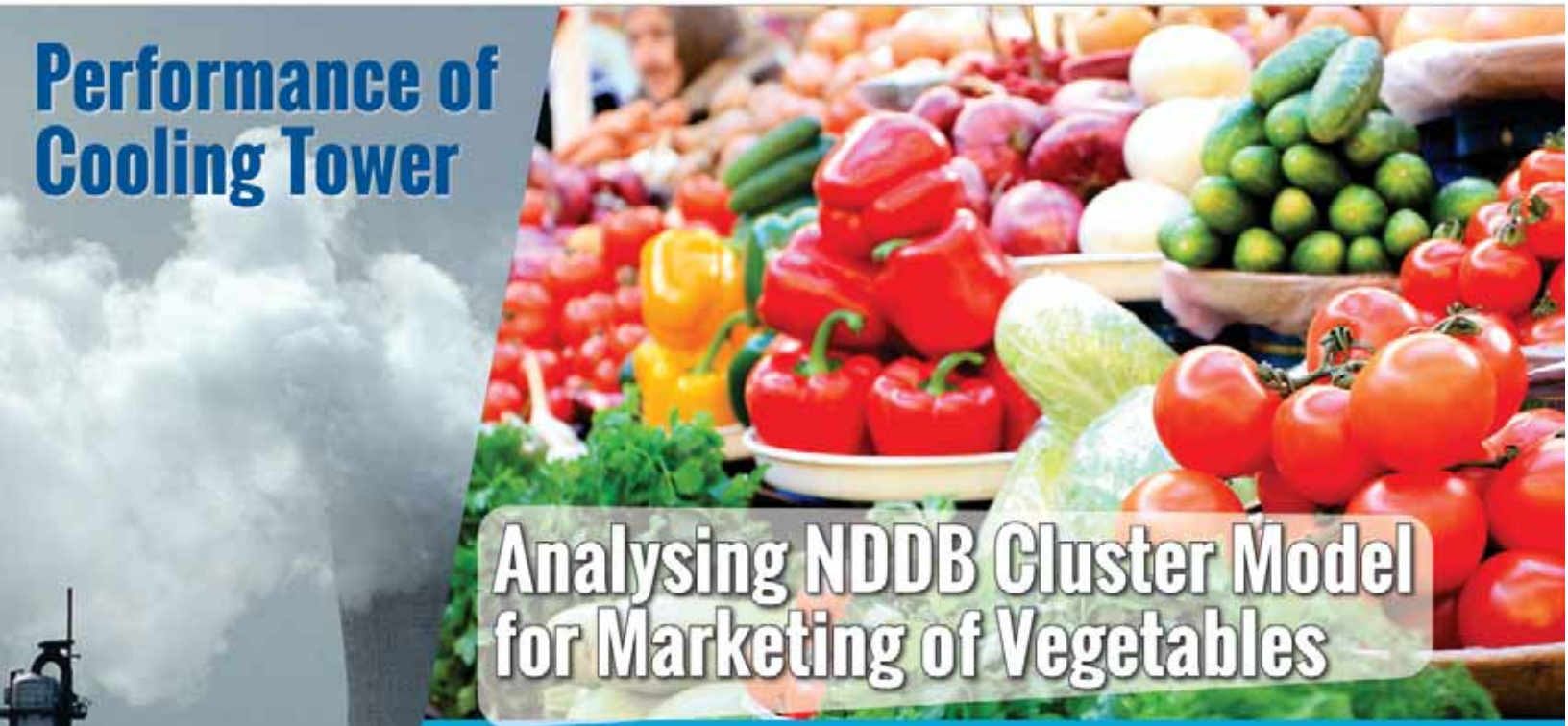
Vol. 13 No. 3 October 2017 ₹ 100

Cooling India

India's foremost Monthly dedicated to the growth of HVACR Industry

Performance of Cooling Tower



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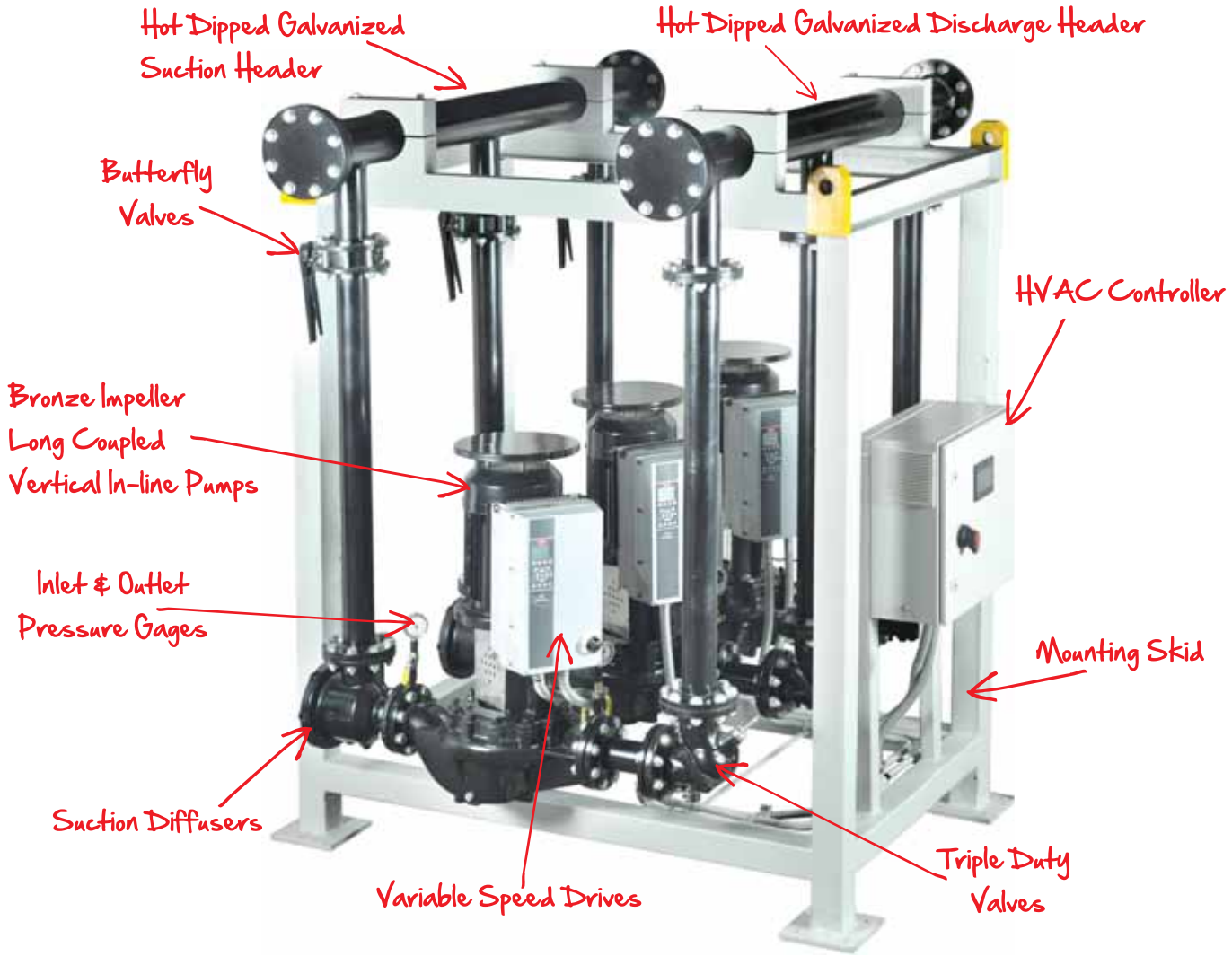

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Publisher's Letter

Hello and welcome once again to **Cooling India**, the one stop guide to the HVAC&R industry in India. Happy to inform you that the ranking of the website of Cooling India has improved since the past two months when I mentioned about it. I have no hesitation in saying that www.coolingindia.in is the No. 1 website in India today among all the publications, if any, in the HVACR industry.

Not long back, Warren Buffet had said and I quote, "India is a huge country on the move." By 2024, or at least by 2030, India will slip past China to become the most populous country, and must rapidly prepare for a fast-changing economy. India will likely hold that rank throughout the 21st century. Our population has increased almost fourfold since our independence whereas in the same period China's population only doubled. We need to, therefore, think out of box to solve our food problem. Even today, seventy years after independence, we import in large quantity our basic food ingredient 'tur dal' from Canada.

Feeding a quarter and billion people is not an easy task by any standard. It's not easy for any government for that matter. But things have to be done. It's same as in infrastructure. We cannot have infrastructure for a billion odd people like in Norway or Sweden or Canada. We need to do it differently. China has done that in infrastructure and shown to the world. This is where the role of food processing industry is and will play an important role in the years to come by linking producers with consumers. It's a major source of employment and income generation for rural areas. The role of food processing industry becomes extremely critical considering the immense and immediate challenge of feeding nutritional food to the over billion population of India. Modernisation of food supply chain will prove a boon for producers and consumers.

Introduction of modern equipment in the HVAC&R industry will definitely play a vital role in the years to come for the entire food industry. Food processing is the first organized stage of the value chain and it provides that vital link, as I mentioned above, between farmers and consumers. It, therefore, has a key role to play in driving productivity improvements across the value chain and increasing availability of affordable, nutritious and safe food. I hope you enjoy reading this issue as much as we have in bringing this to you. Do send in your comments to me at pravita@charypublications.in.

Pravita Iyer
Publisher & Director
Member, Indoor Air Quality Association (IAQA)

Directors
Mahadevan Iyer
Pravita Iyer

Publisher
Pravita Iyer
pravita@charypublications.in

Editor-in-Chief
Mahadevan Iyer
miyer@charypublications.in

Associate Editor
Supriya Oundhakar
editorial@charypublications.in

Advertising Manager
Nafisa Kaisar
nafisa@charypublications.in

Design
Nilesh Nimkar
charydesign@charypublications.in

Subscription Department
Priyanka Alugade
sub@charypublications.in

Accounts
Dattakumar Barge
accounts@charypublications.in

Response Department
Sonali Pugaonkar
mktg@charypublications.in

Digital Department
Ronak Parekh
dgmarketing@charypublications.in

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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%
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COOLING TECHNOLOGY INSTITUTE CTI MEMBER

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Makarand A Chitale
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Emerson Creates Cold Chain Organization

Following its acquisitions in cargo monitoring and building on its years of experience in food retail and foodservice, Emerson announced a new cold chain organization focused on supporting all types of temperature-sensitive and asset optimization solutions wherever commercial goods are moved, stored or sold. Emerson's cold chain organization will offer customers a total-channel approach to protect foods and other critical cargo every step along the cold chain — from grower and processor, to distributor and retailer.

As the cold chain has moved to the forefront in the fight to preserve food safety and freshness, Emerson has expanded its offering and taken a leading role in order to help its customers navigate these challenges. The stakes are high; $990 billion is lost in food waste globally each year and keeping food fresh is a $32 billion global investment in energy. Energy management and maintenance intensity are major concerns of operators from the standpoint of profitability as well as their carbon footprint. According to the Alexandria Engineering Journal, energy consumption in cold chains globally is only predicted to rise due to increasing population, with 40% of all foods requiring refrigeration and 15% of world fossil fuel energy used in food transport refrigeration.

"There are big challenges to solve with the amount of food wasted, revenues lost and energy consumed globally, and this is why we are expanding our role in safeguarding the cold chain," said John Rhodes, newly named group president of cold chain for Emerson Commercial and Residential Solutions. "Organizing our expertise and resources to focus on the cold chain and deliver unique solutions that help improve food quality, reduce energy use and optimize business effectiveness, will allow us to bring more value to our customers while making a positive impact on the environment." ■

Daikin Acquires Heroflon

Daikin Industries recently agreed to acquire Heroflon S.p.A., an Italian manufacturer of fluoropolymer compounds. Daikin will obtain all company shares owned by the Heroflon Executive Officers with finalization of the acquisition planned for the end of October 2017 after completion of all necessary procedures.

Heroflon is a compound manufacturer that produces high-performance fluoropolymers by combining various materials. Its product lineup includes fluoropolymer compounds and micro-powders centering on polytetrafluoroethylene (PTFE). PTFE is a highly functional and high value-added fluoropolymer used in a wide range of fields including the automotive, construction, electrical power, and chemical industries. Business operations center on the European market.

Daikin supplies various kinds of fluoropolymers such as PTFE to processing companies including compounders. With this acquisition, Daikin fully enters the compound business for fluoropolymers and will utilize its global network to expand sales of Heroflon's fluoropolymer compounds and micro-powders. The company also expects this acquisition to further strengthen its relationship with European car manufacturers together with sales expansion of fluoroelastomers and automotive air conditioning refrigerant. By accelerating product development that meets customer needs, Daikin expects to realize sales expansion of fluorinated materials for automobiles.

Moreover, with the automotive parts market shifting toward fluoropolymers to reduce weight, promote miniaturization, and lower fuel consumption, Daikin aims to increase global sales of fluoropolymers and fluoroelastomers to 100 billion yen in 2020 by developing products corresponding to a greater need for functional enhancement, such as in heat and wear resistance, and providing technical services. ■

Panasonic Acquires UNION RHAC TECNOLOGIA

Panasonic Corporation announced that it has completed the procedures to acquire UNION RHAC TECNOLOGIA (UR), a Brazilian air conditioning engineering company recently. UR is engaged in the engineering, installation and after-sales services for commercial air conditioners, such as absorption chillers for large-scale commercial facilities and factories, and gas-cogeneration systems. It is a leading engineering firm in Brazil, handling over 80% of absorption chillers delivered in that country. Through this acquisition, Panasonic will leverage UR's knowhow in this field to establish its presence in Brazil's air conditioner market.

Among Latin American countries, Brazil has a strong demand for commercial air conditioners, with a high potential for business growth. In recent years the country, as with Japan, is actively working to equalize energy demands and lower running costs by promoting the use of energy from gas as well as electricity.

Panasonic, a top manufacturer of gas air conditioners in Japan, has accumulated over more than 40 years a wealth of energy-saving, environmentally friendly technology and services knowhow for absorption chillers and gas heat pumps (GHPs). Combining this with UR's strengths in sales and engineering services platforms will allow Panasonic to further strengthen and promote its proposals for energy-saving solutions based on gas energy from GHP for buildings to absorption chillers for large facilities and factories. Panasonic aims to expand its gas air conditioning business in the Latin American market, centering on Brazil. ■

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North America Air Conditioners Market to Grow at 7.5% during 2017 – 2022

According to a TechSci Research report, the air conditioners market in North America is projected to grow at a CAGR of around 7.5% during 2017–2022. Various technological advancements over the last 10-15 years have resulted in increased use of air conditioners in summers as well as winters. Growing demand for air conditioners across the region is being hugely supported by increasing number of real estate projects, both in residential and commercial segments, coupled with rising purchasing power and increasing urbanization.

Light commercial air conditioners, which include splits air conditioners, cassettes, window air conditioners and concealed ductable splits, dominate North America air conditioners market due to growing demand from residential as well as commercial sectors. Additionally, growing demand for energy efficient air conditioners across the region is leading to replacement of old air conditioners with newer ones. With increasing awareness among consumers about air pollution and its adverse impact on health, air conditioners featuring air purifying technologies are expected to register healthy growth during forecast period.

"Leading air conditioner manufacturers such as LG, Samsung, Carrier, Daikin, etc, are offering air conditioners with built-in air purifiers, which are gaining popularity among consumers due to their dual features. Moreover, average cost of purchasing air purifier based air conditioners is comparatively lower than average price of purchasing air conditioners and air purifiers separately. This is anticipated to boost the sales of these advanced air conditioner systems in North America in the coming years." said Karan Chechi, Research Director with TechSci Research, a research based global management consulting firm. ■

A-Gas Acquires Diversified Pure Chem

A-Gas has acquired Diversified Pure Chem (DPC) Llc headquartered in Rhome, Texas. DPC is an industry leading reclaimer and supplier of refrigerant gases. They have a national reach operating out of 13 refrigerant collection and distribution hubs and their 40,000 sq. ft. separation and blending facility in Texas. DPC offers a full line of refrigerants including the leading technologies in HCFC and HFC replacements. As the USA refrigerant market faces future regulations of environmentally sensitive gases including the continued phase down of R22, this alliance brings together A-Gas existing Total Solutions® offerings with the established recovery, reclamation, manufacturing and sales expertise of DPC.

Monte Roach, President/CEO of A-Gas Americas, commented, "DPC brings us best-in-class separation and blending capabilities along with a complementary go-to-market approach and customer access. DPC brings a highly-experienced staff of 45 people that expand our industry knowledge and services. Our combined customers across the country will experience a significantly increased Total Solutions approach to their supply and reclamation needs. With the acquisition of Rapid Recovery in 2016 and the addition of DPC, A-Gas will become a clear leader in refrigerant recovery, reclaim and separation in the US. This is one more important step in creating an organization that delivers global expertise on a local scale." The acquisition marks the fifth in the US and the eighth worldwide since 2012 for A-Gas Group International. It is also the first acquisition by A-Gas since KKR, a leading global investment firm, invested in the company in August 2017, in partnership with Group management, with the aim to accelerate the growth. ■

GBCI Introduces TRUE Zero Waste Rating System

Green Business Certification Inc (GBCI) unveiled TRUE (Total Resource Use and Efficiency), the new brand identity for its zero waste rating system. The TRUE Zero Waste rating system helps businesses and facilities define, pursue and achieve their zero waste goals through project certification opportunities so that all products are reused. TRUE-certified projects meet a minimum of 90 percent waste diversion for 12 months from landfills, incinerators (waste-to-energy) or the environment. TRUE is administered by GBCI and serves as a complement to the LEED green building rating system created by the US Green Building Council (USGBC).

"By driving the adoption of green practices at all levels of business, we significantly impact greenhouse gases, manage risk and improve the health and wellbeing of employees and the community," said Mahesh Ramanujam, President and CEO, USGBC and GBCI. "By closing the loop on waste, organizations can become more resource efficient, discover potential new revenue streams and save money. TRUE delivers the business case for addressing waste." Currently, there are 88 TRUE-certified facilities. TRUE focuses on helping businesses, industrial sectors and schools quantify their performance and find additional ways toward zero waste. Microsoft, Tesla, Sierra Nevada Brewing Co, Nature's Path, Earth Friendly Products, Raytheon, Cintas and Northrop Grumman, among others, have facilities certified under the program. The TRUE Zero Waste certification, previously administered by the US Zero Waste Business Council, was acquired by GBCI in 2016. ■

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Chengdu's West Village is First in China to Earn Parksmart Certification

LimeTree and WE PARK (Huibo) announced that West Village has earned Parksmart Bronze from Green Business Certification Inc (GBCI), the exclusive certification body for LEED and premier organization independently recognizing excellence in green business industry performance and practice globally. Parksmart is the world's only rating system advancing sustainable

mobility through smarter siting, design and operations while conserving resources. West Village is the first project in China and the first outside of the US to receive a Parksmart certification. The car park is helping to increase energy efficiency, conserve resources and promote alternative modes of transportation in China. West Village is a multi-functional complex that houses businesses championing a creative lifestyle. It provides a comforting retreat from the fast-paced city and features a courtyard-style building with distinct culture-based commerce and an extensive sports field for outdoor activities. The below-ground car park includes more than 1,000 spaces and uses innovative and efficient technologies to create a unique and hassle-free parking experience. An online reservation and payment system reduces unnecessary idling; state-of-the-art electronic car charging stations promote the use of alternative fuel vehicles; and car park incentives. "With the West Village certification, it is truly an honor for WE PARK (Huibo) to be an industry pioneer in one of the largest, most dynamic, and innovative car parking markets in the world," said Mark Cho, senior partner and CEO China, LimeTree Capital and WE PARK (Huibo). ■

MoFPI Assisting 236 Cold Chain Projects

Ministry of Food Processing Industries (MoFPI) is presently assisting 236 integrated cold chain projects. Operationalization of 236 cold chain projects envisages creation of a cold chain capacity of 7.68 lakh MT of cold storage or controlled atmosphere or deep freezer storage, 215 MT/Hr of individual quick freeze, 110.49 lakh litres per day of milk processing or storage and 1400 nos. of reefer vehicles. Out of this, the ministry has so far created a capacity of 3.98 lakh metric tonnes of cold storage, 104.39 metric tonnes per hour of individual quick freezing (IQF), 39.83 lakh litres per day of milk processing or storage and 591 reefer vans.

A study was undertaken by National Centre for Cold Chain Development (NCCD), Ministry of Agriculture and Farmers Welfare in 2015 on All India Cold-Chain Infrastructure Capacity (Assessment of Status & Gap) to assess the requirement for cold chain infrastructure in the country. The study has made the following analysis of cold chain infrastructure:

Type of Infrastructure	Infrastructure Requirement (A)	Infrastructure created (B)
Pack-house	70,080 nos.	249 nos.
Cold Storage (Bulk)	34,164,411 MT	31,823,700 MT
Cold Storage (Hub)	9,36,251 MT	
Reefer Vehicles	61826 nos.	9000 nos.
Ripening Chamber	9131 nos.	812 nos.

New EU Project to Remove Barriers to Flammable Refrigerants

In a bid to remove barriers currently facing flammable refrigerants in refrigeration, air conditioning and heat pump (RACHP) applications, the EU's new project 'Flammable Refrigerant Options for Natural Technologies – Improved standards & product design for their safe use (FRONT)', aims to help increase the availability of suitable alternatives. The project, led by shecco, is funded under LIFE, the EU's financial instrument supporting environmental, nature conservation and climate action projects. LIFE FRONT is a demonstration project with best-practice elements, combining two main objectives under the EU's Climate Action – Climate Change Mitigation 2016 priority area. It also seeks to increase the "availability of suitable alternatives" in those areas by improving system design to address flammability risk and encourage the use of climate-friendly alternatives to fluorinated gases. LIFE FRONT is coordinated by a consortium of six partners including shecco as the project leader, AHT, ait-deutschland (AIT), European Environmental Citizens Organisation for Standardisation (ECOS), HEAT, and NIBE. The project began in mid-June 2017 and work will continue until end-July 2020.

