. Given this, the development of a substitute fuel for charcoal is necessary. Briquette production technology, a type of clean coal technology, can help prevent flooding and serve as a global warming countermeasure by conserving forestry resources through the provision of a stable supply of briquettes as a substitute for charcoal and firewood.

There are many emerging biomass technologies with large and immediate potential applications, e.g., biomass gasifier/gas turbine (BGST) systems for power generation with pilot plants, improved techniques for biomass harvesting, transportation and storage. Gasification of crop residues such as rice husks, groundnut shells etc. with plants already operating in China, India and Thailand. Treatment of cellulosic materials by steam explosion which may be followed by biological or chemical hydrolysis to produce ethanol or other fuels, cogeneration technologies, hydrogen from biomass, striling energies capable of using biomass fuels efficiently, etc. Table 8 gives a view of the use of Biomass and its projection worldwide.

However, a major gap with biomass energy is that research has usually been aimed at obtaining supply and consumption data, with insufficient attention and resources being allocated to basic research, to production, harvesting and conservation processes. Biomass has not been closely examined in terms of a substitute for fossil fuels compared to carbon sequestration and overall environmental benefits related to these different approaches. To achieve the full potential of biomass as a feedstock for energy, food, or any other use, requires the application of considerable scientific and technological inputs. However, the aim of any modern biomass energy systems must be:

(1) To maximise yields with minimum inputs
(2) Utilise and select adequate plant materials and processes
(3) Optimise use of land, water, and fertiliser
(4) Create an adequate infrastructure and strong R&D base.

An afforestation programme appears an attractive option for any country to pursue in order to reduce the level of atmospheric carbon by enhancing carbon sequestration in the nation's forests, which would consequently mitigate climate change. However, it is acknowledged that certain barriers need to be overcome if the objectives are to be fully achieved. These include the following:

- Low level of public awareness of the economic/environmental benefits of forestry
- The generally low levels of individuals' income
- Pressures from population growth
- The land tenural system, which makes it difficult (if at all possible) for individuals to own or establish forest plantations
- Poor pricing of forest products especially in the local market
- Inadequate financial support on the part of governments
- Weak institutional capabilities of the various Forestry Departments as regards technical manpower to effectively manage tree plantations.

However, social policy conditions are also critical. This is still very much lacking particularly under developing countries conditions. During the 1970s and 1980s different biomass energy technologies were perceived in sub-Saharan Africa as a panacea for solving acute problems. On the account of these expectations, a wide range of activities and projects were initiated. However, despite considerable financial and human efforts, most of these initiatives have unfortunately been a failure.

Therefore, future research efforts should concentrate on the following areas:

- Directed R&D in the most promising areas of biomass to increase energy supply and to improve the technological base
- Formulate a policy framework to encourage entrepreneurial and integrated process
- Pay more attention to sustainable production and use of biomass energy feedstocks, methodology of conservation and efficient energy flows
- More research aimed at pollution abatement
- Greater attentions to interrelated socio-economic aspects

- Support R&D on energy efficiency in production and use
- Improve energy management skills and take maximum advantage of existing local knowledge
- Closely examine past successes and failures to assist policy makers with well-informed recommendations.

Conclusions

There is strong scientific evidence that the average temperature of the earth's surface is rising. This is a result of the increased concentration of carbon dioxide and other GHGs in the atmosphere as released by burning fossil fuels. This global warming will eventually lead to substantial changes in the world's climate, which will, in turn, have a major impact on human life and the built environment.

Therefore, effort has to be made to reduce fossil energy use and to promote green energy, particularly in the building sector. Energy use reductions can be achieved by minimising the energy demand, rational energy use, recovering heat and the use of more green energy. This study was a step towards achieving this goal. ■

Abdeen Mustafa Omer
Energy Research Institute (ERI)
Nottingham, UK

Indoor Air Quality (IAQ) systems are increasingly being used by companies across various sectors to avoid health issues and increase operational efficiency...

A recent report by Technavio titled, 'Global Indoor Air Quality (IAQ) Market' has focused on the key trends expected to impact the market through 2016-2020. According to the report, the global IAQ market is expected to exceed US$ 5.2 billion by 2020, growing at a CAGR of over 8%. IAQ monitoring equipment helps in improving ventilation, disinfect microbiological contamination, and remove dust or harmful gases released by indoor equipment, tobacco smoke, and any particle of outside air pollution.