"We are confident that LIFE FRONT will have a positive impact in facilitating the expansion of natural refrigerants in the European RACHP market, and create a positive ripple effect for other regions beyond Europe," said Alvaro de Oña, Group COO, shecco. The project will result in Europe's largest leakage size and simulation database for equipment using flammable refrigerants as well as testing of different configurations of equipment with increased refrigerant charge to determine to which extent is safe to operate with bigger amounts of flammable refrigerants. ■

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Midea Wins Contract to Provide AC Systems for Russian Stadiums

Midea, the world's leading manufacturer of air conditioning systems and appliances, has won the bid to provide central air conditioning systems for seven stadiums in Russia. Midea will offer comprehensive air conditioning solutions for the stadiums with its leading falling film water-cooled screw chillers, MAi full inverter intelligent variable refrigerant flow (VRF) systems and fan coil units.

Midea's central air-conditioning systems will operate in Luzhniki Stadium, Volgograd Stadium, Ekaterinburg Stadium, Nizhny Novgorod Stadium, Kaliningrad Stadium, Samara Stadium, Saint Petersburg Stadium. "We are very proud to be chosen by these Russian stadiums as their air conditioning supplier," said Johnson Huang, marketing director of Midea central air conditioner division. "It's a great honor for us to support Russian sporting events with our energy-efficient and reliable products and localized service. This is also a great opportunity for us to demonstrate Midea's commitment to providing surprisingly-friendly solutions."

Midea's highly-efficient falling film water-cooled screw chiller and MAi full inverter intelligent VRF system are built upon full inverter technology and meet the level 1 requirement for international energy efficiency standards. The full DC inverter intelligent VRF system utilizes Midea's cutting-edge technologies such as M-Ai full inverter quasi-two stage compression, precision cooling medium control and energy efficient heat exchange to ensure that the system can be operated in a wide temperature range, from - 32°C to 55°C, with higher energy efficiency and an annual performance factor (APF) of 5.2. The system also carries the industry's first blackbox technology that can achieve 24-hour status monitoring, provide remote diagnostics as well as automatically report maintenance issues, guaranteeing stable service during sporting events. In addition, the high-efficient falling film water-cooled screw chiller applies the industry's first full falling film evaporation technology, dual-screw compressor, and eco-friendly R134a refrigerant. It reduces the amount of refrigerant by 40 percent and lowers the emissions of greenhouse gas. The chiller is certified by the International Air-conditioning, Heating & Refrigeration Institute (AHRI) with a coefficient of performance (COP) as high as 6.16.

Midea has a long history of providing efficient, comfortable and energy saving full inverter technology solutions to a series of large scale intercontinental tournaments and national games.

"Midea is a strong supporter of sport. It is our mission to provide comfortable stadium and environments to sporting events. Russia is a vital part of the global sporting community. It has been the host of a series of top sporting events. It also has world-renowned athletes and devoted sporting fans," said Huang. "Midea's contributions will make for a more enjoyable experience for Russian hosts, athletes and spectators." ■

Adobe India Campus Using 100% Renewable Energy

Adobe India has announced that its Bengaluru campus is now among the first in the state of Karnataka to meet 100 percent of its power consumption requirements through renewable energy. As part of the digital developer's initiative, Adobe has signed a 2.5 MW grid-scale solar power purchase agreement (PPA) with CleanMax Solar to operate off-site solar farms in the Tumkur and Bellary districts of Karnataka, according to a release. Covering the company's Bengaluru campus' annual energy demand, the farms will generate 3750 MWh of solar power supply per year, which will go directly into the electricity distribution grid and become a part of the pool of energy that ultimately provides power across Bengaluru and other parts of the state.

"The solar power generated from this initiative will contribute toward cleaning up local air and lowering emissions in the environment where our employees live and we do business," Sanjeev Sethi, Director of global workplace solutions for Adobe India, said. "With this initiative, we at Adobe are happy to play a role in ensuring that the city of Bengaluru and the state of Karnataka burn less coal for their local power needs, and enabling India's goal of transitioning to renewable energy." With more than 5,200 employees in India, Adobe has implemented a wide range of activities to further its sustainability charter. The company's three campuses across Bengaluru and Noida have been certified as gold Leadership in Energy & Environmental Design (LEED) buildings by US Green Building Council. To ensure environment-friendly transportation facilities for employees, Adobe has also implemented green fleet of electric cars across its campuses. The company has also adopted several green practices across its campuses, including implementation of LED lighting, use of reusable beverage cups and following a waste reduction policy. Adobe's sustainability practices have helped the company reduce water and power consumption year on year, despite fast expanding operations in India and steady growth in employee headcount. ■

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Peter Müller to be Chairman of Eurovent Product Group

During their meeting of the Eurovent Association Product Group 'Energy Recovery Components' in Brussels, members have elected Peter Müller as their new Chairman, effective as of 1 January 2018. He is one of Europe's leading experts in this field and Managing Partner at POLYBLOC AG (Switzerland) – a pioneer in advanced heat recovery systems, which has been producing heat exchangers since 1982. Müller follows Timo Schreck (Enventus), who had been chairing the group for more than 10 years and recently changed his company function. The new Chairman is going to be supported by Thomas Richter, responsible for Business Development in the Energy Recovery area at Hoval Aktiengesellschaft (Liechtenstein), who was elected Vice-Chairman. Peter Müller stated following his assignment, 'Energy recovery has become a field of ever-increasing importance in the ventilation area, not least thanks to the constant lobbying efforts of our product group and my predecessor Timo Schreck in front of public decision-makers. Today, nearly each new air handling unit requires heating or cooling recovery due to legislative requirements and its significant contribution to lowering energy demands. It will be an honor for me to continue this path and to bringing European premium technology forward.' The Eurovent Product Group 'Energy Recovery Components' is the largest grouping in its product area in Europe, counting close to 20 manufacturers as members. ■

Peter Müller

Lennox International Appoints Gary Bedard EVP, President & COO

Lennox International Inc announced Gary Bedard as EVP, President and COO of its Worldwide Refrigeration business, effective October 16, 2017. Bedard succeeds David Moon who is leaving LII at year end to pursue other career opportunities. "We appreciate David's significant contributions to our refrigeration business and in particular his last 11 years as President.

David led our Refrigeration business to become the industry leader and innovator that it is today," said Todd Bluedorn, Chairman and Chief Executive Officer of Lennox International. "With Gary's strong operating experience and customer focus, our global refrigeration business is well positioned to continue winning in the marketplace."

Bedard has a proven record of success at Lennox International over two decades, including the last ten years as Vice President and General Manager of our highly successful Lennox Residential business.

Prior to joining LII in 1998, Bedard spent eight years at York International in product management and sales leadership roles for commercial applied and unitary systems as well as residential systems. Bedard has a bachelor of science in engineering management from the United States Military Academy at West Point. ■

Gary Bedard

Mark Vergnano is New Chairman of National Safety Council Board of Directors

The Chemours Company, a global chemistry company with leading market positions in titanium technologies, fluoroproducts, and chemical solutions, announced that its President and CEO, Mark Vergnano, has been elected to chair the board of the National Safety Council (NSC).

Vergnano stated, "I am proud to chair the board of an organization with an unwavering focus on safety that transcends industries and has safety at work, in homes, and communities as the cornerstone of its mission."

He has been a member of the NSC board for the past seven years. Vergnano also sits on the boards of the American Chemistry Council and Johnson Controls International. Vergnano spoke at the opening ceremony at today's NSC 2017 Congress and Expo in Indianapolis. In his remarks, he addressed his belief that safety must be at the core of any industrial company: "Safety Obsession, as we call it at Chemours, is one of our five foundational corporate values. The word obsession reminds us to keep safety top-of-mind for our workforce every day." Mark Vergnano holds a bachelor's degree in chemical engineering from the University of Connecticut and master's degree in business administration from Virginia Commonwealth University. ■

Mark Vergnano

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CAREL Wins RAC Cooling Industry Award

CAREL has taken home the prize in the 'Building Energy Project' category at the RAC Cooling Awards for the case study on Italy's largest retailer, which decided to invest in its HVAC systems (i.e. not the part relating to food refrigeration) at some of its stores with the aim of reducing energy consumption. In absolute terms, energy savings across the six stores came to 440,107 kWh, corresponding to a cost saving of € 13,412 (or 12.83%). In environmental terms, atmospheric CO_2 emissions were reduced by 198 tonnes. The investment will be paid back in 2.6 years, earlier than the initially-expected three years.

The new local control and supervision system is based on pyramid logic, and manages:

- the air handling units;
- the heating-cooling systems;
- the lighting.

The monitoring system in each store is also connected to a centralised (remote) supervisory system, representing the top of the pyramid. System optimisation to maximise energy savings is the main focus of data centralisation, providing a benchmark for direct comparison between the different stores. Design and development of the final system were the result of careful analysis of the energy audit. Starting from this, a machine learning method was developed for evaluating potential savings in different scenarios and for subsequent comparison between actual consumption and estimated consumption without the improvement actions. The resulting comparison of the expected benefits in the various scenarios was used to support the management's decisions on what actions to take to ensure store efficiency, in terms of overhauling the buildings-systems. Held this year for the 13th time, the RAC Cooling Industry Awards recognise the leading innovations and environmental successes in the refrigeration and air conditioning industry. With these cutting-edge results, CAREL has once again proved its role as a reference partner for projects with high energy efficiency potential. ■

Mitsubishi Electric Receives ENERGY STAR

Mitsubishi Electric US, Inc Cooling & Heating Division (Mitsubishi Electric), a leading manufacturer of Zoned Comfort Solutions and Variable Refrigerant Flow (VRF) cooling and heating systems, announces its recognition by the US Environmental Protection Agency's (EPA) ENERGY STAR program. Several Mitsubishi Electric residential systems have received the designation of ENERGY STAR Most Efficient 2017, which is intended to identify and promote energy efficient products in the marketplace.

Among the manufacturers in the "Central Air Conditioners and Air-Source Heat Pump" category, Mitsubishi Electric had 56 qualifying systems, in a range of capacities, across the M-, P- and S-Series product lines. The qualifying M-Series models include select systems from the FH, GE, GL, FE and KJ product lines. The qualifying P-Series models include select systems from the PUZ and PUY product lines. The qualifying S-Series models include select systems from the PUMY product line.

MITSUBISHI ELECTRIC

The Most Efficient designation for approved models remains when the Mitsubishi Electric kumo cloud™ controller app is used.

"Energy efficiency has always been a top priority in the design of our equipment," says Paul Doppel, Senior Director, industry and government relations, Mitsubishi Electric US, Inc. Cooling & Heating Division. "We work closely with the EPA and the US Department of Energy in order to ensure their requirements are incorporated into our product development efforts, so this designation is a proud affirmation that we are honored to have received." ■

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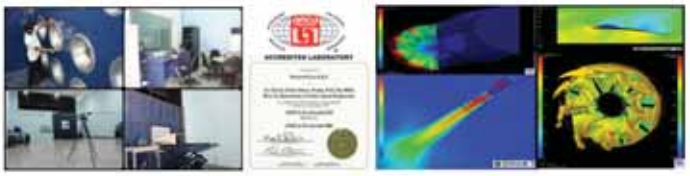

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Food Processing Equipment Market worth 72.27 Billion USD by 2022

Meat & seafood is the fastest-growing segment in the food processing equipment market by application during the forecast period 2017–2022...

The food processing equipment market is projected to reach USD 72.27 Billion by 2022 at a CAGR of 7.0 per cent from 2017 to 2022.The market is driven by factors such as increasing demand for processed foods in related segments of the food industry, such as dairy, meat, poultry, and seafood, rising consumer concerns about safety of food products, and growing demand for processed and convenience foods. Meat & seafood is the fastest-growing segment in the food processing equipment market by application during the forecast period 2017–2022.

Meat & seafood processing equipment helps to ensure that the processing activities are performed on time as well as help in maintaining hygiene, owing to which processing companies are able to deliver better quality products to consumers. With the rise in population, the need for food has also increased. The changes in lifestyles and increase in disposable incomes result in an increased preference for convenience food products. Hence, the inclination towards convenience meat & seafood products is also expected to increase. This is expected to drive the growth of the meat & seafood processing equipment industry as well. North America has a huge market for processed meat & seafood products, and as a result, for processing equipment as well.

In the end product form segment, the solid food products segment has the largest market in the food processing equipment industry.

The solid processed food products include meat, seafood, bakery products, ready-to-eat products, dairy products, and among others. The purpose of processing in solid food products is to produce a desired food product, for easy handling, better taste or sensory characteristics, and greater shelf life.

The equipment that are mainly used in processing of food products in solid form include heating equipment, dryers, fermenters, coolers, coating equipment, evaporators, and powder handling equipment. The consumption of processed food in a solid form is driven by the fast food and convenience food trend across the globe.

Significant growth for food processing equipment is observed in the Asia-Pacific region.

Asia-Pacific led the market for food processing equipment across the globe. In the region, China is estimated to have the largest share in the regional and global market. The Asia-Pacific region has a significant potential for food & beverage market growth; changing lifestyle of the consumers, due to the rise in the disposable income is one of the major factors contributing to the growth of food processing equipment market in this region.

This report includes a study of marketing and development strategies, along with the product portfolio of leading companies. It includes the profiles of leading companies such as GEA Group (Germany), Alfa Laval (Sweden), Bucher Industries (Switzerland), SPX Corporation (US), and Krones AG (Germany). ■

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Common Food Processing Incubation Center for Shallots, Perambalur

Union Minister for Food Processing Industries Harsimrat Kaur Badal said that it is a historic & auspicious occasion for Tamil Nadu and Chettikulam village in particular...

Harsimrat Kaur Badal, Union Minister for Food Processing Industries launched Common Food Processing Incubation Center for Shallots (Small Onions) in Chettikulam village in Perambalur district of Tamil Nadu through video conferencing recently. Speaking on the occasion Harsimrat Kaur Badal said that it is a historic & auspicious occasion for Tamil Nadu and Chettikulam village in particular. She also congratulated Indian Institute of Food Processing Technology (IIFPT), Thanjavur for their initiatives to help double farmers' income by 2022. She also said that farmers in Perambalur district are producing 70,000 tons of shallots per year in a cultivation area of 8000 hectares, in spite of increasing difficulty in cultivation due to increase in prices of inputs, unpredictable weather, disease outbreak and not getting adequate prices in the market. This Central Processing Center for Shallots in Perambalur will ensure that no shallots are getting wasted, increase farmers' income and also ensures availability of shallots to consumers. This onion processing technology should be taken to all parts of India.

C Anandharamakrishnan, Director, Indian Institute of Food Processing Technology said that his Institute has decided to take one crop per year and develop processing technologies and related infrastructure for that crop. In this regard Mission Banana was implemented in the previous year and this year it is Mission Onion. Central Food Processing Center for Shallots in Chettikulam, Perambalur District is part of the Mission Onion in improving the lives of Onion farmers in this area. This center will help farmers' to double their income through value addition. This center will process Shallots and produce 4 Shallot products viz. Fresh Shallot, Peeled Shallot, Onion Powder, Onion Paste, and Onion Flakes. He also said that IIFPT is working on Mission Coconut which will be launched next year on World Coconut Day (2nd September 2018).

Perambalur district is the hub for small onions (Shallots) cultivation in over 8000 hectares producing around 65,000 to 70,000 tonnes every year. Farmers reported massive losses due to conventional methods of handling and storage. Stakeholders from this region expressed their need to provide technological solutions to minimize wastage, particularly, during seasons with surplus production. The farmer producers union which will be involved in this initiative was also launched recently.

IIFPT has developed three machines viz,

Onion Stem & Root Cutter
Small Onion Peeler
Solar Assisted Curing cum Storage Unit for Onions

This Center will make four value added products

Onion Powder
Onion Paste
Vacuum Packed Peeled Onion
Onion Flakes

Benefits of the Value addition created

Reduction of storage losses
Ease of handling
Shelf life extension
Increase in income generation
Wider market coverage for local farmers
More jobs created

Even with proper storage and handling, unprocessed small onions last only upto 15 days and even lesser when stored after peeling. But with the value addition, Onion powder will last for 6 months, Onion Paste for five months, Vacuum Packed Peeled Onion for 1 month (under refrigeration), and Onion Flakes for six months. Thus, it increases shelf life and farmers get better prices for their produce. ■

USGBC Study on New Mexico's Green Building Tax Credit

A USGBC case study reveals the ways New Mexico has been a leader in green building policy.

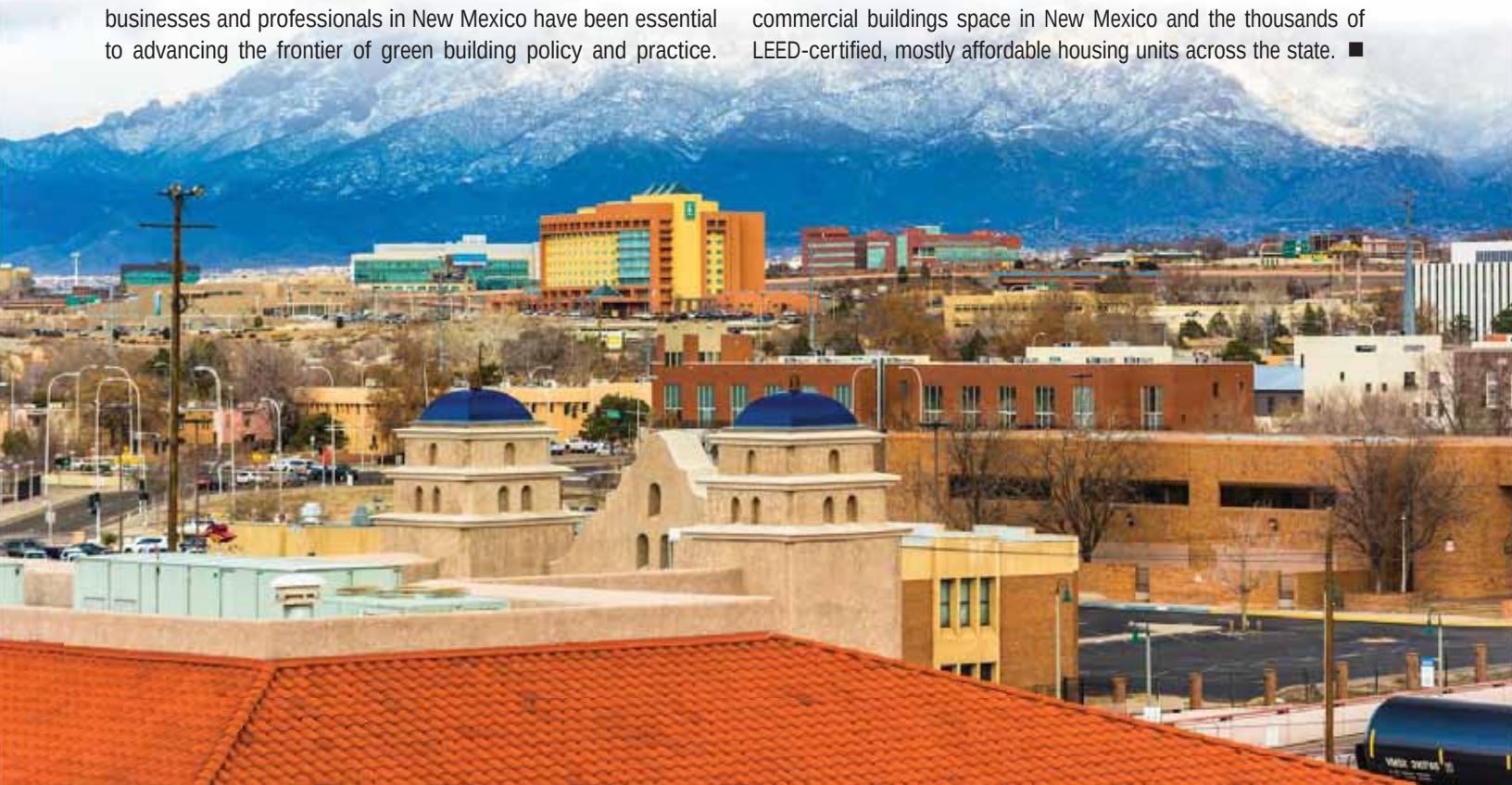
A new USGBC policy case study recounts a decade of green building policy leadership in New Mexico, a state that is probably better known for its green, red and "Christmas" chili sauces. But that reputation should change, because this state of barely two million people has been punching well above its weight class in the fight to improve the economy and the environment through cost-effective, energy and water-saving green buildings. Like other states in the early 2000s, New Mexico began exploring how building green could improve building quality and reduce associated costs and impacts. Albuquerque Public Schools and, separately, the City of Albuquerque, were early adopters of LEED as an instrument to help them achieve these goals. These actions by local governments and school boards paved the way for the statewide Sustainable Building Tax Credit (SBTC), first adopted in 2007, and most recently renewed in 2015. The SBTC supports the greening of many building types in New Mexico, including schools, and has yielded fantastic results. There are now more than 300 LEED-certified non-residential buildings in the state. In addition, there are nearly 3,000 LEED-certified residential units—nearly two-thirds of which have earned LEED Platinum certification.

The USGBC case study tells of this remarkable policy, its contexts and achievements. Early adopters like these jurisdictions, businesses and professionals in New Mexico have been essential to advancing the frontier of green building policy and practice. Central to the work has been USGBC New Mexico, its past and present leaders and its partners across the public and private sectors. Individually and collectively, they have sought to invest in a greener future while also reaping returns in the form of better classrooms, energy and water savings and higher-quality housing.

Many have learned from these early efforts and have continued to demand or reward building quality and sustainability in design, construction and operations. At USGBC, LEED v4 was launched to offer a better, more outcomes-oriented rating system that is both easier to use and is calibrated to today's higher expectations for green building performance.

In addition, the Arc platform was launched as a sustainability performance measurement platform that is helping all buildings monitor green building outcomes during building operations and help them track toward LEED certification (or recertification).

First released on September 30 during the Albuquerque sustainable schools tour co-hosted by USGBC New Mexico (see a video about the event on KRQE news), the USGBC case study features a section on green schools. This was a fitting kick-off for this year's Green Apple Day of Service initiative, spearheaded by the Center for Green Schools at USGBC. Today, there are 39 LEED-certified K–12 schools in Albuquerque and 53 statewide. These are a small part of the more than 13 million square feet of LEED-certified commercial buildings space in New Mexico and the thousands of LEED-certified, mostly affordable housing units across the state. ■



Performance of Cooling Tower

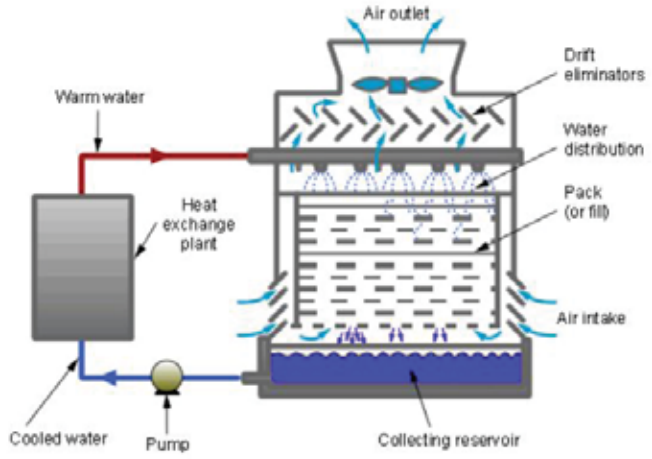
Cooling Tower plays significant part in energy consumption and its performance is majorly driven by ambient WBT, the performance evaluation needs careful attention by effective analysis considering all the factors that are responsible in Cooling Tower Performance...

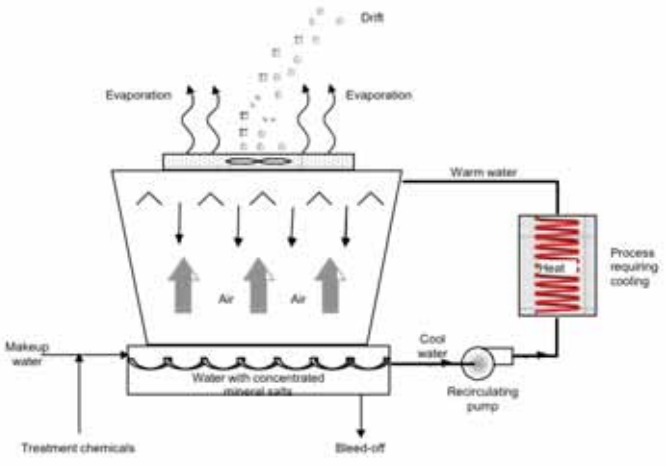
The Cooling Tower is important utility equipment which plays a vital role for operation & energy consumption perspective by providing cold water (above ambient Wet Bulb Temperature Air) by utilizing atmospheric air to cool the incoming hot water. The application of Cooling Tower is very widespread ranging from large thermal power plants for barometric condenser, water cooled chillers for condenser heat exchange application to a process industry or even simple machine tool cooling application. Design, shape, capacity etc vary as per requirement & application. Hence hyperbolic, induced draft cross flow/ counter flow, forced draft or natural draft cooling towers came into picture. In all the cases, it does the same operation of lowering the temperature of incoming hot water by exchanging the heat from atmospheric air. In this process, air and water mixture releases latent heat of vaporization, which has a cooling effect on water by turning a certain amount of liquid into its gaseous state, releasing the Latent Heat of Vaporization. In simple terms, the part of falling/circulating water removes heat from bulk of circulating water, by the way of evaporation with the help of ambient/atmospheric air. This gives rise to loss of water & hence the outlet air has higher Relative humidity (%RH).

Since Cooling Tower plays significant part in energy consumption and its performance is majorly driven by ambient WBT, the performance evaluation needs careful attention by effective analysis considering all the factors that are responsible in Cooling Tower Performance. Often we evaluate Cooling Tower performance based on its effectiveness (%) which is nothing but the simple arithmetic division of Range & Approach as follows:

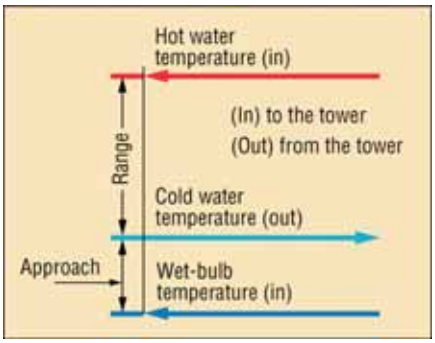
CT Effectiveness (%) = Range (°C or °F) / [Range + Approach] (°C or °F)

Where, Range = (Inlet Water Temp. – Sump Water Temp.)





Approach = [Sump Water Temp. – Ambient Air Wet Bulb Temp. (WBT)]



But this is not the very correct way to get a judgment of cooling tower performance as shown in the following table to elaborate the same:

Particulars	Units	Base Case	Case 2	Case 3
Ambient Wet Bulb Temp. (WBT)	°C	28	28	26
Cooling Tower I/L water temp.	°C	37	39	40
Cooling Tower O/L water temp. (Sump Temperature)	°C	32	32	32
CT Range	°C	5	7	8
CT Approach	°C	4	4	6
CT Effectiveness	%	55.56%	63.64%	57.14%

Now compare the 'Range' & 'Approach' values and corresponding % effectiveness.

Case 1: Base Case of 28 deg C WBT with 5 deg C Range & 4 deg C Approach has 55.5% effectiveness.

Case 2: Same ambient WBT of 28 deg C as Base case with same 4 deg C Approach but higher range of 7 deg. C. This gives higher effectiveness of 63.6%.

Note: Case-2 shows, higher the range higher becomes the effectiveness.

Case-3: The Range is further higher at 8 deg. C with lower ambient WBT of 26 deg. C with 6 deg. C approach. This gives little lower effectiveness of 57.14%.

Note: Case-3 shows, higher the range does not necessarily bring into higher effectiveness but higher the approach results in lower effectiveness as compared with Case-2 but on contrary the effectiveness is higher as compared with Case-1 (Base case).

Similarly, many combinations can become available for analysis but do not give accurate analysis just from the value of effectiveness. Following is another example where with same approach of 4 deg C & different range, the effectiveness values vary.

Particulars	Case-4	Case-5
Ambient Wet Bulb Temp. (WBT)	26	30
Cooling Tower I/L water temp.	37	39
Cooling Tower O/L water temp. (Sump Temperature)	30	34
CT Range	7	5
CT Approach	4	4
CT Effectiveness	63.64%	55.56%

Following is an example where with different approach but same range of 5 deg C, the effectiveness values vary.

Particulars	Case-6	Case-7
Ambient Wet Bulb Temp. (WBT)	28	30
Cooling Tower I/L water temp.	40	40
Cooling Tower O/L water temp. (Sump Temperature)	35	35
CT Range	5	5
CT Approach	7	5
CT Effectiveness	41.67%	50.00%

Hence, the Cooling Tower Performance is not to be decided based on the value of % effectiveness. But the same is also to be evaluated from L/G ratio (Liquid to Gas ratio) & then the same is to be compared with designed conditions for particular cooling tower. Liquid in this case means water & gas means ambient air.

Since the heat transfer takes between water and air, the approach practically could not be zero & hence the cooling tower effectiveness can't be 100%.

Though the cooling tower performance wisely considered as 'CT Effectiveness' will be higher with higher 'Range' & Lower 'Approach' which means as low as possible the sump water temperature (CT O/L water temp) better the performance of Cooling Tower but the same gets largely affected by following five factors:

1. Ambient WBT (Deg. C or Deg. F)
2. Hot Water Temperature (CT Inlet Water Temperature) (Deg. C or Deg. F)
3. Cold Water Temperature (CT outlet/Sump Water Temperature) (Deg. C or Deg. F)
4. Air Flow Rate [L-Liquid) (m^3/sec, m^3/hr, CFM etc.)
5. Water Flow Rate [G-Gas) (m^3/sec, m^3/hr, GPM, Liter/hr etc.)

The practical issues arising at site for measurement of circulating water flow rate and air flow rate have limitations especially for big size cooling towers & parabolic cooling towers, where the proper arrangement for measurement is not available. In these cases, proper calibrated instrumentation plays crucial role which needs to be cross checked with pumping & blower power consumptions as well as material & heat balance for a particular application.

With the help of these measured parameters, the capacity of Cooling Tower can easily be calculated from water side heat and material balance as per following formula:

TR = (m x Cp x Delta T)/3024

.....TR: Ton of Refrigeration

.....m: mass flow rate of circulating water (Kg/hr)

.....Cp: Specific heat of circulating water (Kcal/Kg.°C)

.....Delta T: Temperature difference (I/L & O/L water) (°C)

It is important to maintain the required L/G ratio as per designed conditions. If L/G ratio is less than the Rated this means either circulating water flow rate is lower or the air flow rate is higher. Other condition of higher L/G ratio means either circulating water flow rate is higher or the air flow rate is lower. The corresponding adjustments can be done either in liquid or gas flow rates, as per convenience by adjusting the VFD frequency to get the corresponding saving in energy consumption.

The cooling tower analysis in similar manner can also be done with the help of Merkel Equation as a KaV/L analysis but the same becomes little difficult for calculations & hence not very popularly been used where the air film is represented by the Water Operating Line on the Saturation Curve on Psychrometric Chart with corresponding enthalpies & temperatures.

Merkel Equation:

$$KaV/L = \int_{CWT}^{HWT} \frac{dt}{h_W - h_A}$$

The main air condition is represented by the Air Operating Line and the slope of which is the Water/Air [L/G] ratio. In this analysis, the value of KaV/L remains constant & not directly dependent on ambient WBT, range, approach by formula but depends mainly on L/G ratio and attracts different perspective view to analyze the cooling tower performance. This shows the importance of L/G ratio in analyzing the cooling tower performance.

The seasonal adjustment in CT fan air flow rate are suggested to do as per the variation in ambient WBT, to get better performance & corresponding energy savings. Hence, application of VFD on CT fan becomes useful application which mainly to be operated during winter season of low ambient WBT, otherwise allowing CT fan to run on full speed to maintain sump water temperature (CT O/L water temp.) as low as possible is preferable. In HVAC application for a case of water cooled chillers especially for high ambient WBT & RH conditions (non-winter conditions), since the capacity of CT fan (KW) is so smaller than corresponding compressor motor capacity (KW power consumption), reducing CT fan speed by VFD will save negligible energy than corresponding increase in chiller compressor energy consumption, due to marginal increase in CT O/L water temperature. ■

Abbreviations

WBT : Wet Bulb Temperature	CT : Cooling Tower
RH : Relative Humidity	VFD : Variable Frequency Drive
TR : Tonne of Refrigeration	I/L : Inlet
O/L : Outlet	

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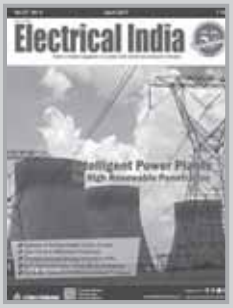

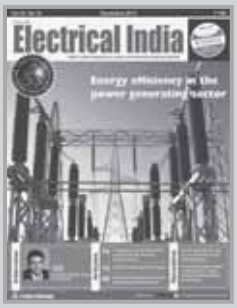

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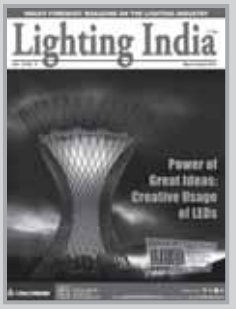

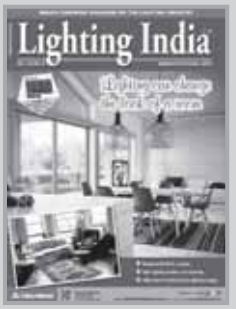

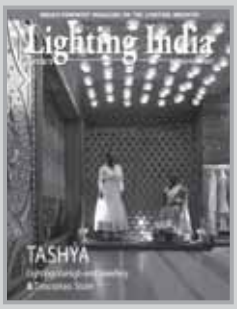

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- Universities, Technical & Research Institutions

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Sturdy & Lightweight: Material for All Areas

LAMILUX produces high-tech composites – for the refrigeration industry

The German company LAMILUX provides sophisticated, tried and tested high-tech materials with the fibre-reinforced plastic sheets produced in a continuous manufacturing process. They are used both on the inside and outside of buses, caravans and commercial vehicles. The very lightweight and equally extremely strong material forms both the outer and inner surface layers of roofs, floors and walls. In the form of LAMILUX India, the German producer has had its own company in India since 2009, which also runs a private warehouse in Bhiwandi near Mumbai. Here, the focus is not just on sales, but also on the technical support for the processing of GRP surface layers. LAMILUX will be at India Cold Chain Show 2017: Visit them from 12- 14 December at booth B57.

From production to processing, to transport and sales: A continuous, temperature-controlled system is required to protect food such as fresh produce and frozen goods against spoiling. LAMILUX composites are used during all phases of this processing and cooling chain, eg as surface layers for walls in processing and storage rooms as well as in truck refrigeration units and cold rooms.

The low weight of the LAMILUX composites, which is significantly lighter than those made of aluminium or steel, is particularly useful here. This makes it possible to have lighter units and therefore save on fuel and generate lower environmental impacts through CO_2 emissions. A study recently determined that a weight reduction of 100 kg reduces fuel consumption by a truck to just under half a litre per 100 kilometres.

With Antibacterial Surface against Germs

Exploiting all innovation potential for fibre-reinforced plastics through targeted research and development – LAMILUX underlines this objective with a technologically sophisticated and solution-oriented project that will end with a sensational composite material: LAMILUX AntiBac – a fibre-reinforced plastic with a surface that has an anti-microbial effect thanks to a nanosilver coating and causes germs on it to die within a few hours. The material was specifically developed as a wall coating for operating theatres in hospitals, as well as for truck refrigeration units, cold stores and processing rooms in the food industry. LAMILUX AntiBac provides supreme sterility that would not be possible using any other material. A completely new level of hygiene can be achieved in combination with simple, residue-free cleaning of the surfaces.

Industrial Production & Worldwide Leading Position

The quality – which has been awarded multiple, top certifications – and material properties ideally tailored to the applications have secured LAMILUX composites a leading position in the international market for fibre-reinforced plastics for many years. Rohan Bellikatti and Manjul Bhatia provide security of supply, top-class quality and expert advice. The two LAMILUX employees offer excellent technical support, detailed advice on-site at the customer as well as a partner programme for LAMILUX customers that involves numerous benefits. ■

Value Chain in Food Processing

Agribusiness is a very common word and many a time it ties to cascade farming with manufacturing without realizing that the manufacturing sector is not the same as farming sector and high tech manufacturer cannot go to the field and grow the raw material. However, farmer, the first entrant has to be supported with all that he needs in farming to get the highest production and productivity and must be ensured profit sharing as much from the chain...

There is a great diversity of agro-processing worldwide and in some countries it accounts for more than 60% of the employment. Many people start agro-businesses at a small scale, often working from home and selling to neighbours and friends via a roadside stall or in a local marketplace. Characteristically, small-scale production is labour-intensive as there is rarely sufficient money to invest in specialized processing equipment. The quality of products may vary and small enterprises often do not have consistency of supply and so cannot cater for wholesalers or retailers who require guaranteed deliveries of consistent quality. Small-scale processors also may not have contracts with raw material or packaging suppliers but buy materials from local markets. There are number of these businesses in emerging economies, and with advice and assistance some of them can develop into larger scale enterprises. When small scale processors try to scale up operations a series of issues may be encountered. For example, products may be in direct competition with those of other processors when displayed on retail shelves and so the quality of the packaging becomes much more important. Retailers may negotiate lower prices than processors have experienced when making direct sales to consumers. Any scaling up of operations brings new challenges: typically these businesses employ more people and the owner must have staff management skills; more careful control is needed over business finance, especially, production and distribution costs; business management and financial planning skills are required to stay ahead of competitors; investment decisions are needed for both new equipment and improved packaging. The larger production volumes require production-planning skills and may create a need for environmental protection through waste management. Other issues, such as market research, product development and the business image may also increase in importance.

The degree of processing can vary tremendously, ranging from the cleaning and grading of fruits to the milling of rice, to the cooking, mixing, and chemical alteration that create a textured vegetable food. As shown in table 1.0, agro industries can be roughly categorized according to the degree the raw material is transformed. In general, capital investment, technological complexity, and managerial requirements increase in proportion with the degree of transformation. The purposes of

Table 1.0 Categories of Agro Industries based on degree of transformation of raw materials

PRIMARY PROCESSING	• Cleaning • Grading • Conditioning • Packaging • Storage	No physical transformation of the commodity
SECONDARY PROCESSING	• Paddy to rice • Wheat to flour • Oilseed to Oil • Pulses to dal • Dal to basen	Physical transformation but product is not ready to eat
TERITARY PROCESSING	• Cooking rice • Baking bread & biscuit • RTE foods • Pickles • Ketchup	RTE products Convenient

transforming raw food and fiber are to create an edible or usable form, to increase storability, to create a more easily transportable form, and to enhance palatability or nutritional value.

Processed foods far from being a luxury can significantly enhance an economy by freeing the work force (especially women) to more productive activities rather than preparing and serving food in the house. In addition to preserving perishable crops, processed foods can improve health esp. of children, increase incomes, reduce sickness and improve quality of life. Food spoilage is wasteful, costly and can adversely affect trade and consumer confidence. People have the right to except the food they eat to be safe and suitable for consumption. Everyone including farmers, growers, manufacturers and processors, food handlers and consumers has a responsibility to ensure that food is safe and suitable for consumption.

Half a century ago, green revolution provided the first big leap for Indian agriculture and food security. The country became self-sufficient in food and from a net importer of grains, it transformed into an exporter. The Government's strong interventions in creating minimum support price assured farmers of definite marketing. Institutions like FCI supported then government and farmers in this regard. Further, R&D institutions like ICAR, SAU with strong extension complemented the efforts. A public distribution system created fair price shops to sell essential food items at affordable prices. However, over the last 50 years, the context for food and agriculture has changed. Now, tiring public infrastructure, serious water stress and growing threat of environment change

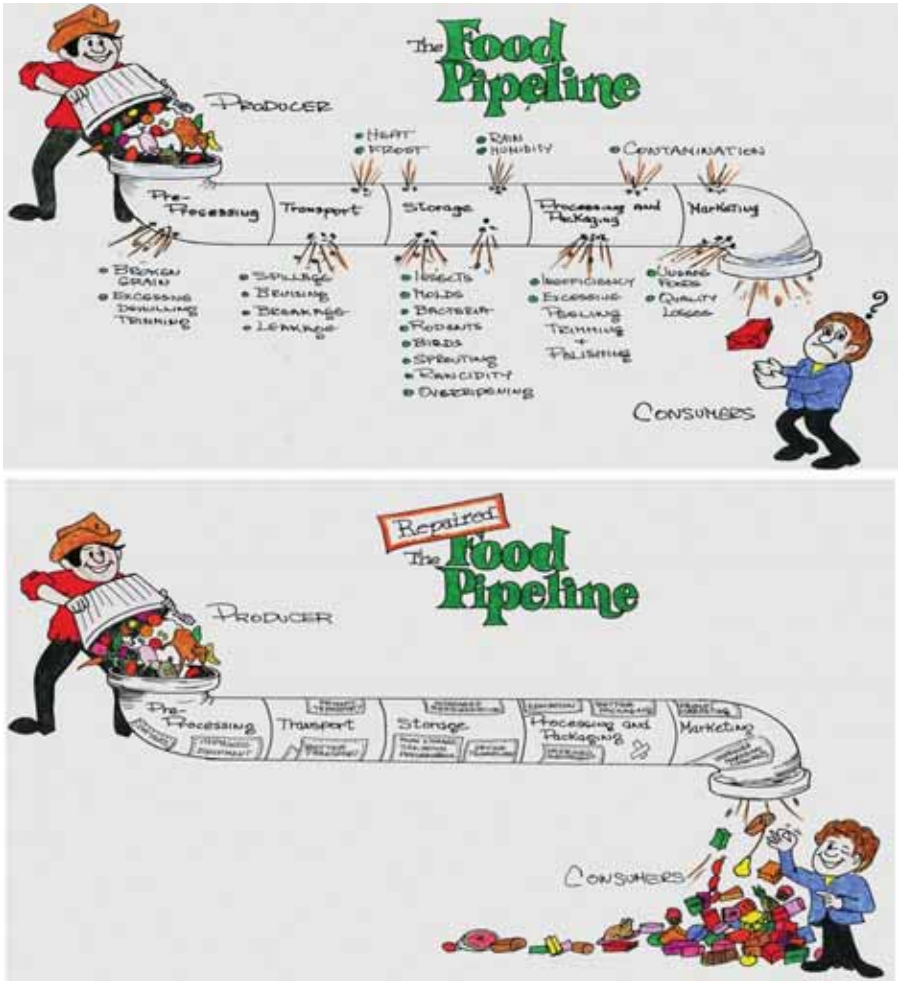


Figure 1.0: Postharvest losses in the supply chain

necessitate new thinking towards market driven approach that will support sustainable agriculture and ensure remunerative returns to the farmers. The corporate sector can add a unique dimension, given the power of private entrepreneurship, its capacity to innovate, its wide variety of skill as well as its ability to reach markets more efficiently. Today's consumer is seeking superior nutritional and taste benefits, better hygiene and convenience. Increasing awareness of health and well being is also generating demand for wider variety of grains. This calls for a change in farming system from selling whatever is produced to producing what the consumer wants. Increasing crop production alone is not sufficient to raise farmer income if markets do not support such production. India's agri waste is estimated to be Rs 92000/- crore. A big fraction of this wastage is in perishables. A higher level of food processing can create quality agri commodities thereby, reducing farm wastages. This requires cold chain infrastructure as well as branded products that can win the consumer confidence. An integrated network of refrigerated buildings and vehicles to transport produce from farm to shop quickly and in good condition is must. Growing middle class in big cities is hungry for high quality fresh and processed food products. If India develops a nationwide cool cold chain, it would connect farmers with these premium markets and raise their income. As per International Institute of Refrigeration, if developing countries had same level of refrigeration infrastructure as developed, they would save 200 million tonnes of food or around 14% of their food supply. In India, NCCD estimated that country has meagre (15%) control temperature transportation facility and less 1% of pack houses that pre-condition the produce for onward transportation. This lack of infrastructure means just 4% of country's food is moved through cold chain. So, main missing link is seamless control environment supply chain, comprising on farm pack houses, pre-cooling, distribution hubs, refrigerated transport and marketing vital to move the fresh produce swiftly from farm gate to consumption centers. The country needs to adapt the solution that worked and delivered throughout the world. Cold chain does not just reduce the post harvest losses but also allows the farmers to earn more by maintaining the quality of their produce by marketing it to distant cities. Recently, Surinder Kumar of Abohar has successfully marketed his kinnows from Punjab to Bangalore using the cold chain like waxing, grading, pre-cooling, packaging and transportation in reefer vans. This has not only reduced the wastage but also raised his profits ten-fold. So, entrepreneurial farmers or farmer cooperatives can move right up the value chain by developing its own processing activities and products that serve the

Table 1

Is there a demand for the produce?	(Find out the characteristics required for the product and size and value of market)
Who else is producing similar products?	(Determine number and type of competitors)
What is needed to make the product?	(Find the availability and cost of staff, equipment, services, raw materials, ingredients and packaging)
What is the cost of producing a product?	(Calculate the capital costs of getting started and the operating costs of production)
What is the likely profit?	(Calculate difference between expected income from sales to an estimated share of market and costs of production)

society as a whole. The following few points could guide and help in this regard.