In the words of Vishu Rai, Lead Analyst, Technavio for Power Research, "IAQ systems are increasingly being used by companies across various sectors to avoid health issues and increase operational efficiency. This, in turn, is likely to result in the steady growth of the global IAQ market." As per the research analysts from Technavio, the top three emerging trends influencing the global IAQ market are:

Advanced HVAC system

The quality of equipment that is designed to improve the indoor air has been growing at a rapid pace. For instance, the Heating, Ventilating, and Air Conditioning (HVAC) system is an apparatus that heats, cools, regulates and controls the outdoor air – and also checks for humidity. Advanced HVAC controls are focused on components such as sensors, field devices, and floor level controllers to effectively manage indoor air.

For a healthy working and living environment, it is important that all the buildings have a constant supply of outdoor air. This air may need to be heated or cooled depending upon the outdoor conditions, available space for distribution, and also the specific ventilation needs of the buildings. Indoor air contains various contaminants such as Volatile Organic Compounds (VOCs), bio-aerosols, tobacco and combustion products. Elimination of such products and proper maintenance ensure good air quality.

Planned constructions

Architects or builders contribute significantly to the growth of the global IAQ market, as it is the design and architecture of the building that significantly streamlines the flow of air within a building. The building design can also facilitate in retaining the quality of indoor air. The rise in awareness about IAQ has driven various builders to undertake initiatives to propose novel ideas for IAQ management.

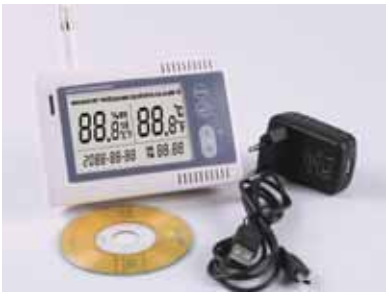


Image Courtesy: Shanghai Yi Hua Y&A Instrument Co., Ltd.

An indoor air quality monitor-desktop...

Thus, during the construction of a house or any building, adequate steps for IAQ control can be taken by the house or building owner. As it addresses many health concerns by providing a protective and safe environment for the occupants of the building, it results in cost savings from expenses that would otherwise have arisen due to health issues. Thus, the initiative of installing IAQ products by builders is one of the major positive trends being observed in the market.

Technological advances

Various technologies are being developed to assess the IAQ of a building. These include smart, responsive systems for ventilations such as computational fluid dynamics that integrate the air quality and risk assessment management models. Computerised simulation, advanced sensor technology and micro-engineered machines are some of the advanced technologies used to improve IAQ models.

"Many players are investing in such technologies to improve their product portfolio. Companies; such as Samsung; are participating in intensive R&D to create gas sensors," says Vishu. Chinese smartphone manufacturers are likely to be the early adopters of air quality sensors. These developments are predicted to have a positive impact on the market.

The Technavio analysis states that some of the top vendors in the global indoor air quality market are – 3M, Carrier, Trane and TSI. ■

Airleader Wins 2016 Energy Efficiency Award Challenge

The judges chose Airleader from the four finalists, highlighting that the company made a return on investment within one year...

Airleader, a compressor management system from WF Steuerungstechnik GmbH and represented in the US by SIGA Development LLC DBA Airleader, has recently been honoured with the coveted Energy Efficiency Award at the 2016 Energy Efficiency Award Challenge for the installation of their compressor management system at the Herman Miller facility in Spring Lake, MI.

The judges chose Airleader from the four finalists, highlighting that the company made a return on investment within one year. Airleader's compressor management system has already paid for itself and continues to improve operating efficiency within Herman Miller's furniture plant.

Award Winner Jan Hoetzel said, "We believe that informed people make the difference. Airleader enables compressor operators to understand their system and harvest energy savings. Energy efficiency is the cheapest energy source."

The Award Challenge was organised and hosted by GACC Midwest to showcase and promote American and German partnerships for innovative and energy efficient building technologies. The Award Challenge is part of the 'energy solutions – made in Germany' initiative sponsored by the German Ministry for Economic Affairs and Energy to recognise the positive impact German businesses and technologies have in the US.

Current market trends suggest that building owners and managers will invest $960 billion between now and 2023 on 'greening' their existing infrastructure. Colin Rohlfing, Director of Sustainable Development at HDR Inc., who made the opening remarks on sustainable trends during the morning session, noted that the four finalists are prime examples of energy efficiency trends in the building and construction industry – including the use of more controls & monitoring, climate resiliency plans, a push toward Net Zero buildings and more occupant comfort. German standards in the building sector are pushing American design firms to do better in terms of energy efficiency. This was highlighted by a presentation of Werner Sobek's Activhaus B10 pilot project in Stuttgart presented by Viola Kosseda at WSNY, Inc.

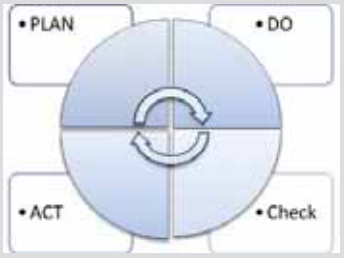
Given German leadership in this space, there are many opportunities for collaboration, including those represented by the Award Finalists:

- Airleader Compressor Management – installed their master controller at the Spring Lake facility in Michigan of Herman Miller to increase the efficiency and reliability of its compressor system.
- Baumann Consulting – developed the Integrated Energy Master Plan (IEMP) for the City of Holland, Michigan.
- INTEP – designed North America's first certified Passive House, the Waldsee BioHaus in the Concordia Language Village's German campus near Bemidji, Minnesota.
- Schüco – supplied the intelligent façade system, which had a key role in achieving the net-zero energy goals of the Bullitt Center in Seattle, Washington by significantly reducing loads to the building HVAC system.

While President Obama hosted a discussion about the Supreme Court at the University of Chicago School of Law, attendees of the Award Challenge visited the University's Mansueto Library across campus – where they were joined by representatives of JAHN Architects, LLC and seele, Inc. The library exemplifies architecturally compelling design and energy efficiency from Germany. ■

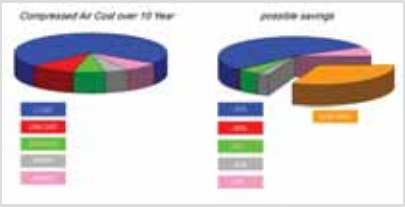
Innovation In Air Compressor Management

Compressed air is an expensive medium and system transparency is rather the exception and not the norm. The Airleader presents consumption-based and self-learning control in the market. The transparent web-based monitoring has been developed over the last 20 years in connection with their customers. It provides the information that matters to understand and run a compressed air system most effectively. Improving the system performance; making the system transparent, while increasing the system reliability; is easy and affordably accomplished with an intelligent Compressor Master Controller.



Future investments in compressed air systems become fact-based and traceable...

Capturing essential system performance data while monitoring critical air quality data is not only eye opening, it provides the tool to continuously improve system performance and awareness. It is an essential integral to effortlessly support the requirement of an ISO 50001, P-D-C-A (Plan-Do-Check-Act).


Payback times vary, but are typically between 6 and 24 months. The company has also seen payback times of only a few weeks...

The Airleader provides system simulation to show the effects of a new compressor or storage receiver prior to investing any money. Their open system architecture allows their clients to take any data in real time from Airleader via OPC-server into any other plant monitoring system. More than 8,000 customers are already saving energy for years, and have reduced their service cost while increasing their system reliability and air quality. ■

Source: www.airleader.us

Danfoss launches Optyma Plus packaged condensing units

Danfoss has introduced inverter variable speed technology versions of its Optyma Plus packaged condensing units.

Optyma Plus Inverter with variable speed scroll compressor and drive are said to deliver the best Seasonal Energy Performance Ratio (SEPR) on the market for refrigeration applications in medium temperatures for cooling capacities ranging from 2 to 9 kW.

Offering a wide stepless capacity modulation ranging from 30 to 100Hz, Optyma Plus Inverter enables tight temperature control to within ±0.3°C.

Danfoss inverter scroll technology is said to allow from 20 to 30% higher energy efficiency for medium temperature refrigeration applications compared to fixed-speed or mechanically modulated condensing units.