First step towards operating a successful food processing plant is to have a good idea. You also need to find out whether idea is feasible and if necessary to convince financial backers (friends, family members, banks or shareholders) to support the idea. It is not always easy to get started but with persistence, help and determination, almost anyone can start a small processing business. However, poor planning can lead to production stoppages. (Planning is thinking ahead to make sure that everything is in place to produce the required amount of product in the time available.)

Feasibility Study

Aspiring entrepreneurs may have an idea about the type of food product that they would like to make. This can come from seeing others successfully producing a food and wanting to copy them or from talking to friends and family members about products that they think they could make. However, an idea for a business is not a sufficient reason to begin production straight away, without having thought clearly about the different aspects involved in actually running the business. To reduce this risk of failure and losing money, potential producers should go through the different aspects of running their business in discussions with friends and advisers before they commit funds or try to obtain

Figure 2: Pack house operation being performed at Ludhiana

a loan. This process is known as doing a feasibility study and when the results are written down, the document is known as a business plan.

Market Feasibility

Once a potential producer decides that he wishes to start a business, the first thing to do is to find out what is likely demand for the food product that he or she wishes to make, by conducting a short market survey. There are two types of information that are needed:

1) Information about the product and its quality
2) Information about how much people will buy, how often and for what price. (Survey of market size and value)

The questions in Table 1 needs to be answered by a feasibility study.

Each of these aspects should be looked at in turn. When all the information has been gathered and analyzed, it should be possible to make a decision on whether the proposed investment in the business is worthwhile.

Technical Feasibility

Once an entrepreneur has found information about potential consumers, their requirements and the likely share of the market that could be obtained for a new product, it is then necessary to assess whether production at this scale is technically feasible. The series of questions below is helpful in deciding the technical requirements of the business:

- Are enough raw materials available of the correct quality when needed for year-round production?
- Is the cost of the raw materials satisfactory?
- Is the correct size and type of equipment available for the expected production level and at a reasonable cost?
- Can it be made by local workshops & are maintenance and repair costs affordable?
- Is sufficient information and expertise available to ensure that the food is consistently made at the required quality?
- Are suitable packaging materials available and affordable?
- Are distribution procedures to retailers or other sellers established?
- Is a suitable building available and what modifications are needed?
- Are services (fuel, water, electricity etc.) available and affordable?
- Are trained workers available and are their salaries affordable?

Financial Feasibility

It takes into account the following issues:

Start-up costs, Operating costs, Cash flow, Profit potential and Loans

The **start-up capital** is the amount of money that is needed to buy facilities and equipment to register and licence a business and get necessary hygiene certificates.

Working Capital includes costs of raw materials, packaging, staff training, product promotion etc that have to be made before a business begins to generate income from sales of a product. The requirement for working capital also continues as the business develops.

Operating Costs

There are two types of operating (or production) costs: those expenses that have to be paid even if no production takes place and those that depend on the amount of food that is produced. The first types are known as fixed costs and the second type are variable costs.

Agribusiness is a very common word and many a time it ties to cascade farming with manufacturing without realizing that the manufacturing sector is not the same as farming sector and high tech manufacturer cannot go to the field and grow the raw material. However, farmer, the first entrant, has to be supported with all that he needs in farming to get the highest production and productivity and must be ensured profit sharing as much from the chain. Currently, we have one way movement of raw materials and one way movement of finished good and it must change to two way movements of commerce and money between farmer and consumer. ■

Mahesh Kumar
Punjab Horticultural Post Harvest Technology Center
Punjab Agricultural University
Ludhiana

BVC Mahajan
Punjab Horticultural Post Harvest Technology Center
Punjab Agricultural University
Ludhiana

Belimo's New Generation Butterfly Valves

The latest actuator and valve technologies increase reliability and flexibility, simplify installation and thereby, reduce energy consumption by up to 80 percent. The new generation of butterfly valves for high flows is compelling because of their simple installation, maximum application flexibility, and excellent longevity. The new PR actuators cannot only be used with Belimo valves but are also compatible with over 2500 types of third-party valve suppliers globally.

Clever Design

Thanks to lower overall height and reduced weight, the new PR actuators are quick and easy to install. With 80 percent lower power consumption this valve-actuator combination allows for substantial energy savings. The visual position indicator shows the position of the butterfly valve from distance.

NFC and SuperCap

Near Field Communication (NFC) allows wireless parameterization via smartphone, even if the actuator is not connected to the power supply. This set of technologies can also run a quick and thorough functional check for diagnosis during commissioning and in the operating phase. That increases operational safety. The Butterfly Valves are also available with the patented SuperCap technology, which allows moving to the desired safety position during a power failure – an application utilized, for example, in data centers. ■

For further information, email at info.india@belimo.ch

Johnson Controls Announces Accelerated Leadership Succession

Johnson Controls announced effective from September 1, 2017, George Oliver, currently President And Chief Operating Officer, has assumed the role of Chairman and CEO. This action accelerates the move of Oliver to his new position six months earlier than previously announced. The acceleration was unanimously approved by the company's board of directors. Molinaroli, currently Chairman and CEO, will leave the company and the board effective Sept. 1, 2017.

In addition, the company announced that Jürgen Tinggren, chair of the audit committee and a member of the executive committee, has been appointed lead independent director of the Johnson Controls board of directors, effectively immediately. Separately, the company announced that Jeffrey A Joerres has stepped down from the board of directors.

Tinggren said, "Given the progress made on the merger integration as we approach the one-year anniversary and upcoming start of a new fiscal year, this is an opportune and appropriate time to implement this planned leadership succession. The board has been impressed by George's leadership and oversight of the integration, and we believe accelerating the transition provides clarity and continuity as we move into the next phase and continue to deliver the benefits of the transaction and enhance long-term shareholder value.

Tingren added, "On behalf of the entire board, I want to thank Alex Molinaroli for his many years of outstanding service and leadership. He has led Johnson Controls through a period of unparalleled strategic transformation and helped position the combined company for success as the leader in buildings and energy storage solutions."

Oliver said, "I am honored by the trust the board has placed in me and look forward to building on the progress we have made in combining the companies. Since completing the Tyco merger, we have been executing a robust integration plan to maximize the skill sets and capabilities of the combined company, develop solutions to better meet our customers' needs and realize approximately $1 billion of cost savings. As CEO, I will continue working with the board and our employees around the world to deliver on the Johnson Controls promise to make the world a more productive, secure and sustainable place. I would like to thank Alex for his direction and partnership, both before and during this critical year of change."

Molinaroli said, "It's been an honor to lead Johnson Controls since 2013, and I want to thank all of our employees for their continued trust, commitment and incredible contributions. The company has a great strategic foundation and is well-positioned for growth as a market leader in buildings and energy solutions. I'm confident as I've worked with George over the past year that he and his management team are well-positioned to propel the company forward."

Joerres stated, "It has been an honor to have served on the Johnson Controls board for the last 16 years. I thank Alex for his dedicated service and am confident that the company will be well-served under George's capable leadership." ■

"We have been constantly innovative"

Mist Ressonance Engg Pvt Ltd is pioneer in the field of Vacuum Generation & Revolutionary Mist Cooling System. The company is specialized in generating a fine water fog through Patented Mist Creator Nozzles & used for industrial hot water cooling as Energy Free Cooling Tower. The industry (was and) is still governed by consultants who usually prefer conventional technology. So, it is a challenge to divert their mindset from a conventional technology to a new technology, informs **Makarand A Chitale, Director, Mist Ressonance Engg Pvt Ltd** in an interaction with **Cooling India**...

Please tell us more about Mist Creation technology.

Very fine and tiny particles of water droplets generally sized below 100 Micron are referred as Mist. The simplest mist particles we all have witnessed while standing near the high water fall. When water falls from height hitting on rocks it breaks into tiny particle and very fine water particles get carried away with air breeze, of which we feel cooling and slight wet effect, are nothing but Mist particles. We create similar Mist through our patented technology of Mist creator Nozzles but at very low water pressure. The operating pressure range is 0.8 to 2 Kg/Cm^2. Water is fed at required pressure to nozzles though which water comes out with whirling action with high velocity and forms fine mist.

According to you what are trends in cooling industry?

These days we all are witnessing shortage of rainfall year after year which leads to water scarcity & hence power generation shortage. Therefore, everyone is looking for economic and natural cooling technology. In coming days water cooling towers shall slowly shift to air cooled technology. And till then everybody is eying upon energy efficient cooling technologies. We are proud to mention that ours is green technology which does not require any power for cooling except circulation

pumping nor maintenance.

What are the products and Services offered by you for HVAC & R Industry?

HVAC&R industry will have two types of chiller, one uses water cooled condensers equipped with cooling towers and other is air cooled chillers equipped with air cooled condensers. We offer Louvers type Mist cooling system for water cooled chillers where conventional cooling towers can be replaced with energy efficient mist cooling system. Due to its high efficiency huge amount of energy is saved on compressor motor of chiller and that to with ZERO fan power. In case of air cooled chillers, we are supplying our mist and cool system as a water spray support to reduce incoming air temperature. This is high pressure operating system uses very fine misting nozzles. Mist created instantaneously evaporates in air giving cooling effect. These misting nozzles are installed on periphery of condenser units for cooling incoming air. This helps to operate chiller at best efficiency giving compressor power saving.

What are the applications of this technology? Which sector does generate maximum demand for this technology?

It is applicable in all industries wherever process water cooling is required i.e. chemical, petrochemical, plastics, refineries, sugar, edible oil, oil and gas, HVAC&R, steel & power. HVAC&R, steel & power and chemical industries require large amount of water cooling.

What technological innovations would you like to incorporate in Mist Technology to make it more energy and cost efficient?

Every technology undergoes constant research and development activities so ours too. We are working on reducing on overall plot size requirement of our cooling technology without sacrificing on efficiency.

The industry (was and) is still governed by consultants who usually prefer conventional technology. So, it is a challenge to divert their mindset from a conventional technology to a new technology.

How is Mist Cooling Technology different than conventional cooling technology?

The most basic difference with MCS and conventional cooling towers is water sprayed in form of fine mist inside louver type chamber hence water gets two times to travel as against one way for cooling tower. Secondly water particle size is in <50 Micron in MCS and ~5 mm in conventional cooling towers. These water particle sizes make MCS most efficient and effective.

What are the Mist Cooling Projects accomplished by the company? What hurdles do you face during the completion of these projects?

Firstly let me tell you, carrying out research and catering to market demand simultaneously is indeed a challenging task. We achieved this by effective decentralization. We have two major sections in our company – one looks after existing business and other focuses on future business by getting involved in active R&D. Our company has survived on the basis of continuous research. Otherwise, it would have been extremely difficult for a new technology to endure. The industry (was and) is still governed by consultants who usually prefer conventional technology. So, it is a challenge to divert their mindset from a conventional technology to a new technology. That is the reason we have been constantly innovative. This is why we have completed over 300 projects worldwide so far and some major customers are Tata Consultancy Services, Aditya Birla group, ITC Paper, JK Paper, West Coast Paper, Raymond, D'décor, IOCL, Heavy water Board, Haldia Petrochemicals, IFFCO & many more. For completion or execution of such projects there were no hurdles because of the above mentioned organized way of functioning.

What challenges do you face while providing after sales service all over the country? How do you overcome the same?

As mentioned earlier or technology does not require any service for years together, as it does not involve any moving components inside. It requires simple cleaning of piping and nozzles after prolonged usage that too would depend upon water quality, and such cleaning job can be done by customer himself. So, as such there are no challenges in after sales service.

What is your outlook for cooling industry in India?

According to us, in coming days only green technology based and energy efficient cooling towers shall have more demand in market. At the same time considering year on year water shortage and increased water demand, a cooling tower technology in place of conventional water cooling towers, which combines air and water using much lesser water than conventional cooling towers shall be much economical to users as well as save water and power both. ■

Analysing NDDB Cluster Model for Marketing of Vegetables

The gap between demand and supply is due to ineffective market links, poor handling and lack of consolidation on both the demand-side and supply-side. On the supply side, the government has agenda to promote modern cultivation practices and collaborative farming. On the demand side, the government has example of NDDB's vegetable marketing initiative, ie. Mother Dairy Fruit & Vegetable Pvt Ltd (SAFAL)...

India is the world's largest producer of many vegetables but there still exists huge gap between per capita demand and supply due to enormous waste during post-harvest handling & marketing. These losses are missed opportunity to recover value for the benefit of farmers. The deploying of appropriate strategic and operating models, will allow the efficient closure of gaps between demand and supply so as to contribute to doubling farmers' income.

The gap between demand and supply is due to ineffective market links, poor handling and lack of consolidation on both the demand-side and supply-side. On the supply side, the government has agenda to promote modern cultivation practices and collaborative farming. On the demand side, the government has example of NDDB's vegetable marketing initiative, ie. Mother Dairy Fruit & Vegetable Pvt Ltd (SAFAL).

Post-harvest Supply Chain Systems

Supply Chain Management represents the management of the entire set of production, manufacturing or

transformation, distribution and marketing activities by which a consumer is supplied with a desired product. Post-harvest supply chain encompasses the planning and managing of all activities involved in procurement, preconditioning, and delivery system of farm produce. Marketing of horticultural crops is quite complex and risky due to the perishable nature of the produce, seasonal production and bulkiness. The marketing arrangements at different stages play an important role in price levels at various stages viz. from farm gate to the ultimate user. These features make the marketing system of vegetables to differ from other agricultural commodities, particularly, in providing time, form and space utilities. While the market infrastructure is better developed for food grains, but vegetables markets are not that well developed and markets are congested and unhygienic. Generally, the middlemen and wholesale businessmen purchase the agricultural products from the farmers at a lower price. In turn, fresh vegetables and fruits purchased at lower price from farmers are sold out to retail businessmen at higher price and the retail businessmen sell those agricultural products further at higher price to the consumers. As a result, the farmers get only the lower price for their produce whereas the consumers have to pay higher price for the same produce. Vegetable farmers are the most vulnerable. Even if prices soar to one of the highest levels, they only get a third or fourth of the prices in retail markets. Vegetables are a perishable commodity; therefore, retailers can't take the risk of losses from leftover vegetables, which will be of no value after a few hours. At urban retail markets, onions, tomato, cabbage and cauliflower are being sold for Rs 80-120 a kg, three-four times the prices farmers get. For farmers, input costs have been rising and in turn growers do not get value to produce. High inflation has generated cost pressures and this has also impacted profits.

Supply chain development not only benefits the private sector but also creates spinoffs that stimulate social, economic and environmental sustainable development in the region (employment generation, added value, minimization of product losses etc. The specific gains are:

- Reduction of product losses in transportation and storage
- Increasing of selling radius and revenue from sales
- Productivity Improvement
- High customer satisfaction
- Increased profit
- On time delivery
- Tracking and tracing to the source
- Better control of product safety and quality
- Better information about the flow of products, markets and technologies.
- Transparency of the supply chain
- Dissemination of technology, capital and knowledge among the chain partners
- Large investments and risks are shared among partners in the chain
- Gross Capital Formation at back-end and in agriculture allied business

Summary of NDDB model (Dairy and Vegetables)

The NDDB (National Dairy Development Board) model can be understood in its two main product formats – for milk and the case of SAFAL for fruits & vegetables (Delhi NCR centric).

a) DAIRY model

In the case of milk, the model is centred on farm to market collaboration through cooperatives of farmers for –

- Milk procurement at rural gate
- Milk treatment and packaging at processing unit
- Dairy product distribution to consumer-gate (this can be through 3rd party channels)

The model is based on empowering farmers in the form of collectives such that a village centre receives raw milk from a local cachement of famers. The receiving centre at first mile has recourse to technology in the form of assaying kits and refrigerated milk-chillers (200 to 600 litres) to facilitate handling, paying and short term storage of milk. The milk is thereafter picked up for delivery to the processing unit (depending on distance, a bulk milk chiller at processing unit can directly receive fresh milk from farmers). The energy needs at the first mile facility is powered by the electricity grid or using bio-gas/bio-mass systems. The milk is collected and delivered to the processing unit on a daily basis, mostly twice a day. The processing unit forwards the milk to market after appropriate heat treatment (pasteurisation) and packaging (poly-pack, tetra-pack, tankers), as well after converting surplus into other dairy products (milk powder, butter, ghee, etc.). Processing facility may also supply milk to other food processing units that use milk for secondary products (chocolates, beverages, sweets, ice-cream, etc.). Marketing is done by the processing facility as the new owner/producer of the saleable product, with the farmer having realised value at first instance where custody of milk is handed over to the supply chain.

The operating model is amenable to milk supply as the raw produce (unprocessed, unpasteurized milk) is in a homogenous format (liquid) and technology exists to promptly assess and categorise the price of raw milk on the basis of quality factors (fat, protein, solid contents). Milk Co-ops manage the procurement from small and marginal producers and NDDB also facilitates the setting up of milk producing companies to secure their raw milk requirement. The marketing of the final saleable products varies depending on each product type. Fresh milk (and by-products) is retailed through franchisee or owned outlets and/or through existing retail/distribution channels. Mother Dairy (wholly owned marketing subsidiary of NDDB) sources milk & other products under its brand from various milk coops, milk producing companies and from local SHGs for the Delhi NCR market. The last mile supply of milk is replenished on need, which is on a daily or more frequent basis. A similar model is pursued in other states through federations of marketing Coops/organisations.

b) Vegetables Model

On seeing the success in milk supply

chain, Mother Dairy Fruit & Vegetable Pvt Ltd (SAFAL) was especially conceived to adapt and replicate same in the marketing of vegetables and fruits. The SAFAL model is primarily as follows –

- Procurement on receipt of supply from farmers at Delhi hub
- Distribution operations from Delhi hub
- Retail to consumers from owned outlets
- Backward linkage through extension work on quality requirement & handling

In case of SAFAL (Mother Dairy Fruit & Vegetable Pvt Ltd) the main operations (procurement and marketing) are adjusted for non-homogeneous produce type. A key difference in the SAFAL model is, that unlike NDDB, there is no active village level development of producer cooperatives and instead area stations are set up by local associations. Through these area stations extension services for production is promoted and they serve as daily aggregation platforms of the harvested produce. The aggregated produce from these area stations is loaded onto ordinary trucks for onward delivery to Mother Dairy's (SAFAL) location, the Mangol Puri distribution centre (DC unit). This activity is by local association of farmers, who are responsible for transport and delivery to SAFAL's DC unit at Mangol Puri in Delhi.

SAFAL deals with approximately 180 farmer associations (with membership of approximately 8,000 farmers) and formal contracts are not the norm. The farmer's association manages local procurement from its members and the transportation link to SAFAL DC unit. However, SAFAL provides support by facilitating tender/ contracts for transport services where needed for the associations. Similarly, selection of crates and weighing machines for use of the associations is facilitated through SAFAL. SAFAL also has agriculture extension workers on call to support farmers linked to the area stations by providing extension services on good agricultural practices. Notably, there is no formal contracted arrangement with SAFAL and farmers. On receipt at the Delhi (Mangol Puri) distribution hub, the produce is segregated into demand based lots for each outlet in Delhi, for the subsequent last mile distribution.