The permanent magnet motor, inverter-driven modulation, intermediate compressor discharge valves, together with the micro-channel condenser are said to contribute to an SEPR of 3.84, a performance level certified by ASERCOM for R407F. Return on investment is said to come in about one year for applications operating 24 hours per day, 7 days a week. Optyma Plus has been developed to operate with R404A alternatives like R407A and R407F. ■

Website: www.danfoss.co.uk

Emerson unveils small scrolls for lower GWP refrigerants

Emerson Climate Technologies has launched three ZS*KA Copeland scroll compressors for use with lower GWP alternative refrigerants R448A, R449A and R407A/F. The new scroll range includes three models from 1.3 to 1.8 hp, namely ZS09KAE, ZS11KAE and ZS13KAE. They are said to be designed to suit a range of applications such as units for walk-ins or commercial kitchen equipment, integrated display cases, as well as cooling systems used in light industrial applications where smaller cooling capacities are required.

In addition to R134a or R404A, these compressors are approved and qualified for lower GWP alternatives such as R407A, R407F, R448A and R449A. Emerson has said that it will release models for more refrigerants soon. The new models are manufactured at Emerson's Northern Ireland factory and are available in different motor configurations.

With evaporating temperatures from -25°C to 10°C, the ZS*KA compressors are said to have a wide operating envelope that allows end users to operate compressors at very low condensing temperatures for maximum energy efficiency. "Within the past few years, the demand for higher energy efficiency has become more prevalent in the commercial refrigeration market," said Sylvain Lamy, Emerson's Director Refrigeration Marketing. ■

Website: www.emersonclimate.com

Fujitsu to launch 10kW wall-mounted single split air-conditioner

Fujitsu has launched a 10kW single split wall-mounted unit. Also they have a new range of 360º cassettes and new medium static ducted split systems. The inverter driven heating and cooling wall-mounted split system is said to have an A+/A+ energy rating and is capable of operating in cooling and heating modes down to -15°C, making it suitable for use in server rooms as well as commercial office applications. Suitability for server rooms is enhanced further by the option of operating two systems in a run and standby arrangement.

For unoccupied spaces a '10°C heat' function prevents space temperatures from dropping too low, while the 'powerful mode' provides a maximum air flow and compressor speed for fast temperature recovery. Three timer modes are provided as standard with the wireless remote controller. Wired remote controllers, including a touch panel model, are available as options. ■

Website: www.fgeurofred.co.uk

Johnson Controls Mini VRF System combines high efficiency, flexibility

The latest York Mini variable refrigerant flow cooling and heating system from Johnson Controls provides personalised comfort to residential or light commercial buildings. With its small footprint, it offers a VRF option for buildings with zero lot lines or zoning restrictions and its lightweight, flexible piping possibilities enable it to be installed on the ground, on a terrace or balcony or on a roof. The modular system enables each unique solution to be built room by room and floor by floor. These new 3, 4 and 5 ton heat pumps will accommodate up to eight of the VRF indoor units from Johnson Controls' current offering, as well as the vertical (4-way convertible) Johnson Controls air handler. A dedicated outside air system will also be introduced, which will be integrated into VRF piping and controls, with the DOAS providing a zoned and decentralised approach towards conditioning as well as supply of outside air. ■

Website: www.johnsoncontrols.com

Refrigeration Systems delivers improved head pressure control

Refrigeration Systems has introduced its condensing units with a unique three-fan design that delivers improved head pressure control.

RSI condensers generally feature three separate circuits and, in the past, shared two banks of fans. However, with three banks of fans in its latest design, each compressor circuit has its own set of fans, which would help improve head pressure control. This design is unique to RSI.

RSI condensing units are available in a wide range of configurations, including single, dual or multiple-compressor arrangements with air-cooled or evaporative cooled systems.

As a result, RSI Condensing Units are suitable to address a variety of applications and load requirements.

All RSI Condensing Units are designed to operate in diverse and demanding environments including high as well as low-ambient conditions or high altitude locations, and could even be treated to operate in corrosive environments.

Additionally, these units ship fully assembled and with a dry nitrogen holding charge, making installation as well as set-up easy.

Refrigeration Systems is a division of RAE Corporation. ■

Website: www.rae-corp.com

York Chilled Beams maximise comfort; reduce heating and cooling energy costs

Johnson Controls has introduced a full line of York chilled beams. York active and passive chilled beams work together with industry-leading chillers and air handlers to deliver maximum occupant comfort while reducing energy needs for heating as well as cooling a building.

Chilled beams transport cooling and heating through water versus air, to condition a space, resulting in less energy needed to maintain a comfortable building environment. This flexible solution can meet the requirements of any design or installation.