SAFAL sells approximately 350 tons/ daily in the Delhi NCR market, sourced from across 16 states. SAFAL also makes 12% of its procurement from the local mandis (Azadpur mostly) to buffer against variations in its sales forecast. In addition, another 4% to 5% amount is also procured from the local mandis for certain low volume or offseason produce (where demand is too low to justify long haul freight but customer satisfaction is targeted). Hardy items like ginger, onion and potato is sourced from APMC mandis at the growing areas - SAFAL maintains a low inventory cycle to minimise its own storage, through fast turn-around from its retail outlets. The entire lifecycle from farm-to-consumer is majorly handled in the open ambient without any pre-cooling at farm/village level. This is possible as the farm to consumption handling is fast-tracked in less than a 48 hour timeline. As also discussed in NCCDs reports, cold-chain facilitation within a 300 km radius is not always necessary where the farm to consumer marketing cycle is within the normal holding life of the fresh produce, unless quality is a main concern or produce holding life extension is required. However, when the demand for quality is of concern, the use of reefer transport and associated handling can be considered. This requires differential pricing and marketing of the produce.

SAFAL has around 390 outlets, the average floor size is 400 ft² and entails investment of Rs 7 to 10 lakhs for its infrastructure. The captive retail is fed from handling capacity at SAFAL DC unit for supply of fresh fruit & vegetables - cold storage for fresh produce of 480 tons storage capacity, with 5x space for production hall (for handling staging and dispatch area); and 175 tons for ripening unit. The average waste from handling at Mangol Puri unit is reported at less than 2.5% (however, this may not be indicative of the losses incurred at farm-gate and during transport). The dispatch from SAFAL hub to various retail outlets is twice a day and the docks are worked 3 shifts in a day. SAFAL manages its own route planning for last mile distribution to its retail outlets. On a price transaction, SAFAL does not bring additional advantage to farmers since it pays them the same Azadpur mandi rate for quantity/quality delivered. However, it retails to consumers from its captive outlets at market linked retail prices.

Suitability of Adopting NDDB model for Marketing of Vegetables

The NDDB model for handling milk cannot be adopted directly for the purpose of handling of vegetables. The main difference is that milk is homogenous for

handling purposes, which allows it to be easily consolidated into any container type for safe transport to the packaging and processing unit. In the case of fruits and vegetables, the produce is of various sizes and shapes, requires individual handling at first instance of aggregation, before they can be dispatched for onwards distribution and marketing. This, therefore, requires specifically designed post-harvest receiving & handling stations at the back-end (rural-gate or farm-gate).

Mother Dairy Fruit & Vegetable Pvt Ltd (SAFAL) was especially conceived to adapt and replicate the successes seen in the milk supply chain into marketing of vegetables and fruits. Some minimal adaptions needed for the purpose of handling fruits and vegetables are already evidenced at SAFAL - the learnings since its inception can be suitably documented (operating model and standard procedures) and made common domain knowledge for the benefit of new entrepreneurs or for setting up similar marketing networks in other cities. At the moment the SAFAL model facilitates farmer associations by becoming an assured buyer, and thereby justifying investment by farmers association in its aggregation point (primarily weighing machine, crates, covered area, manpower).

The main strength of SAFAL is its established outlets (approx 400) which assures a predictable throughput or sales volume. Against this fixed sales volume, SAFAL is able to undertake assured procurement and build relations with farmers associations, despite not underwriting the arrangement with legal contracts. This system has allowed SAFAL to become a market linked model for the limited number of farmers it procures from. To replicate this pattern of benefit to farmers, SAFAL will need to expand its retail footprint so that, in turn, it will need to procure more produce from more farmers.

SAFAL supplies about 4% of Delhi NCR consumption only about 315 to 350 tons per day. It has maintained this status quo for almost a decade and the enterprise footprint can be considered for upscaling. This can tactically be done, either within the existing NCR area by targeting a larger share of the demand, or by expanding its spread of operations into other towns and cities. Alternately, marketing organisations under state marketing boards can partner with SAFAL to share business operations.

Table 1

Model	Description
NDDB – Dairy model	Production to retail is operated by Coops/Federations. Raw milk is sourced from producing organisations/SHGs from village centres. Homogeneous produce is marketed after treatment or is processed into milk products. Coop manages branding and market connectivity. Marketing is through multiple retail channels.
SAFAL – Vegetable model	De-risked from production as farmers are paid on successful delivery to city centre. Farmers associations manage back-end aggregation and transport against assured market demand. Onward last mile distribution through owned outlets is managed by SAFAL.

However, SAFAL does not undertake any pre-cooling or specialised storage/ transport from procurement centres till point of sales for fresh fruits and vegetables handling. It has limited or no formal arrangement with the back-end - effectively SAFAL serves as a superior marketing model (assured evacuation) for perishables from market proximate producing areas. SAFAL also procures from distant markets in case of onions and potatoes where need of technology is minimal. Therefore, the learning from current operations do not translate into knowledge where modern post-harvest management in form of back-end preconditioning (sorting, grading, packaging, precooling and reefer transit) is required - i.e. long distance procurement of exotics or off-season high value produce.

SAFAL had forayed into Bangalore market by opening a SAFAL F&V Auction centre.

The Delhi model was changed into that of a terminal market and the original plan comprised a central auction facility with 100 wholesale shops, a 10,000 tonne capacity cold storage for bulk produces like potato. Initially, managed by NDDB, the intention was to gradually involve farmers' associations to become partners in the project. The backward linkage for F&V would be through 42 collection centres, to be set up in the local farm produce growing areas. The forward linkage was planned through 8 to 10 cash-and-carry grocery stores to be constructed at strategic locations in the city, in addition to four such stores at the auction market itself. The model, without own captive retail as was the case in Delhi, required competing with existing wholesalers and hence did not meet related success. The low level of success at Bangalore is inferred largely due to the changed business approach, wherein SAFAL did not set up own outlets and resorted to emulating existing wholesale into non-captive retail.

However, the HOPCOMS network of retail in Bangalore, which emulated the SAFAL Delhi model by establishing own retail, has met relatively higher success. HOPCOMS also channelizes the demand into indents to the back-end. Thereafter, farmers on their own arrange supply as per indent, to deliver to the city based DC. The HOPCOMS model differs from the SAFAL Delhi model as it pays higher than the reference mandi prices to farmers (HOPCOMS also offers a minimum support price in times of distress). HOPCOMS also provides opportunity for farmers to hold and directly sell to consumers at certain collection centre locations. The city-proximate production cluster has the advantage of immediate access to a large market centre. This ensures low connectivity cost and higher transaction level margins. The volumetric growth is restricted or linked directly to localised demand.

Causes of Instability in Onion, Tomato and Potatoes in Market

On enquiring from SAFAL team on

causes for instability in market level prices of said crops, it was informed that a key aspect was the vagaries of consumers. As per SAFAL, the consumer is always willing to explore new price point opportunities – case in example informed was recent supply of low quality onion from Rajasthan which in turn lowered the price of good quality supply from Nasik. This example was indicated in each case, as the customer was not loyal to quality parameters. It is felt that this may be prevalent because the country does not have any major fresh produce brands and price point at retail was defining demand rather than quality perceptions. Another reason for instability in supply, stems from availability of transportation and this too gets reflected in market prices. Every month-end the demand for trucking fluctuates because of inventory cycles of consumer durables and other goods. As the same trucks are used for food shipments, certain instability arises from lack of transport availability. Similar shortage in transport also manifests at times due to other reasons, depending on market manipulation, weather vagaries, local disruptions, etc. which are not always captured by marketing organisations. The price discovery is centred on those quoted at Azadpur mandi, which are dynamically ascertained on a daily basis. SAFAL, a long standing organisation, also prides itself for being guided by Azadpur for procurement prices. Effectively Azadpur defines the returns to the farmers. SAFAL, a member of APMC, has special waiver on mandi commission.

Any fluctuation at Azadpur immediately reflects in knee jerk pricing at farm-gate and has a cascade effect at front-end. This provides opportunistic or differential pricing options within the value chain system. The opportunistic framework is customary in most produce types and gets amplified in those with high volume sales. Onion, tomato and potato form almost 50% of the total F&V sales (SAFAL reports that on average onion and potato is 30% of sales). Being high volume items, these food items show lower bottoms and higher tops when subject to price instability. It is to note that potato and onion inventories are longer term and there is advance information in the market on remaining inventory (from potato cold stores or onion farm-gate storage). However, this advance market-intel is not validated or updated with regulators for monitoring purposes. Such information in the hands of a few can be easily manipulated for transactional gains. In case of tomato, the situation is more dynamic as tomato selling cycle is shorter. Short term life cycle of tomato deters any large scope for manipulated pricing and hence it is more closely linked to the real-time physical supply constraints. The above assessment is with the assumptions that farm-gate production is not the core reason for the frequency of fluctuations but that the fluctuations are a reflection of market linkage, market competition, market level organisation and failures therein.

Recommendation to Alleviate Instability

To alleviate instability in market supply, production and pricing, the key strategy would be to extensively develop a large number of supply chains so as to increase sourcing range into each market, promote competitiveness with efficiency of the supply chain system and –

- Incentivise to develop a dedicated transport on predetermined schedules via railways or roadways for potato and onion. A favourable transport environment will ensure a timed push of inventory into the city instead of random pull from traders. Additionally, provide incentive for Delhi traders to link up with multiple sourcing mandis via eNAM. A complementary storage option to be developed to locate buffers of onion and potato close to the markets. These need not be high technology systems but designed to cater to a two week inventory cycle from the buffer into market. The source points can remain the existing farm-gate inventory held at cold stores (potato) or other storage structures (onion).
- In case of tomato, the back-end source and reefer transport needs developing to ensure tomato production in other states reaches the city markets safely and in quality. This will require undertaking ongoing development work under mission mode such that production is assured suitable market linkage. Such development may be targeted through FPOs or rural enterprises focused on agriculture allied businesses.
- To alleviate similar demand-supply gaps in other vegetable types, there is need for simultaneous development of modern facilities at the first mile, at rural gate. It is felt imperative, that to make vegetables marketing feasible, suitable technology in form of modern pack-houses be urgently developed when sourcing from distant areas, as in the case of tomatoes.

Table 2 showing main infrastructure and equipment requirement

Sr. No.	Description	Explanation (reference vegetables)
1	Aggregation centre	For consolidating produce from individual farms with facility to segregate by quality and prepare for onwards dispatch.
2	Crates or suitable bulk packing	For moving vegetables to receiving hub at wholesale point.
3	Transportation	CNG motored trucks for movement from aggregation point to receiving hub. Additionally, vehicles for last mile distribution.
4	Dump handling	At aggregation point and receiving – so as to divert discards into other related uses.
5	Traceability systems	Record keeping at aggregation point and/or receiving hub to develop farm level traceability.
6	Cleaning/Washing system	At receiving hub to maintain hygiene for returning crates and to prepare vegetables for retail.
7	Receiving Hub	Distribution hub with or without cooling to manage the deconsolidation, preparing and dispatch of retail lots on daily basis. The hub includes grading for retail, especially for produce sourced from peri-urban regions.
8	Precooling and Staging rooms	For highly sensitive crops, or for markets with longer than 48 hours selling cycle. This is recommended after a certain economy of scale is developed at production end (10 to 15 tons dispatch per day).
9	Food processing units	At the bulk collection centre or DC Unit, waste generated due to discards can be processed into juices, jams, pickles. Alternately, dedicated processing for vertically integrated crops can be set up as per local factors.

- The SAFAL example also indicates that a structured front end merchandising system helps build better transactional relations with the back-end. Therefore, not unlike the FPO initiative, a Farm Produce Marketing Organisation (FPMO) is recommended under professional management. These can be structured so as to organise the grocery shops, street vendors, etc. into localised demand groups (SHG, or enterprises) which will facilitate the demand-side hub-spoke model of operations.
- SAFAL to be provided resources to expand in Delhi NCR and/or to replicate in at least 3 other major cities. Alternately, a dedicated team from SAFAL and spearhead hand-holding and guide similar organisations in other cities.

Technology Needed in Preconditioning, Storage, Transportation at Village Level

In the case of peri-urban clusters, and where the product selling cycle is less than 48 hours (peri-urban supply), aggregation and staging platforms are recommended at village level. The intention is to create nodal points where individual farmers can collect small loads so as to consolidate into viable truck loads. The total load size can be in the range of 2 to 10 tons depending on terrain and distance from urban centre. These aggregation points should be designed with a covered area for receiving of fresh vegetables and with facility for basic sorting as per quality. Certain volume can be marketed from these centres for the local market from the same location. Other quantities of suitable quality can be packaged in crates for short term transit to the nearby urban centre to initiate the peri-urban supply line. Each aggregation point would require CNG supply vehicles of size 2 to 10 tons (a dedicated fleet of 1 or 2 vehicles is recommended). The supply is expected to go to predetermined wholesale buyers or as direct sales to retail points or vendors. In cases where the source points will involve vegetables that will incur longer than 48 hours selling cycle, it is recommended that pre-cooling systems be attached to the aggregation platforms (modern pack-houses) with onwards transport on reefer trucks. The system standards as listed for MIDH can be used as to guide the infrastructure development.

The technology related to long period handling of perishables will mainly apply to a certain economy of scale at farm-gate – this option is better suited for FPOs that are producing homogenous crop types and undertaking collaborative marketing to achieve such economy of scale at production side.

Technology Needed in Preconditioning, Storage, Transportation at District (intermediate) level and at City (Wholesale level)

Same as above, directly linked to scale of material handled. In addition, the appending of a small scale food processing unit would be preferred. At District level, it is assumed that sufficient quantity of produce would be culled due to mishandling or market demand to justify a processing unit (pickling, juicing, jamming, drying, etc.). Food processing units are better established at back-end or first mile handling facilities as the culled items

would be edible and not at last stage of their holding life. It is noted that the SAFAL model does not extend to ownership of the back-end infrastructure, restricting itself to the front-end distribution hub and retail outlets. However, the HOPCOMS model extends itself into the back-end by taking ownership of collection centres, transport vehicles and on occasion, mobile vending units. The HOPCOMS model differs from the SAFAL model as it is able to pay higher than the reference mandi prices to farmers. HOPCOMS also provides opportunity for farmers to hold and directly sell to consumers at certain collection centre locations. Besides retailing of fresh whole produce, both SAFAL and HOPCOMS also process and sell products such as juice, frozen peas, etc.

The table 2 shows the main infrastructure and equipment requirement.

The size and scale of infrastructure and equipment will be project dependent – directly related to the scale of operations, at production end and at wholesale point. It is to be noted that the SAFAL model is considered successful because of the integration with front-end with retail outlets, which allows to plan for an assured daily off-take of the produce.

Technology Needed at Merchandising Level

At last mile, there are large number organised retailing groups, individual Fruits & Vegetables (F&V) selling outlets including street hawkers. The provision of consolidating demand has been largely ignored, from merchandiser's view point. Individual point of sales is expected to arrange their own procurement from wholesale mandis on a daily basis. The frequent attention to organised retail including developing the same through FDI, is expected to organise the selling of harvested fruits and vegetables by consolidating the daily retail throughput and linking with daily supply. However, organised retailers use Fruits & Vegetables merely to attract footfall with purpose to market various other items which are deemed more profitable. There is opportunity in organising the multiple channels that sell agricultural produce much like how Farmer Producing Organisations is intended to organise production into a scale of logistical viability. Farm Produce Marketing Organisations (FPMO) comprising street vendors and vegetable sellers is a clear learning from the SAFAL model. This can also be done under the umbrella of whole-selling companies who wish to enter the retail side of food business. The value to consolidating front-end demand is from streamlining throughput into assured demand and fluctuating demand. The assured quantum can then be vertically integrated with peri-urban growers while the variable demand is linked with indirect or mandi based procurement.

Infrastructural and Professional Management

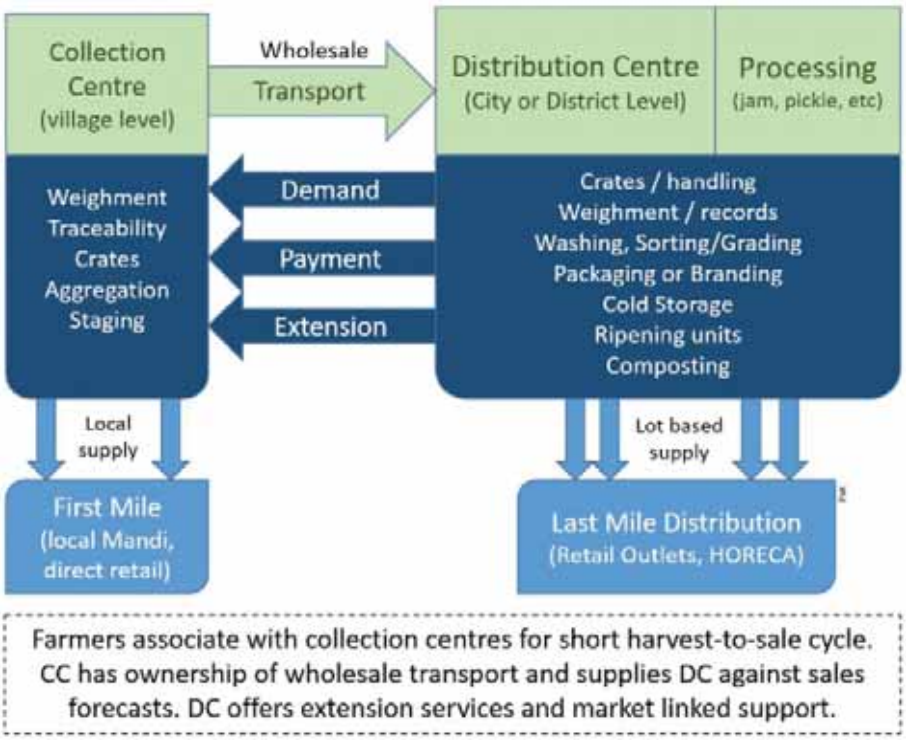
Infrastructure support is required for the capital investment as well as in its initial operations. This operational assistance may require considering a form of AMC (Annual Maintenance Contract) that manages a three year PMS (Periodic Maintenance System). After a three year period, the AMC/PMS should be self-sustained by business operations of the operators. The hiring of professional managers and mitigating risk of initial period of operations (learning curve in managing infrastructure technology) is not promoted in current government support mechanisms. The main focus is on creation of infrastructure and keeping certain share for PMS/AMC system for an initial 3 or 5 year period may be considered by implementing agencies. In addition, the ongoing extension activities by the government may be dovetailed to provide knowledge based support where infrastructure is developed. This is especially the case where modern pack-houses are developed as the extension work should assist farmers in the region of the pack-house to produce market linked crops that can be pre-conditioned in such facilities.

Measures to Identify & Promote Production Clusters

An assessment or map of Protected Cultivation (PC) and Open-field Cultivation can be carried out within a 300 km radius of NCR. Each cultivator can be tabulated with yield as declared per crop grown in last three years. In addition, these can be categorized on basis of type of assets owned to connect with Delhi-NCR (packhouse, traceability, packaging/crates and vehicles). The trend of PC development in the region needs to be evaluated since this provides for partial extension of season. However, metric for PC development ought to be linked to the crop production or yield per unit over two or three seasons, and not merely the physical number of PC units created. The Protected Cultivation (PC) units will also benefit from linked development of vegetable seedling units. Appropriate cost norms and system norms are under development by horticulture division. Consumption volumes in Delhi/NCR - listed for each crop (with possible monthly trends). Evaluation of demand-supply gap is done by cross-tabbing assessment of NCR demand with production from the local cultivators. Gap assessment with appropriate cost-benefit analysis (factor competitive advantage of lowered delivery costs due to shorter product selling cycles) as well as opportunity for distant bulk production with associated economy in logistics handling can be propagated. Accordingly, differential support under special support schemes can be developed to directly link support with volume delivered, stage-wise over a 3 to 5 year period. It is observed that the Kisan Mandi launched in Sep-2014 in Alipur under aegis of SFAC was not operational to date. Revival of this model will strengthen/ support production clusters for vegetable marketing in NCR region.

Summary

- The NDDB's fruit and vegetable - SAFAL model - primarily stems from frontend consolidation of demand (from captive retail). This results in arranging a steady-state and assured evacuation from the back-end aggregation points. Any variance in daily demand or supply is offset from local mandi procurement.
- SAFAL is effectively a wholesale point



for farmers – the farmers themselves, through collaborative associations take up the onus and costs of aggregation and delivery to the SAFAL receiving hub in Delhi. As part of the relationship with such associations, extension services and negotiation for transport services is managed through SAFAL.

- SAFAL model does not directly infuse technology for post-harvest handling and mainly focuses on procurement from peri-urban sources with fast connectivity to consumer through its network of owned retail outlets. Cold chain technology will be needed only with volumetric sourcing from outside the peri-urban range.

Typical Peri-Urban Marketing Linking Operations (SAFAL model)

To grow such a model, for improved quality of produce, support to farmer associations at back-end in form of short term storage weighing and traceability systems, vehicles, crates and material handling equipment can be considered.

- To grow this model for larger volumes, support in form of expanding and modernising the retail outlets can be considered. The desired increase in consumer level transactions can be also obtained by linking with street vendors to create a front-end hub-spoke retail system (each existing SAFAL outlet can link and supply multiple street vendors). The revival of Kisan Mandi in Alipur is recommended – this will aid production clusters to access the Delhi market.
- To grow this model, for a larger basket of produce, support in form of direct linkage with FPOs at larger distance from Delhi-NCR is recommended. In this instance, the use of technology for long term handling/storage and marketing is made feasible. The advantage stems from low cost procurement due to economy of scale at the backend. The economy at source justifies buffering at supply side and mechanised handling capacity - cluster based production provides associated scale of allied agriculture business (PHM, Processing, etc.)

Key Recommendations

– Replicate the SAFAL model into other cities or expand in Delhi NCR
– Link peri-urban area expansion with crop planning and demand forecast, for crops under protected cultivation and open field cultivation
– Implement targeted development of post-harvest infrastructure for this model.
– Run pilots to scale up volume and quality for existing SAFAL network.

Any Issues for Robust & Efficient Marketing for Vegetables

Other Recommendations

- Provide a higher allocation to cold-chain and agrilogistics for agricultural produce (with focus on vegetables and fruit) so as to directly empower farmers or producers with the ability to connect with multiple markets.
- Give preference to developing agrilogistics infrastructure for cooperatives or FPOs and enterprises with prior experience in food production or supply.
- Reduce subsidy for bulk cold storages and enhance incentives for other supply chain components (Pack-houses, transport, ripening, merchandising systems) which are in greater shortfall.
- Provide seasonal rebate to freight (long-haul transport) of key commodities such as onion, tomato and potato to offset seasonal fluctuations.
- Initiate predetermined container rail routes to promote cross-regional multi-modal trade (greater than 500 kms) of agricultural produce.
- Commission a national policy on cold-chain and agrilogistics to align the various interventions across the country.
- The support for area expansion or crop intensification or yield productivity to be directly linked with marketing and agri-logistics development.

Operational Model (Recommended Pilot for Execution)

The following may be considered by implementing agencies and implemented to test operational models and explore the

Recommended Module for Aggregation Centre

Sr. No.	Infrastructure item	Description – main activity
1	Receiving area/shed - 18 m x 9 m approx	Covered shed with a landing platform, 18 m x 9 m approx for off-loading produce from local transport, weighing for records and/or payments.
2	Sorting Grading zone - 20 m x 20m	Enclosed area with tables or conveyors for sorting the produce intomarketable quality and grading for packaging purposes.
3	Cleaning & packaging area – 10 m x 10 m	Washing or brushing (as per need) and packaging the produce for market. This can be manual procedure or mechanised depending on volumes being handled.
4	Pre-cooling unit – 5 ton per batch	Complete package is pre-cooled to provide extend the saleable life of the fresh produce. This may not be required for the dispatch to nearby markets.
5	Cold room (staging) – 30 tons storage	A small cold store, capable of buffering two days output, pending transport variation/availability. Depending on crop types handled, this may require added compartmentalisation.
6	Transport unit	Covered non-refrigerated vehicle for delivery to nearby wholesale markets. Insulated and refrigerated vehicles for distant transport. Unit sizes recommended (4t, 7t, 10t, 15t). Number will depend on road travel time to market.

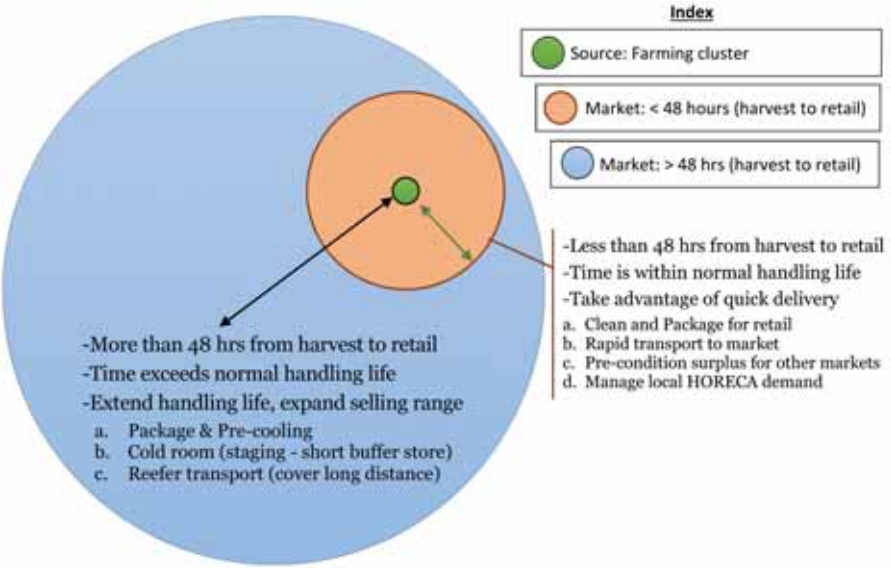
scope for replication in various regions:

1. Establish an operating team or organisation to develop and execute aggregation centres at district, with Delhi or NCR as the primary target market.
2. Each aggregation centre will be designed in a modular fashion, each module to handle 7 tons per day of fresh produce. Localised scalability will be possible by adding modules of 7 or 15 tons capacity each.
3. Each aggregation centre will implement the following activities:
   - Serve as collection points for vegetable farmers in a 10 kilometre radius (i.e. each centre will become a fist level hub at the back-end)
   - Serve as pre-conditioning facility for market linkage of fresh produce (i.e. prepare produce for Delhi market and for distant markets per need)
   - Serve as dispatch centres of retail-ready produce to wholesale markets (i.e. directly connect prepared produce to wholesalers at target market)
   - Serve as procurement centres for wholesalers registered in NAM (i.e. option to assay and place orders for produce at each centre)

- Serve to give feedback on market demand to attached farmers for quantity and quality requirements (i.e. market linked information).
- Provide appropriate extension service and other facilitation from state (i.e. facilitation centre for government support or linkage with policies).

Infrastructure of Each Module (Aggregation Centre)

- Each module will be designed as an integrated packhouse (as defined under MIDH operational Guidelines) – receiving shed; manual or assisted sorting/grading/cleaning of local produce; packaging of produce into retail lots; pre-cooling the produce as per market; storing or staging the produce for onward dispatch.
- Each module will have captive transport for short distant delivery (into Delhi wholesale) or have owned reefer transport for distant markets. Each centre will be a nodal point for local farmers, especially small farmers, to aggregate market linked volumes, such that viable transport loads to wholesalers can be initiated. Therefore, the capacity of each module is recommended as 7 tons per day to allow two 4 ton vehicular loads to be dispatched to markets. Alternately, smaller loads or multiples thereof can be designed.



Market Range and Technology

The following assumptions are taken:

i. Cluster has small vegetable farmers with Delhi market as target
ii. Cultivators require localised aggregation to facilitate market access
iii. Excess production is not finding market access - surplus is available
iv. There is scope to increase production with improved market linkage
v. Land for aggregation centre is available (approx 1 to 2 acre)

Two key operational models are recommended:

i. Consolidation and streamlining of existing selling cycle into local Delhi market. The operations bring qualitative improvement in supply system and improved delivery fulfillment ratios. There may be no immediate transaction level gains but volumes handled would increase and add to revenue.
ii. Produce in surplus to existing market linkage would be routed to distant urban centres. A radius of 300 kms is thumb-rule adopted to deploy cold chain infrastructure to allow perishable produce to travel longer distance. The supply side would be empowered with a logistics bridge and productivity enhancement linked to non-local demand would be promoted. A modular approach is recommended and operation can be undertaken, starting with at least three differentiated source points around Delhi-NCR. The finalisation of the source points may be taken up by the agency to implement and execute the aggregation centres. A wider stakeholder consultation may also be undertaken in due course for involvement of the neighbouring states.

Example (modify to suit locations and crops): Farming Cluster: Sonipat – Haryana. Crop targeted: Coloured Capsicum, Cabbage, Green Chillies, Herbs, etc.

Target Market: Delhi-NCR and surplus staged to Kanpur.

Operating Plan: Assuming that 50% of daily collection of 15 tons is sold to Delhi (50 kms) and remaining 50% is sold in Kanpur (500 kms).

For the Delhi assortment of produce, peri-urban farmers would use the aggregation centre to optimise the collection & transport to wholesalers. The intention would be to harvest and reach the market using commercial transport. Where possible, CNG powered vehicles would be preferred to allow bigger delivery window into Delhi.

The produce selected for delivery into distant market (Kanpur in example), would be packaged and precooled for transport in a 7 to 10 ton vehicle. Though Kanpur is 500 kms distance, the vehicle timing through Delhi make the town more than 10 hours travel from Sonipat. This infers that aggregation centre would require at least one reefer vehicle to make the round trip on a daily basis. For cities at a longer distance, the number of vehicles required will depend on turn-around-cycle of vehicles.

In summation, the operational model will strategically implement a low-technology but fast-tracked supply system to nearby cities (Delhi); and will implement a higher technology, buffered-supply system to distant cities (> 300 kms).

Organisational Model

To operate these aggregation centres with transport, it is recommended that implementing agencies identify private entrepreneurs to execute the supply chain. On the other hand, keeping in view the success of NDDB in dairy chain, similar government driven interface can also be explored. For this, organisations like NHB/ NAFED/SFAC with procurement and experience in developing commercial models can be empowered to operate this model, singularly or by collaborating in a SPV or entity with progressive farmers or existing wholesale aggregators.

However, for purpose of operating a pilot, as recommended by chairperson the establishment of a special cell under a body such as the National Horticulture Board can be explored. The pilot can be supported by giving priority or assured off-take from SAFAL retail to fast-track and spearhead the market linking process. The long term hiring of retail space at various Delhi Haats can also be carried out. Not unlike the NDDB system, the direct involvement of professionals is recommended with a long term mandate. To closely monitor, guide and facilitate the pilot, there may be need to setup a Steering Committee. This will help to dovetail various existing interventions for market linkage (marketing), infrastructure (MIDH), extension service (ICAR), etc. Successful achievement may be measured by sustained volumetric throughput over a three year period and dissemination of the activity information for replication in other regions. ■

Pawanexh Kohli
Chief Advisor, CEO, National Center for Cold Chain Development, New Delhi

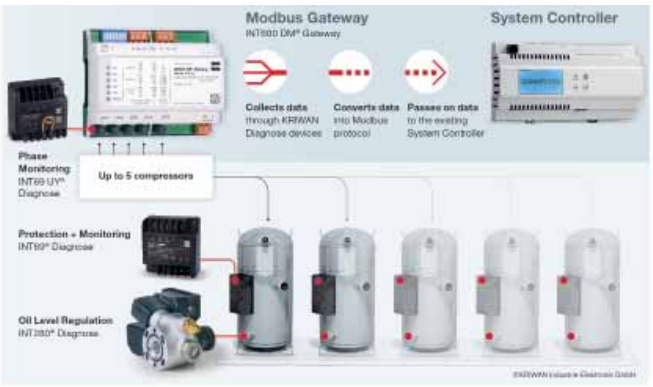
Preventive Maintenance with KRIWAN Diagnose

Requiring a technician to utilize a laptop (sometimes in bad weather on roof tops) with a proprietary piece of software for only one brand of equipment, continues to add cost and downtime. A mobile work force needs a mobile-driven strategy as well as Predictive analytics enabling prescriptive maintenance...

For HVAC/R contractors, building facility managers, or building owners, Predictive Maintenance is crucial in every day operations. Shortages of HVAC/R technicians has been a topic of concern for a number of decades. As service providers are becoming over tasked, one of the first services to be placed on the back burner is preventive maintenance. This can quickly turn into a self-inflicted emergency repair that simultaneously depletes precious available manpower. Within the realm of preventive maintenance, complex systems and machines are required to effectively communicate to service personnel what the problem is, and (with the proper tools at the technician's disposal) how to fix it. When a first responder shows up, the system or machine should be able to offer a list of high probability solutions to the problem. Down time and return service calls and warranty returns are all driving up expenses.

The need for protecting systems and machines while also providing communication and diagnostics is a necessity. This all equates to simple diagnostics for rapid problem solving. Traditionally, field service management solutions have been too cumbersome and inflexible to enable organizations to quickly and easily reap the benefits. Requiring a technician to utilize a laptop (sometimes in bad weather on roof tops) with a proprietary piece of software for only one brand of equipment, continues to add cost and downtime. A mobile work force needs a mobile-driven strategy as well as predictive analytics enabling prescriptive maintenance. "Skills can be leveraged anywhere, any time with the capability of modern mobile technology" – drastically improving first time fix rate or FTF. With the rapid rise of IoT and Industry 4.0, sensors and integrated technology on equipment is enabling more efficient field service. Instead of performing maintenance when an error occurs, if the type of fault is recorded with predictive analytics and remote monitoring equipment is enabled through IoT technology, faults can be detected before they occur. This drastically increases the First Time Fix Rate (FTF) when service providers are called. Field service solutions should be able to find and collect patterns of critical performance data from past actions and then use this information to create rules that highlight how repairs and services can be improved which play directly into operational efficiency. This, in turn, directly empowers service engineers by providing them with the right tools and information at their fingertips to better perform their job.

Kriwan Connected 4.0 - Modbus Gateway INT600 DM®



By combining modern condition monitoring sensors and technologies with its industry expertise, KRIWAN provides condition monitoring directly at the site for individual machine analysis AND Remote condition monitoring.

This can be quickly and easily implemented on the vast majority of compressors within the HVACR industry. If we are to meet this demand for connectivity, we need to maximize our efforts and strategies to ensure that all available technologies and resources are utilized to their fullest possible potential. Today, Internet Of Things consists of approximately 5 billion devices and is expected to grow to 26 billion devices by the year 2020. All of the KRIWAN data collected through various KRIWAN Diagnose devices can now be passed on to the new Modbus Gateway INT600 DM, and read into the refrigeration controller or building automation controls. With five inputs, the gateway can process entire systems together, and send the data stream to the system or building controller. Each input on the Modbus Gateway can be connected to a chain of INT69 xxx Diagnose and INT280-xxx Diagnose oil level regulators. Since 1979 Modbus protocol has remained simple and robust. It has since become a de facto standard communication protocol, and it is now a commonly available means of connecting industrial electronic devices. This in turn reduces the need to employ proprietary hardware and software as well as specialized resources which aren't communicating with one another.

This allows a maximum of 10 devices in a refrigeration rack to be connected to a single gateway. The set-up is fully configurable, and can be modularly adapted to suit the requirements on site.

Also shown is the INT69 UY Diagnose Phase Monitor, which protects complex systems from undesired power grid conditions. This new concept means that the refrigeration system installers can simply turn on the diagnosis system and run the Modbus cabling to the system or building controller. This enables remote monitoring / Data logging and provides for on-site diagnostics as well as collecting predictive maintenance data through the building or system controllers in use. The KRIWAN approach to Intelligent System Diagnostics provides flexibility and power to all levels, making HVAC/R systems more reliable, more efficient, and easily integrated and most importantly predictive. ■

For further information, visit us at
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Govt Nod for New Central Scheme SAMPADA

The Cabinet Committee on Economic Affairs has approved the renaming of the new Central Sector Scheme - SAMPADA (Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters) as 'Pradhan Mantri Kisan Sampada Yojana (PMKSY)' for the period of 2016-20 coterminous with the 14th Finance Commission cycle. Earlier, CCEA in its meeting held in May, 2017 approved the new Central Sector Scheme - SAMPADA (Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters) with same allocation and period.

Objective

The objective of PMKSY is to supplement agriculture, modernize processing and decrease agri-waste.

Financial Allocation

PMKSY with an allocation of Rs 6,000 crore is expected to leverage investment of Rs 31,400 crore, handling of 334 lakh MT agro-produce valuing Rs 1,04,125 crore, benefit 20 lakh farmers and generate 5,30,500 direct/ indirect employment in the country by the year 2019-20.

Impact

- The implementation of PMKSY will result in creation of modern infrastructure with efficient supply chain management from farm gate to retail outlet.
- It will provide a big boost to the growth of food processing sector in the country.
- It will help in providing better prices to farmers and is a big step towards doubling of farmers' income.
- It will create huge employment opportunities especially in the rural areas.
- It will also help in reducing wastage of agricultural produce, increasing the processing level, availability of safe and convenient processed foods at affordable price to consumers and enhancing the export of the processed foods.

Measures to give a boost to Food Processing Sector

Food Processing Sector has emerged as an important segment of the Indian economy in terms of its contribution to GDP, employment and investment. During 2015-16, the sector constituted as much as 9.1 and 8.6 per cent of GVA in Manufacturing and Agriculture sector respectively.

The manifesto of NDA Government stresses upon incentivizing the setting up of food processing industry for providing better income for the farmers and creating jobs.

Government has taken various other measures to boost food processing sector as follows:

a. To provide impetus to investment in food processing and retail sector, government has allowed 100% FDI in trading including through e-commerce, in respect of food products manufactured and / or produced in India. This will benefit farmers immensely and will create back - end infrastructure and significant employment opportunities.

b. The govt has also set up a Special Fund of Rs 2,000 crore in NABARD to make available affordable credit at concessional rate of interest to designated food parks and agro processing units in the designated food parks.

c. Food and agro-based processing units and cold chain infrastructure have been brought under the ambit of Priority Sector Lending (PSL) to provide additional credit for food processing activities and infrastructure thereby, boosting food processing, reducing wastage, create employment and increasing farmers' income.

Background

PMKSY is an umbrella scheme incorporating ongoing schemes of the Ministry like Mega Food Parks, Integrated Cold Chain and Value Addition Infrastructure, Food Safety and Quality Assurance Infrastructure, etc. and also new schemes like Infrastructure for Agro-processing Clusters, Creation of Backward and Forward Linkages, Creation / Expansion of Food Processing & Preservation Capacities. ■

Minimizing Air Conditioner Usage

The optimization of air circulation inside the premises is that to ensure adequate but mild air changes inside the premises, and not air blast by the old ceiling fans. This enables you to minimize the air conditioner settings from 22* C to 27 * C first thus comforting you mildly with air conditioning + air circulation around you. Automatically, this will reduce the running AC hours, less AC KWH units consumed per day now...

Air conditioner usage makes everyone of us accountable to local & global warming. First the AC user, as electricity consumer, and next the AC OEM who had given previously, yester-year-starred AC but now poorly rated, and last but not the least, the Govt, which needs to promote mandatorily, the energy conservation in AC, AC run hour & KWH monitoring, Star rated AC promotion and sales tax reduction in star rated AC & other energy saving & monitoring gadgets.

The optimization of air circulation inside the premises is that to ensure adequate but mild air changes inside the premises, and not air blast by the old ceiling fans. This enables you to minimize the air conditioner settings from 22* C to 27* C first, thus comforting you mildly with air conditioning + air circulation around you. Automatically, this will reduce the running AC hours, less AC KWH units consumed per day now.

Human Body Comfort Temperature for Cooling Air & Hot Water

India's climate suited the human peak hour productivity per day because of the ambient temperature near to our body temperature at 37 degrees C Plus / Minus 5* degrees C, that is 32 to 42 degrees C with comforting RH of around 55 percent. Human is comforted by the temperature, that is 10 *C less than 37 *C, the human body temperature. Hence, raise the AC setting to 27*C from 22 *C and this gives minimum of 10 % electricity savings. And storage water heater set at 47 –50 band in*C gives power savings. Ultimately, 10*C above & below cooling and heating is better for the human body medically than higher settings.

Govt Initiatives to Promote Air Conditioner Related Savings

The energy savings in air conditioner can be achieved in three ways:

1. Improving generation efficiency in air conditioners – Low cost to High cost ECON measures, possible.
2. Improving the distribution efficiency in AC air – Zero cost to Low cost ECON measure, possible.
3. Reducing the Air conditioner settings and usage – zero cost to low cost ECON measures possible.

The Govt plans now for the zero cost measure to ask the AC users to set to 24 *C minimum as the AC lower digital cut-off set point. The government has taken the right step on the AC usage aspects to raise the settings from 18* to 24 * C in AC remote hand set. They are planning to instruct the AC OEM to keep the AC digital settings at 24 * as lower cut-off from 18*C presently. Air conditioners sold in the country currently have a fixed lowest minimum temperature of 18°C. The government has to approve and implement few more measures, listed below to achieve energy savings in air conditioners and thus, a step towards reducing electricity supply –demand gap in the national grid by air conditioner loads in summer months.

What AC OEMs Can Offer?

Also the Government can simultaneously promote the combo schemes to monitor AC consumption and

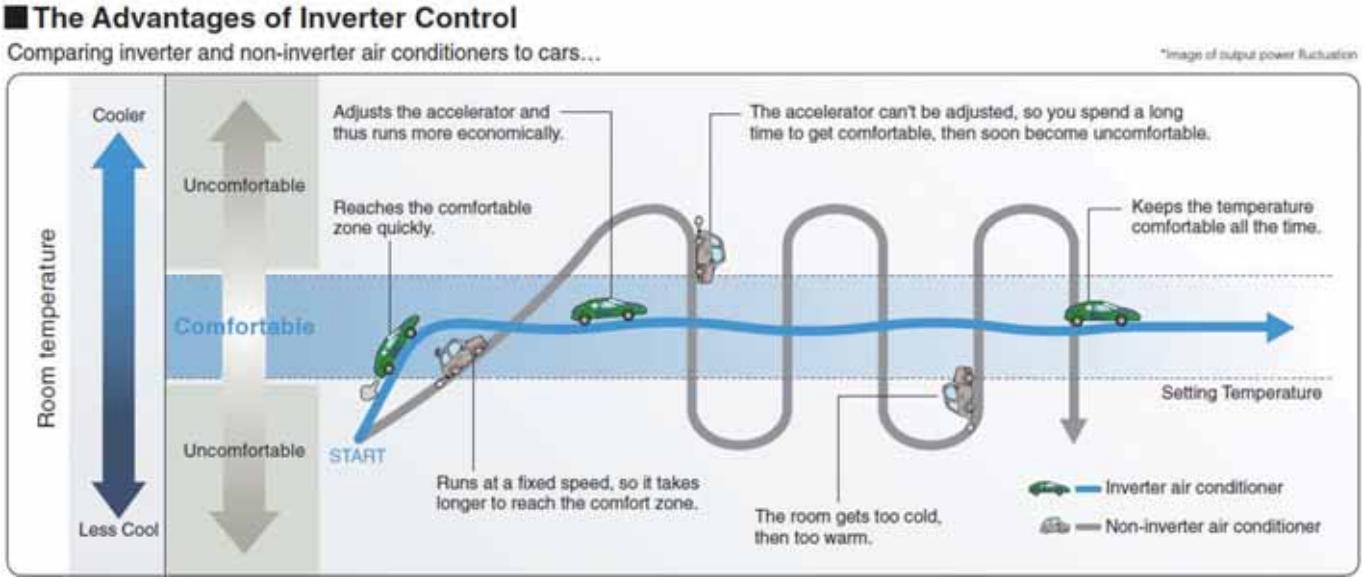


Figure 1: Non-Invertor AC short cycles more after the first cycle and could maintain wider AC temperature band only

target towards reduction.