It works by utilising a shallow unit which requires 60% less vertical space than conventional all air systems and reducing air-handler size / capacity and duct work size up to 50%. This allows for reduced slab-to-slab heights, significantly reducing built cost per floor in new construction.

It lowers maintenance costs and increases opportunities for free cooling by utilising water-side economisers. ■

Website: www.york.com

PremiSys Fusion DOAS improves efficiencies; reduces sound in VRF applications

Mitsubishi Electric US Inc's Cooling & Heating Division has introduced its PremiSys Fusion Dedicated Outside Air System, which is a premier split-system solution for acclimatising outside air for commercial buildings.

PremiSys Fusion DOAS is a split-system consisting of a Variable Refrigerant Flow outdoor unit and an air handler. The system is designed to handle 100% outside air with energy recovery models. It offers an energy-efficiency improvement of up to 20 percent over a traditional dedicated outside air system.

PremiSys Fusion DOAS is the latest innovation among Mitsubishi Electric's dedicated outside air systems. The two models – MPF-1 and MPF-2 (a split-system with energy recovery) are pre-engineered to provide semi-custom flexibility. Heating options include modulating gas heat, electric and hot water coils. It not only offers improved efficiencies, but building owners can also save on operating costs. The use of an inverter-driven compressor in the PremiSys Fusion DOAS allows the unit to better match the conditions of the targeted temperature and outside air. This technology results in significant energy reduction during mild and moderate months of the year. Other benefits include:

- Equipment location – allows for a distributed load on the roof by separating the condenser from the dedicated outside air unit by up to 50 feet.
- Humidity control – single refrigeration circuit provides directly proportional reheat to the entire cooling load, allows for room-neutral conditions and humidity control.
- Cooling capacity of 5 to 20 tonnes.
- Optional accessories include smoke detectors and condenser hail guards. ■

Website: www.mitsubishipro.com/ready

Bitzer launches dedicated frequency inverters

A range of frequency inverters, specially developed for refrigeration, was introduced at Mostra Convegno by Bitzer. This new generation of intelligent frequency inverters, is said to be suitable for use with all Bitzer reciprocating compressors.

After intuitive commissioning, frequency inverters take over control functions of the refrigeration system. According to Bitzer, optimised adjustment to suit the system's current cooling demand reduces energy consumption as well as running costs.

Of modular design, the Varipack series opens up a wide spectrum of applications, including supermarkets, hotels as well as restaurants, besides food production and processing centres. The series is suitable for refrigeration systems, air conditioning systems and heat pumps. They can be integrated both in single compressors and in compound systems.

Varipack frequency inverters can be operated in two modes. Compressor capacity control either depends on an external set point signals or on the evaporation pressure with an optionally available add-on module for pressure control. In addition to direct control of the evaporation pressure, the condenser fan can also be regulated via a 0–10 V output signal and a second compressor can also be switched on.

Frequency inverters can either be integrated completely in a switchboard or mounted via push-through installation as desired. With the second option, Bitzer says that smaller switchboards offer sufficient space, because the cooling body protrudes out due to which most of the generated heat is discharged directly outside.

By applying Varipack and configuring using Bitzer Software, users can select the optimal combination of compressor, motor and frequency inverter for every application. Communication for configuration, monitoring and reading out error messages takes place via Bitzer's BEST software, the control unit or the integrated web server. ■

Website: www.bitzer.de/in/en

Cofely offers containerised R1234ze chiller

Cofely has extended the options on its Quantum G chiller series, which uses refrigerant R1234ze, with a containerised solution.

Originally introduced towards the end of 2014, the R1234ze Quantum G chiller now offers a space-saving, pre-assembled cooling system configuration.

The containerised solutions from Cofely Refrigeration are based on a modular principle – containerised systems are pre-mounted on a base frame so that they can be quickly adjusted to conditions on site.

Pre-wired and piped, they can also be easily relocated if required. The container can also be implemented as a machine room to provide integrated chiller components with effective protection against the elements.