1. When an AC vendor sells one AC, the government can guide to sell along with, one BLDC fan for mild air circulation.
2. AC user can be advised to have one KWH meter, one run hour meter and AC OEM can provide in their AC indoor.
3. Latest automatic voltage stabilizer with output settings at 220 Volts +/- 5 % as ratings. (Now it is 10 % volts).
4. User can go for Optional Aircon Saver to trim down his power bills in new or existing AC room temperature settings.
5. One spare AC air intake filter to keep as active spare routinely cleanable by the user himself.
6. All the above measures can reduce AC energy by more than 30 % in power & run hours from the existing full load consumption.

Optimize Air Velocity & Circulation

According to researchers of Toyohashi University of Technology in Japan, airflow from an AC stimulates the human body while sleeping and impacts on sleep conditions even if the mean airflow velocity is lower than an insensible level. In this study, a comparison was made on the influence of two types of airflow, mean velocity of 0.14 m/s (general AC) and 0.04 m/s (customized AC), both at a room temperature of 26 degree C.

The participants felt cooler with the higher airflow velocity during wakefulness and sleep. However, no significant difference was observed in the feeling of comfort, length of sleep depth, skin temperature, rectal temperature or sense of warmth or coolness in each subject before sleeping. The result is useful clue as to how to configure the airflow velocity of an AC to create a comfortable sleeping environment.

Now to improve air circulation, the user can install a BLDC ceiling fan and operate the same at mid position thus consuming 10 Watts only, and effectively air is circulated from top to bottom only, and not scattering to outside. This practice increases the human comfort because of mild cool air breeze circulated around our human body.

Referring to Figure 1 now, let us work towards flattening the same compressor duty cycle curves first and approach to narrow down the AC temperature settings in non-inverter AC bought now instead of switching over to buy a new inverter AC.

Energy Saving Possible By AC Users

Air conditioning consumes 20 times more power than the power consumed for air circulation by ceiling or fresh air fans. Let us live by adhering to the nature surrounding us, at the same time mildly comforting ourselves first by air circulation only, then only by air cooling utilizing the ambient wet bulb temperature characteristics. The ceiling fan is comforting the man by two ways namely by Evaporative Cooling and by air circulation. To achieve both the functions, the fan has to breathe in more from its top area under the ceiling. The ceiling fan especially the BLDC type

Figure 2: Choked window Netlon PVC mesh and the removed Dirt

Figure 3: Split AC Indoor Air filter choked with dust

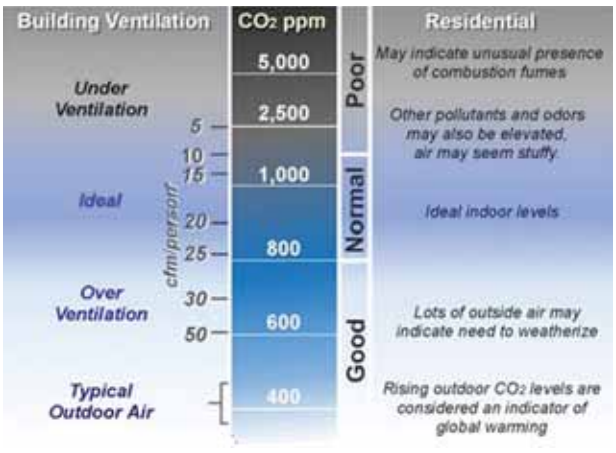


Figure 4: Building ventilation in CO_2 ppm and limits to maintain.

needs to be mandatorily fitted in AC room or hall application.

Based on the above and the image below, the intelligent air conditioner today, runs on high speed on the first cooling cycle, and then run at slow speed between cut-in & cut-out temperature settings. AC without room fan will make the cooled air throw at one area and hot pockets in other areas in the room are not medically good to us. Practically felt, it is really the light weight bladed ceiling fan + AC, is comforting the humans now.

Referring to Figure 2, Netlon PVC mesh window cleaned once in six months yields heavy dirt and dust. Figure 3 shows choked-split-AC filter in hospital, once a month. So, wherever windows are provided now, better to retrofit the routinely but frequently cleanable window PVC mesh screens. Dust spreads in choked window air filter screens are blocking air way passages and results in poor fresh air circulation. Domestic or any building needs first and primary Netlon type PVC window filter. In a non-AC premises or partly-used AC premises, fresh air circulation needs to be ensured first for free positive cross air flow through windows, doors, openings, vents.

In 24 x 7 humans-occupancy halls or buildings, indoor air quality IAQ parameters as described in Fig 4 by portable & in-situ monitoring is becoming mandatory for the OHS, the Occupational Health & Safety of the staff working inside the building. If this is monitored and controlled within the norms, this will lead to less health hazards arising out of poor IAQ. Respirable Suspended Particulate Matter is one of the air pollutants in the surrounding ambient air. But CO2 is also a factor towards poor IAQ which causes mental fatigue syndrome in prolonged working hours in In-door. And, CO2 is measureable easily and is one symptom of ventilation efficiency. (Courtesy: Inputs from ISHRAE)

Now, many existing AC users are using retrofit electronic gadget costing only few thousand rupees to their AC so that the gadget's sensor-driven software algorithms are designed to detect the AC compressor's thermodynamic saturation and optimizes the same. In fact, this retrofit is a sensible move taken by the AC user and this gives around 20 % savings in the existing rated AC. Instead of going for new inverter duty AC, this is a low cost option available to you in between, to optimize your AC running cost. Referring the image, the main idea is to smoothen ups & down of AC room temperature.

Monitor AC kWh Consumption Daily To Target Reduction

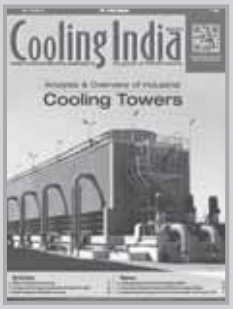
Thus, AC OEM can help consumer to monitor AC and its compressor run hours in usage. This is what BEE says "Monitor your energy usage to target the reduction of the same." The consumer will be made aware of the AC kWh consumption per hour in its total run hours, and relatively compare his AC efficiency with others around for the given same application like bedroom, office cabin, computer room, etc.

In the residential electricity consumption, out of total say 20 units per day consumption, and more than 10 units is consumed by the AC. If the same AC is monitored by just retrofitting single phase Static Watt-hour meter costing just Rs 400/-(ISI branded static Watt-hour single phase rated 5 to 30 amps), then we can have, day to day control of AC electricity consumption in domestic and commercial buildings, instead of annoying over inflated monthly EB bills, coming later.

Conclusion

Thinking and acting on conservation measures catalyzes our social responsibility, caring for others and sacrificing our selfish comforts. When we are safe and healthy, conservation prevails. If safety fails, conservation fails and pollution starts. So, comfort our AC machines to get more input power savings, first target the input power to appliances, and reduce the same, monitor the individual energy consumption & optimize the same, thus, paving for greener environment. ■

Ashok Sethuraman
BEE Accredited Energy Auditor,
Coimbatore



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Smartcool Distributor Installs at McDonald's Chain in Riyadh

Achieves 20% Savings on Air-conditioning costs at The Luxury Tiara Hotel Riyadh

Smartcool Systems Inc is pleased to report that Kafaat Energy Company, its distributor in Saudi Arabia has been appointed by Riyadh International Catering Corporation to supply and install Smartcool's energy efficiency technology at McDonald's branches in Riyadh. The above appointment is part of Riyadh International Catering Corporation's plans to promote energy efficiency standards, green environment and reduced levels of carbons' emissions.

Bashar Abdulrahman, CEO, Kafaat Energy Company, stated, "We have been successfully installing Smartcool's energy efficiency systems in various locations in the KSA. Initial installations for Riyadh International Catering Corporation at McDonald's locations have been completed and are being evaluated for a full rollout to all 162 branches. With the significant requirement for climate cooling in Saudi Arabia and additionally, refrigeration requirements at McDonald's, there are many buildings that could benefit from Smartcool's proprietary technology. We look forward to growing the installed base of satisfied customers that are implementing the technology and whom are not only realizing a financial benefit but reducing their carbon footprint."

Ted Konyi, CEO, Smartcool Systems, commented, "Kafaat Energy Company has been extremely focused on marketing Smartcool's technology and it shows. In addition to working with Riyadh International Catering Corporations' McDonald's locations, they recently installed at Tiara Hotel, a unique luxury hotel in Riyadh. Results at Tiara showed a 20% savings on Air Conditioning costs. This represents significant savings for the hotel as well as reducing emissions. We continue to support Kafaat and their initiatives and look forward to their continued success."

Riyadh International Catering Company is proud to serve the Central, Eastern and Northern regions of KSA some of its favorite food since 1993. McDonald's KSA Central, Eastern and Northern regions today has 162 restaurants geographically located and over 5,007 employees to service customers. McDonald's KSA Central, Eastern and Northern regions is committed to the quality of the products it serves at each restaurant and also maintains an active social responsibility agenda.

Kafaat Energy Company is specialized in providing energy saving solutions and products for various applications (HVAC, heating systems, motors) through partnership with international energy saving companies. Those solutions guarantee savings of around 15% - 20% of the total electricity consumption at clients' premises. ■

Heating of Biogas Digester through Solar Thermal

There are many different ways to maximize both the efficiency of biogas plants, and the usefulness and effectiveness of digester. With the right advice and by choosing the correct technology, it is possible to enhance the production of biogas which is not only increase plant efficient, but also improve the overall environmental profile of biogas plants and maximize its benefits in terms of mitigating climate change...

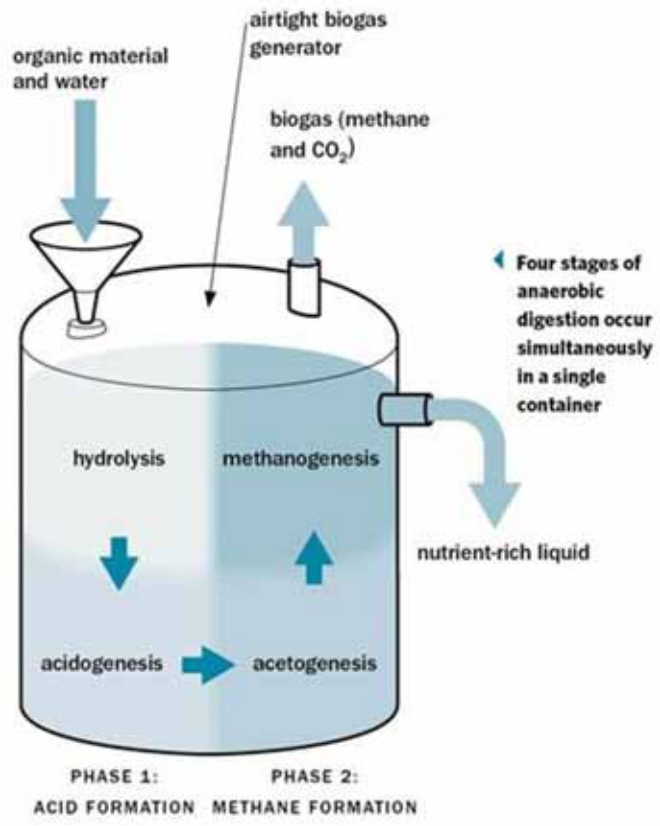
Biogas is basically a mixture of methane and carbon di-oxide gases, generally produced from cattle dung, agriculture manure, MSW etc by anaerobic digestion process. This technology has many benefits in view of environment, agriculture and sustainability. Biogas plants have been extensively used in India. There are certain parameters that affect production of biogas plant. Temperature is one of them. Although anaerobic digestion can take place under psychrophilic (15-25°C), mesophilic (35-40°C) and thermophilic (50-60°C) conditions. Temperatures of 35-37°C are typically recommended for best methane production. As the temperature varies, percentage of methane decreases. However, digesters require significant amount of heat energy to maintain temperatures at these levels. There are various technologies available to increase the temperature of digester. Use of solar energy is one of the cheapest ways.

Description of Solar Heating System for Biogas Production

Solar air/water collectors combined with a heat exchanger can be used for heating digester and increase temperature to an optimum value in a steady condition. In order to keep the system run in steady condition, the control unit can be adopted. If there is not enough solar thermal energy input to the digester (e.g. cloudy season), then the auxiliary electrical heating system starts to supply the heat to the digester. The digester is generally positioned under the ground. There are basically two methods that are most efficient to heat the biogas digester.

Use of Solar Water Heater

In this design, the digester is kept underground and heated via heat exchanger using the hot water from the solar water heaters so as to maintain the desired temperature for better production of biogas. Efficient system if enough sunlight is available as it serves to increase the digester's reaction temperature and/or reduce reactor's volume.

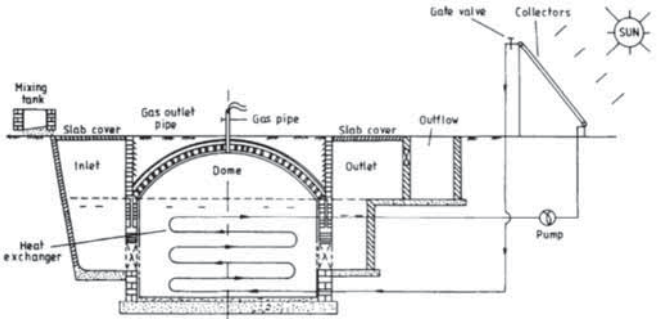


Schematic view of Biogas Plant

For such applications double tube heat exchangers can be used. It is an industrial double tube heat exchanger, comprising a tube within a tube. The inner tube is corrugated for increased heat transfer and reduced fouling without the risk of obstruction or blockages associated with spiral heat exchanger systems, thus, ensuring continuous operation in such a harsh environment. The product flows through the inner tube and the service fluid through the annulus between the inner and outer tube. Because of its geometry, the double tube heat exchanger is a true counter-current heat exchanger. An expansion joint (bellow) is fitted in the shell to allow for differential expansion of the inner and outer tube during operation. Multiple units can be interconnected and have the options of frame mounting, insulation and cladding in stainless steel.

Solar Canopy

Polythene/plastic sheet is used as a canopy for tapping solar



Schematic layout of utilization of solar water heater with heat exchanger in biogas digester.

HRS make double tube heat exchanger

energy. This method is used to enhance the biogas production for the low temperature in winter. This method is the most effective methodology in plan area. A black plastic hut is made over the dome of a biogas digester so that solar radiation is absorbed by the hut and consequently rising the temperature of the digester. The contents of the digester must be heated to maintain the ideal temperature for the bacteria to work. In addition, pre-heating the feedstock prior to putting it in the digester can reduce the amount of heat needed in the digester itself and improve the overall efficiency of the digestion process.

Conclusion

There are many different ways to maximize both the efficiency of biogas plants, and the usefulness and effectiveness of digester. With the right advice and by choosing the correct technology, it is possible to enhance the production of biogas which is not only increase plant efficient, but also improve the overall environmental profile of biogas plants and maximize its benefits in terms of mitigating climate change. ■

Er. Kapil K Samar
Department of Renewable Energy Engineering,
College of Technology and Engineering
Udaipur

Dr. Deepak Sharma
Professor
Department of Renewable Energy Engineering,
College of Technology and Engineering
Udaipur

Er. R. Lavnya
M Tech
Renewable Energy Engineering
College of Technology and Engineering
Udaipur

UL Classified Fire Dampers by Air Master

Air Master, the pioneers, who introduced world class air distribution products for the first time in India in the year 1997 now once again bring to you the UL Certified fire and smoke dampers from their new plant located in Bangalore with state-of-the-art plant and machinery.

Facts about Fire

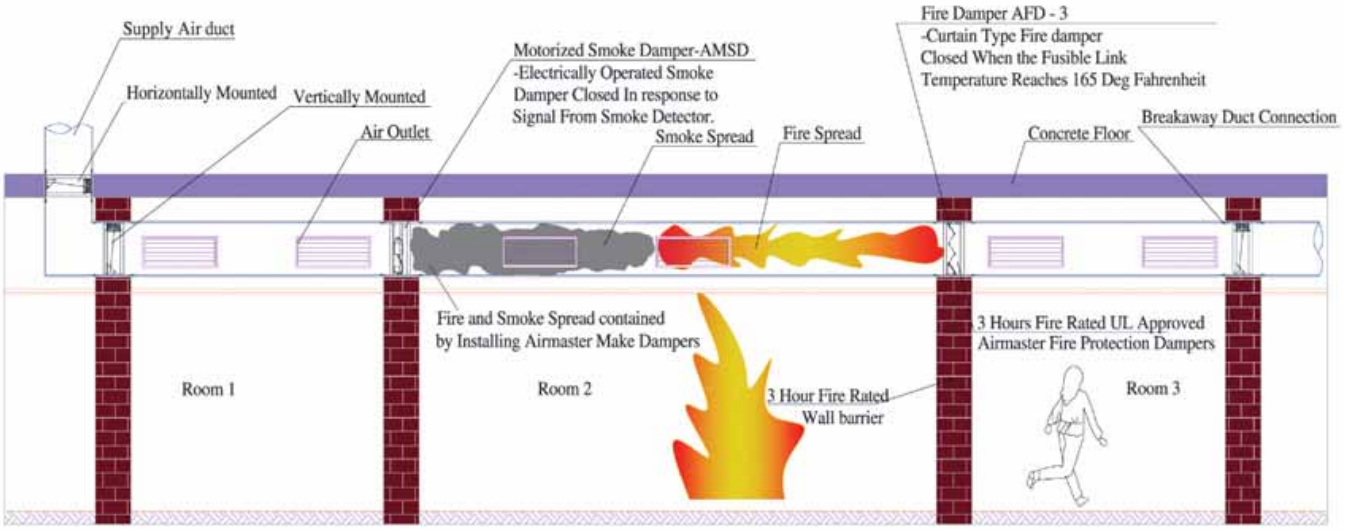
- Fire is a reality and time is a factor to save
- Fire occurs at any time any place irrespective of its occupancy
- Fire is a friend when it is with in limits but it become the worst enemy when it rages beyond our control
- Its a matter of seconds you will be left when fire changes from smoke to flaming state
- Fire is caused from our daily Living style which impossible for us to change.
- A Fire can cause potential damage to Life and severely damage the property and bring the business to a virtual halt and its another potential threat in todays era of highly competitiveness

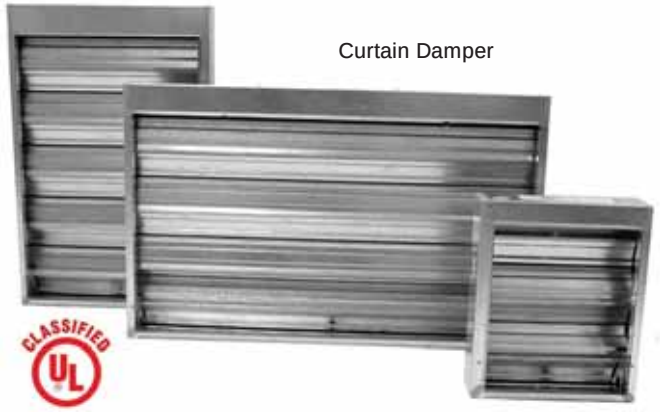
Smoke and Flames rising from residential buildings, hotels, warehouses have become a common sight now-a-days. Out of 1.2 million fires reported in the USA in 2013, almost 39% of the cases were structural fires causing more than 2800 deaths and $9.5 billion in property damage. The Centre for Disease Control and Prevention notes death from fires and burns are the fifth most common cause of unintentional injury deaths and third leading cause of unintentional injury deaths and third leading cause of fatal home injury. Smoke inhalation during fire accidents is another major reason for deaths in such cases.

In a case study conducted by NFPA, it was found that the HVAC system was not linked to smoke detector system and did not shut off during fire accident. The air from the operating HVAC system and natural ventilation increased the growth of the fire. It is, therefore, important to cut-off air supply by shutting down the HVAC system during fire thereby, preventing the spread of fire and smoke. Various fire safety equipment are prescribed by national authorities in their building codes to overcome fire hazards in order to save life and property. One such requirement is the use of Fire Dampers in the HVAC system.

What is a Fire Damper?

Fire damper is a device installed in an air distribution system or an air transfer opening designed to close automatically upon detection of heat interrupting airflow and thereby, restricting the passage of fire in the process. Fire dampers are installed in fire rated walls or barriers or partitions where the HVAC ductwork penetrates ensuring that their integrity is maintained. The location and installation procedure of fire dampers should be in accordance with the widely accepted and recommended NFPA 90A – Standard for installation of Air-Conditioning.





Curtain Damper

How are UL Fire Dampers different from other Fire Dampers?