Cofely is one of a number of major chiller manufacturers which provide chillers operating on the new low GWP refrigerant. R1234ze has a GWP of less than 1 and is consequently not subject to a leak test as per F-gas regulations. ■

Website: www.cofely.de

MECO rolls out new 6000 Count TRMS Digital Clampmeters

MECO introduced new 6000 Count TRMS Digital Clampmeters, Models: 1080-TRMS and 1008-TRMS

1080-TRMS is a 3 5/6 Digit 6000 Counts, Current Range upto 1200A AC & DC, Auto / Manual Ranging Digital Clampmeter with LCD Backlight having Voltage Range upto 1000V DC & 750V AC and with Jaw Opening size of 30mm. Basic accuracy for DC Voltage is ±0.5%rdg + 3dgt and for AC Voltage ±0.8%rdg + 5dgt, for DC Current ±0.8% + 10dgt and for AC Current ± 2.0% rdg + 30dgt. In addition it has special features like Auto Power Off, Resistance, Capacitance, Frequency, Duty Cycle, Temperature, Diode Test, Audible Continuity, Data Hold etc.

1008-TRMS is a 3 5/6 Digit 6000 Counts, Current Range upto 1000A AC Auto / Manual Ranging Digital Clampmeter with LCD Backlight having Voltage Range upto 1000V DC & 750V AC with Jaw Opening size of 30mm. Basic accuracy for DC Voltage is ±0.5%rdg + 3dgt and for AC Voltage ±0.8%rdg + 5dgt, and for AC Current ± 2.0% rdg + 30dgt. In addition it has special features like Auto Power Off, Resistance, Capacitance, Frequency, Duty Cycle, Temperature, Diode Test, Audible Continuity, Data Hold etc. ■

Website: www.mecoinst.com

FLIR TG130 – Spot Thermal Camera

Save money on heating and cooling energy costs with the FLIR TG130 Spot Thermal Camera. Quickly find and troubleshoot temperature-related issues around the house and solve problems fast. Advantages:

Reduce energy costs.

Ideal for seasonal home inspections

- Find heat loss around doors, floors, walls, pipes or windows
- Locate spots where insulation is missing • Find drafts

Solve household heating/cooling issues.

Save time and money on troubleshooting

- Check HVAC performance and functionality • Discover electrical issues affecting home appliances • Confirm that refrigerator settings are correct, and food is stored at a safe temp.

■

Website: www.flir.com/TG130

Forthcoming Events At A Glance

The 7th International Conference on Heating, Ventilating and Air Conditioning

Venue:
RIPI Conventions Center, Tehran – Iran

Date:
30th May to 1st June, 2016

Website:
www.hvac-conference.ir

ASHRAE Annual Conference

Venue:
St. Louis, Missouri

Date:
25th to 29th June, 2016

Website:
www.ashrae.org/membership--conferences/conferences

International Compressor Engineering, Refrigeration and Air Conditioning, and High Performance Buildings Conferences

Venue: Stewart Center, Purude University

Date: 11th to 14th July, 2016

Website:
https://engineering.purdue.edu/Herrick/Events/Conferences

International Conference on Clean Water, Air & Soil (CleanWAS)

Venue:
Shangri-la Hotel, Beijing, China

Date:
26th to 28th August, 2016

Website:
http://www.cleanwas.aconf.org/en-us

Fifth International Conference on Human–Environment System

Venue:
Higashiyama Campus, Nagoya University

Date: 29th Oct to 02nd Nov, 2016

Website:
www.iches2016nagoya.com

RAAR 2016

Venue: C.V. Raman College of Engineering, Bhubaneswar

Date:
10th to 12th November, 2016

Website:
www.iches2016nagoya.com

recognition

IDSA recognises Lou Lenzi as one of its 50 most notable members

Lenzi joined GEA in 2011 – and is responsible for all of GEA's industrial design...

Industrial Designers Society of America (IDSA), formed in 1965, is celebrating 50 years of innovation and industrial design. In its Winter 2015 issue of INNOVATION, IDSA examined the past 50 years of the organisation – and how they would move forward. The issue recognised the 50 most notable IDSA members, 35 years of IDEA award winners, and the 50 most memorable moments in IDSA history.

Lou Lenzi, Industrial Design Director for GE Appliances, was recognised as one of the most notable members from the past 50 years, as voted on by current members of IDSA.

Lenzi joined GEA in 2011 – and is responsible for all of GEA's industrial design, user interface design, and user experience design activities.

Other members recognised include Rowena Reed Kostellow, Yves Béhar and Lorraine Justice. ■

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Walgreens store building receives award for energy management

The building was designed by the Chicago-based Cyclone Energy Group, headed by its President Benjamin A Skelton...

Walgreens 'Net Zero' Store building at Evanston in Illinois has received an award in the New Commercial Buildings Category from the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) for effective energy management and indoor air quality as well as innovative systems design. The building was designed by the Chicago-based Cyclone Energy Group, headed by its President Benjamin A Skelton, who is an ASHRAE-certified Building Energy Modelling Professional.

The global retail pharmacy brand set out with a vision to create a scalable retail building design that would serve as a showcase for innovative, sustainable and high performance design to sustainability, architecture, engineering and retail communities. The store is designed to achieve net zero energy use by the National Renewable Energy Laboratory's most stringent definition of 'renewable energy generated within the building footprint.' Among its innovative features there are 840 roof-mounted solar panels, generating enough energy to power 30 Illinois homes for a year, besides two 35-feet-tall wind turbines, using winds from Lake Michigan to generate enough power to offset annual greenhouse gas emissions from 2.2 passenger vehicles. ■

(Source: www.ashrae.org)

DPR Construction's San Francisco office building gets award for integrated design

The building was designed by Dylan T Connelly, an Associate of the Integral Group, based in Oakland, California...

DPR Construction's San Francisco 'Net Positive Energy' office building has won an award from the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) in the Existing Commercial Buildings category. The building was designed by Dylan T Connelly, an associate of the Integral Group, based in Oakland, California.

DPR retrofitted its 22,000 square feet San Francisco office, demonstrating the potential of integrated, innovated and replicable design, reducing energy use and improving indoor environmental conditions, while being cost effective. The design includes a 118 kW rooftop photovoltaic system, all electric systems, operable skylights, building management system controlled ceiling fans, enhanced day lighting and living walls. A net positive energy office building was achieved by reducing energy loads through use of efficient HVAC and electrical systems, and by installing photovoltaic and solar thermal systems on the roof to produce more energy than the building consumes. ■

(Source: www.ashrae.org)

John Abbot College's Anne-Marie Edward Science Building wins award

The building was designed by Nicolas Lemire, who is President and Principal of Pageau Morel and Associates, based in Montreal...

The Anne-Marie Edward Science Building at John Abbott College, located at Sainte-Anne-De-Bellevue in Quebec, Canada has received an award from the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) in the New Educational Facilities category. The building was designed by Nicolas Lemire, who is President and Principal of Pageau Morel and Associates, based in Montreal, Quebec.

Energy diversification is accomplished with the use of geothermal wells, electrical heating and cooling, natural gas hot water heating and solar preheating. Potable water consumption is reduced with the use of low flow plumbing fixtures, and resources are maximised through reuse of return air as compensation air in laboratories, reuse of coil condensation water to humidify exhaust air, as well as recuperation on both general and laboratory exhausts.

Reduced potable water consumption was achieved through recuperation through heat pump extraction and storage in stratified tanks, besides recuperation of rainwater and fan-coil condensation water. ■

(Source: www.ashrae.org)

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Sr. No.	Parameter	Cooling Tower (Induced Draft)	LTMCS
1	Wet Bulb Temperature	29°C	29°C
2	Chilled Water Temp in °C (Assumed)	5°C	5°C
3	Supply Temp. from CT / LTMCS	33°C	30°C
4	Approach to WBT	4°C	1°C
5	**ΔT for Chiller**	**28°C**	**25°C**
6	Chilled Water Compressor Motor Kw for 1200 TR	720	643
7	Energy Saved in %	-	10.7%
8	**Energy Saved in Kw**	**-**	**77 Kw/Hr**
9	Total Running Hours per Annum	8640	8640
10	**TOTAL POWER SAVED PER ANNUM**	**-**	**6,65,280 Kw**

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E-mail : mistcreation@gmail.com ■ mistcool@vsnl.com ■ Website : www.mistcreation.com

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Factory : 21.5 Km., Main Mathura Road, Faridabad - 03
Ph: 2275691-94 *Fax:* 0129-2275695. *email:* fbd@frick.co.in

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BRANCHES :

Ahmedabad	gujarat@frickmail.com
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Chennai	chennai@frickmail.com
Cochin	cochin@frickmail.com
Jalandhar	jalandhar@frickmail.com
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