UL Dampers are of very precise quality and reliable in the outbreak of a fire. They are thoroughly tested at factory and each component comprised in the UL damper is a UL Listed component including Actuators, Thermoelectric Tripping Device, Electrical Cables, Flexible Conduit, Silicon and Rubber Sealants etc. The GI sheets are also of special quality with a higher GSM coating as compared to regular dampers.

Smoke Damper

What sets UL dampers apart?

The most prominent testing laboratories globally for evaluating resistive materials and assemblies is the Underwriters Laboratory (UL), USA. Air Master has taken great efforts in developing fire dampers and getting it certified from UL after passing their stringent testing procedures successfully. Our dampers have withstood the demanding test requirements of UL 555 and UL 555S standards. Both these standards call for a series of tests like: cycling test for operational reliability, salt water spray test, fire endurance test followed by high pressure hose stream test, leakage test, dynamic closure test and overall integrity of the damper is also checked.

The factory visits by UL on a continuous basis and their quality audits ensures that manufactures strictly hang on to the UL procedures and quality standards ensuring zero defect delivery to customers. This implies that manufacturers cannot deviate to any small extent from the UL procedures. UL listed products are finally dispatched after UL labels are proudly pasted on each and every fire damper. The installation has to be carried out strictly as per the installation instructions that is sent along with every shipment.

Air Master UL Fire Dampers

All Air Master fire dampers are tested and certified by UL. Air Master fire dampers are developed with the intention of maximizing the occupant's safety. The UL directory online can be checked on www.ul.com for the listing by filling in the company name, country and the code EMME which pertains to fire dampers. Air Master has multiple listing for both Middle East and India.

Types of Fire Dampers

There are two basic types of damper operations: a) Curtain type b) Multiple blade type. Though construction of both dampers are different, the purpose is the same – to interrupt airflow in order to restrict the passage of fire & smoke. The following types of models are manufacture by Air Master:

1. AFD-3 - Curtain Type Fire Damper (3 hour rated)
2. AMFD - Air Master Fire Damper
3. AMFSD - Air Master Fire and Smoke Damper
4. AMSD - Air Master Smoke Damper

Curtain type: The blades are folded and held under spring tension using a bi-metal fusible link. Heat of 165°F (74°C) inside the duct is sufficient for fusible link to melt and break, thus, allowing blades to shut like a curtain under the force of the springs attached. The fire damper acts as a barrier between fire and non-fire zones thus containing the fire in the compartment from which it originated. This gives sufficient time for occupants to escape and move into safety.

Multiple blade type: This model operates mainly using an electric actuator. Based on the application – i.e. Fire, Smoke, Combination Fire & Smoke, the actuator can be configured with the Building Management System (BMS) or a smoke detector. The electric actuator is energized with power supply to keep the damper open under normal conditions. When heat or smoke is detected by the thermal responsive device (TRD) or smoke detector, power supply to actuator will be disconnected.

Should the BMS be used to close the actuator, it has to be configured to disconnect the power supply to the actuator. Once the circuit is open, the damper closes automatically by the force of the springs inside the actuator. Such actuators are otherwise known as spring return actuators. TRDs are supplied with a rest button to re-establish power supply, thereby, keeping the damper in open position.

The open close position can be monitored by introducing a limit switch or auxiliary switch in the damper which communicates the open or close status to the BMS or a standalone control panel. As a result, further actions could be programmed like switching off all HVAC units or informing Fire department and so on. ■

For further information, visit us at
www.airmaster.co / www.airmasteremirates.com

Cooling & Preservation without Electricity

The present cooling and preservation technologies are electricity dependent and generation of electricity from conventional sources of energy has already attracted concerns about depletion of resources, environmental degradation, cost of electricity etc. It is, thus, important to find out ways and means to achieve cooling and preservation without the use of electricity. In this regard, we have to look back to the innovations used by our ancestors in this field and revive them with the help of modern technology for maximum benefits...

Refrigeration in its small to very large equipment or installations has become an integral part of most of the population of present civilization to be used for cooling and preservation. However, still there is a large section of society who is far away from the benefits or utilization of refrigeration technology and moreover, upto few decades before almost all the population used to live without the use of so called modern cooling and preservation technologies. The present cooling and preservation technologies are electricity dependent and generation of electricity from conventional sources of energy has already attracted concerns about depletion of resources, environmental degradation, cost of electricity etc. It is, thus, important to find out ways and means to achieve cooling and preservation without the use of electricity. In this regard, we have to look back to the innovations used by our ancestors in this field and revive them with the help of modern technology for maximum benefits.

Basic Technologies of Cooling & Preservation without Use of Electricity

Canning

Canning is basically vacuum packing in sterile environment. If we don't have electricity, canning is possible on a wood stove, though it would be a lengthy (yet effective) process. We can process anything: meat, vegetables, stews, fruit, fish and dessert like carrot pudding. Here are some very general canning tips:

- The jars and lids must be sterilized first, by boiling for a few minutes.
- Then add what you want to can, add boiled water, and some seasonings.
- Leave at least 1/4 inch space at the top.
- Tighten the lid, then loosen a quarter turn. This will allow room for the air to leave.
- A high pressure canner is ideal, it cuts the time by at least half.
- Take out, tighten the lids and let cool completely.
- Ensure that all jars have sealed – the lids will be concave.

Dehydrating

Almost everything can be dehydrated (dried), plain and simple. The earlier people used to dry their meat and fish by hanging it, and smoke it to keep the bugs off. The meat will last for the remainder of the warm months and all winter. Today we can purchase dried fruit, mushrooms, vegetables, and hydrate them. We can have a wood oven and a wood dehydrator – as these would run without power.

Salt Preserved

Around the world, meat is preserved with salt, thus the birth of sausage. But sausage does not last long without cooling.

Techniques of Cooling & Preservation without Use of Electricity

Mitticool Fridge: uses clay and is designed as an evaporative fridge. Water from the upper chambers drips down the side, and gets evaporated taking away heat from the inside, leaving the chambers cool. The top upper chamber is used to store water. A small lid made from clay is provided on top. A small faucet tap is also provided at the front lower end of chamber to tap out the water for drinking use. In the lower chamber, two shelves are provided to store the food material. The first shelf can be used for storing vegetables; fruits etc. and the second shelf can be used for storing milk etc. Cool and affordable, this clay refrigerator is a very good option to keep food, vegetables and even milk naturally fresh for days.

Wind-chill Food Preservation: the device connects an air tube to an evaporation chamber, which connects to a sealed refrigeration chamber that looks a lot like an esky, the contents of which are cooled through the process of evaporative cooling. It works by passively drawing in warm ambient air through the funnel, which is fed into a pipe that's been buried underground. This already starts to cool down the air before it's fed into coiled cooper pipe that's been immersed in water in the evaporation chamber. The evaporation process is helped along by a small, solar-powered fan. The water evaporating around pipe chills the air inside and this is then fed back underground before entering the refrigeration chamber. The next step will be to improve the design to achieve a consistent 4.5 degrees Celsius temperature in the refrigeration chamber, which is what's needed to keep food from spoiling.

Preserving fruit and vegetables using solar power: the device, using a liter of water per week and solar power, produce can be preserved. A ventilator turns the water into humidity, keeping produce cool inside a tent that can hold about 440 pounds of food. The device is currently being tested, but it could offer a cool use of solar technology in countries where fridges may be scarce but sun is abundant.

Store vegetables in sand for months (Groundfridge): Still today, preserving seeds of root vegetable (like ginger, potato, turmeric and arbi etc.) for use in agriculture in large quantities is done by storing these seeds in fields under soil for many months as safe and best for use. So, we can store root vegetables for months in soil/sand for use as food items or as seeds. Soil/sand works to prevent moisture from rotting the fruits and veggies. This centuries-idea gives an alternative for cooling and preservation of food items without the use of any energy at all. Groundfrige can be installed underground and covered with a layer of dirt about three feet thick.

Futuristic Bio Robot Refrigerator uses gel to preserve food: Rather than using cool air, the refrigerator of the future could employ gel. Engineer (Yuriy Dmitriev) decided to develop a new idea for refrigeration, and his Bio Robot Refrigerator design incorporates odorless, non-sticky biopolymer gel to chill food. Once to get past the futuristic coolness of the gel (pun intended), another unique innovation is that fridge uses zero energy.

Cooling via Vegetation: Coca Cola has teamed up with Leo Burnett Colombia and International Physics Center for designing a Bio Cooler. It will become operational when users water plants growing on top of the device. The water evaporated inside the cooler, chilling the drinks inside. On top of the cooler, a

mirror took temperatures to the next level, converting gas to liquid to ensure the perfect chill. The idea could spur ideas in the future for cooling via vegetation.

Other Things to Avoid Use of Cooling & Preservation

Change of mindset: Believe it or not, more food than we might think can go for some time without refrigeration and still remain safe to eat. While we may be used to stocking up on and refrigerating cheese, butter and fruits and vegetables, it is entirely possible to buy just enough of these items for a week and store them in a cool, dry place on countertop. Say goodbye to huge stock-up trips, though, because without some sort of cooling system, the food will eventually go bad the longer it sits out at room temperature.

Know Your Fruits And Veggies And Their Needs: Your only option of storing your fruits and vegetables need not be the refrigerator. There are plenty of other options for storing them, and some of them may even allow your food to last longer than if you kept them in the refrigerator. Generally, the optimal conditions for storage of fruits and veggies are a temperature between 50 degrees and 55 degrees Fahrenheit (pumpkins, winter squash, and sweet potatoes can tolerate up to 60 degrees) and low humidity. Cabbages, celery, and root crops can handle cooler temperatures, down to 30 to 35 degrees Fahrenheit, and can tolerate more humidity.

Learn To Cook Just Enough: What are we supposed to do with the food that we've cooked and is left over from the meal after everyone has eaten? What do we do with the leftovers? The first answer is to plan ahead and cook only enough for the meal so there is nothing left over to worry about storing. The second answer is, depending on what the food contains, to set the food aside in a semi-cool place and eat it for the next meal or snack. In other countries, such as Japan, meals are often left in a covered pot at room temperature. The food is eaten as snacks throughout the day or is eaten at the next meal. ■

Dr. S. S. Verma
Department of Physics,
S.L.I.E.T., Longowal,
Distt.-Sangrur, Punjab

Honeywell to Aid Rajkot Smart City & Surveillance Goals

Honeywell, a global leader in connected buildings, announced its project with Rajkot Municipal Corporation and Rajkot Police to implement a smart city command-and control center along with a citywide surveillance system. The project for Gujarat's fourth-largest city includes more than 450 integrated closed-circuit televisions (CCTVs) and Wi-Fi at 13 key public places, supported by software and servers across 107 strategic locations in the city.

The efforts are aimed to boost security, prevent crimes, maintain law and order, fine traffic violators, control traffic, and effectively monitor the city. The surveillance system was formally launched by Vijaybhai R Rupani, Chief Minister, Gujarat, in the presence of Banchhanidhi Pani (IAS), Municipal Commissioner, Rajkot, and Anupam Singh Gehlot, Police Commissioner, Rajkot. The project covers a citywide installation of CCTVs, including an automatic number plate reading system (ANPR), and monitoring via two command-and-control rooms. Honeywell will also deploy intelligent traffic management technologies, including a red-light violation detection system with e-challan, and digital signboards at critical public places. In addition, Honeywell will install 50 environmental sensors across the city to monitor air pollution and contamination level. Banchhanidhi Pani (IAS), Municipal Commissioner, Rajkot, said, "The implementation of these smart city technologies will add to our efforts in resolving urban challenges and contribute to the city's overall development."

Anupam Singh Gehlot, Police Commissioner, Rajkot, said, "These smart surveillance technologies will not only drive operational efficiencies and aid day-to-day policing, but will make

our citizens feel more safe and secure."

Aseem Joshi, Country General Manager, Honeywell Building Solutions, said, "The Rajkot Police team has been progressive as an early adopter of technology, which will help meet their modernization goals, and we are pleased to support them. With our broad technology portfolio, Honeywell will deliver scalable communication, surveillance, and sensing solutions to our customers, in line with the Indian Government's 100 Smart Cities vision."

Honeywell has already been working on smart city initiatives including city surveillance projects in Aurangabad in Maharashtra state; an 11-city project in Madhya Pradesh state, including a successful Ujjain Simhastha Kumbh event requiring security management of a 70 million devotee gathering and in Bhubaneswar in Orissa state. ■

State-Wise Distribution of Cold Storage Capacity

As per All India Cold Storage Capacity and Technology - Base line Survey (10.12.2014) conducted by M/s Hansa Research Group, commissioned by National Horticulture Board (NHB) under Department of Agriculture, Cooperation & Farmers Welfare, 75% of the total cold storage capacity in the country was used for the purpose of storage of horticulture crops including potato. Out of total production of potatoes in the country, 75% was stored in cold storages for long term storage at farm gate. Further, 95% of cold storages in the country were owned by private sector, 3% by cooperatives and remaining 2% were under Public Sector Undertakings.

As per the information available as on 31.03.2017, there were 7645 cold storages with a capacity of 34.95 million MT in the country. The state wise and agencies wise details are as follows:

State wise & Agency wise distribution of Cold Storage as on 31.03.2017

Sr. No.	Name of the State	upto 2009*		2009-10 to 2016-17							
				NHB		NHM		MoFPI		Total	
		No.	Capacity (MT)	No.	Capacity (MT)	No.	Capacity (MT)	No.	Capacity (MT)	No.	Capacity (MT)
1	Andaman & Nicobar Islands (UT)	2	210	0	0	0	0	1	600	3	810
2	Andhra Pradesh & Telangana	290	900606	36	220158	101	619021	15	42776	442	1782561
3	Arunachal Pradesh	1	5000	0	0	0	0	1	1000	2	6000
4	Assam	24	88068	10	61738	0	0	2	8100	36	157906
5	Bihar	246	1147041	28	111821	29	153233	3	3500	306	1415595
6	Chandigarh (UT)	6	12216	1	246	0	0	0	0	7	12462
7	Chhattisgarh	69	341885	14	68323	13	65349	2	8530	98	484087
8	Delhi	95	126158	2	3699	0	0	0	0	97	129857
9	Goa	29	7705	0	0	0	0	0	0	29	7705
10	Gujarat	398	1267304	50	169199	295	1419209	21	46095	764	2901807
11	Haryana	244	393121	39	147816	45	152509	10	56384	338	749830
12	Himachal Pradesh	18	19858	7	20504	29	54805	12	35850	66	131017
13	Jammu & Kashmir	19	42869	6	24630	7	37707	6	7310	38	112516
14	Jharkhand	45	170148	8	36757	5	29775	0	0	58	236680
15	Karnataka	170	407165	8	78844	12	49392	8	24777	198	560178
16	Kerala	193	58105	1	5000	0	0	4	17300	198	80405
17	Lakshadweep (UT)	1	15	0	0	0	0	0	0	1	15
18	Madhya Pradesh	197	808052	22	114580	71	320083	10	20950	300	1263665
19	Maharashtra	466	546748	30	106860	58	151122	50	173662	604	978392
20	Manipur	0	0	0	0	0	0	2	5500	2	5500
21	Meghalaya	3	3200	1	5000	0	0	0	0	4	8200
22	Mizoram	0	0	1	3471	0	0	2	530	3	4001
23	Nagaland	2	6150	0	0	0	0	2	1200	4	7350
24	Orissa	101	291039	0	0	68	247100	2	2002	171	540141
25	Pondicherry (UT)	3	85	0	0	0	0	0	0	3	85
26	Punjab	422	1345193	55	176908	166	584902	17	48701	660	2155704
27	Rajasthan	110	324226	26	98907	21	88760	9	43385	166	555278
28	Sikkim	1	2000	0	0	1	100	0	0	2	2100
29	Tamil Nadu	148	238536	16	65047	1	6000	9	28042	174	337625
30	Tripura	11	29450	3	16027	0	0	0	0	14	45477
31	Uttar Pradesh	1589	10118000	503	2975267	184	1016530	23	66265	2299	14176062
32	Uttrakhand	15	68499	5	9272	10	21650	16	60998	46	160419
33	West Bengal	463	5682000	14	47812	26	153699	9	64050	512	5947561
	Total	5381	24450652	886	4567886	1142	5170946	236	767507	7645	34956991

(Source: Directorate of Marketing and Inspection (DMI) upto 2009, National Horticulture Board (NHB), National Horticulture Mission (NHM) & Ministry of Food Processing Industries (MoFPI)

Food Processing Industry at a Glance

Summary

- 194.39 million Hectares of Gross Cropped Area in 2012-13(P)
- 66.10 million Hectares of Net Irrigated Area in 2012-13(P)
- 127 agro-climactic zones
- 42 mega food parks being set up with an allocated investment of USD 2.38 billion

Reasons to Invest in Indian Food Processing Industry

- A rich agriculture resource base-India was ranked No. I in the world in 2013 in terms of production of arecanut, bananas, castor oil seed, chick peas, chillies & peppers dry, ginger, lemons & limes, mangoes, mangos teens, guavas, millet, okra, papayas, pigeon peas, meat- buffalo, milk-whole fresh buffalo & goat, ghee, butter oil of cow milk, ghee of buffalo milk, sesame seed.
- India ranks second in the world in the production of Anise, fennel, coriander, beans-dry, cabbages and other brassicas, cauliflower & broccoli, egg plants (aubergines), garlic, groundnuts with shell, lentil, onions dry, peas green, potatoes, pumpkins, squash and gourds, rice/paddy, safflower seed, sugar cane, tea, tomatoes, wheat, meat-goat, milk whole fresh cow. Further, India is at third position in the production of cashew nuts, with shell, coconuts, lettuce and chicory, nutmeg, mace and cardamoms, pepper (piper spp), rapeseed.
- The country's gross cropped area amounts to 194.39 million hectares, with cropping intensity of 139%. The net irrigated area is 66.10 million hectare in 2012- 13(P).
- A total of 127 agro-climatic zones have been identified in India. Strategic geographic location and proximity to food-importing nations makes India favourable for the export of processed foods.
- Extensive network of food processing training, academic and research institutes.
- 42 Mega Food Parks (MFP) are being setup with an investment of USD 2.38 billion. The parks have around 1250 developed

plots with basic enabled infrastructure that entrepreneurs can take on lease for the setting up of food processing and ancillary units. As on 25.07.2016, out of 42 MFP projects 8 projects have been operationalised.

- The cost of skilled manpower is relatively low as compared to other countries. Attractive fiscal incentives have been instated by central and state governments and these include capital subsidies, tax rebates, depreciation benefits, as well as reduced custom and excise duties for processed food and machinery.
- Major global players in the food domain are already present in India.
- 134 cold chain projects are being setup to develop supply chain infrastructure. As on 22.07.2016, out of 134 Cold Chain Projects, 87 projects have been completed.

Statistics

- India has been ranked 12th in the world in exports of food and food products in 2015.
- Major industries constituting the food processing sector are grain milling, sugar, edible oils, beverages, fruits & vegetables processing and dairy products.
- The contribution of the food processing sector to the Gross Value Addition (GVA) in 2014-15 amounts to USD 22 billion at 2011-12 prices. In 2014-15, GVA in food processing grew by 5.78%.
- The share of Food Processing Sector in GVA of manufacturing sector was 8.6% in 2014-15.
- Investment in fixed capital in registered food processing sector had grown from USD 24.5 billion in 2012-13 to USD 25.85 billion in 2013-14, making a growth rate of 6%.
- The number of registered food processing units has increased from 37,175 in 2012-13 to 37,445 in 2013-14.
- Food processing industry is one of the major employment intensive segments contributing 11.69% of employment generated in all Registered Factory sector in 2013-14.

Growth Drivers

- Liberalisation and the growth of organised retail has made the Indian market more attractive for global players with a large agricultural resource base, abundant livestock and cost competitiveness, India is fast emerging as a sourcing hub of processed foods.
- With a population size of 1.22 billion of which 604 million were under the age of 24 in 2011, this rising youth population is likely to increase India's overall food consumption.
- Rising income levels, affluence and a growing middle-class.
- One-third of the population will be living in urban areas by 2020.
- Increasing desire for branded food as well as increased spending power.
- Large distinct consumer segments to support customised offerings or new categories and brands within each segment.
- Consumption in India is driven towards packaged and ready-

to-eat foods.

- Favourable economic & cultural transformation, shift in attitudes & lifestyles, consumers are experimenting with different cuisines, tastes and new brands.
- There is an increase in awareness and concern for wellness and health, high protein, low fat, wholegrain and organic food.
- Exports of food items have been rising steadily, the main export destinations being Middle East and South East Asia.

FDI Policy

- 100% FDI is permitted under the automatic route in food processing industries.
- 100% FDI is allowed through government approval route for trading, including through e-commerce in respect of food products manufactured or produced in India.

Sector Policy

- Food processing is recognised as a priority sector in the new manufacturing policy in 2011.
- Government has set up a special fund called 'Food Processing Fund' of approximately USD 300 million (at Rs. 67.25 to 1 USD) in National Bank for Agriculture and Rural Development (NABARD) for extending affordable credit to designated food parks and the individual food processing units in the designated food parks. As on 31.05.2016 about a quarter of the fund as term loan has been sanctioned to 12 mega food parks projects.
- Reserve Bank of India has classified loan to food & agro-based processing units and Cold Chain under agriculture activities for Priority Sector Lending (PSL) subject to aggregate sanctioned limit of USD 15.38 million per borrower from the banking system. It will ensure greater flow of credit to entrepreneurs for setting up of food processing units and attract investment in the sector.

Financial Support

- Services of pre-conditioning, pre-cooling, ripening, waxing, retail packing, labeling of fruits and vegetables have been exempted from Service.
- Exemption to transportation of 'food stuff' by rail, or vessels or road will be limited to transportation of food grains

including rice and pulses, flours, milk and salt only. Transportation of agricultural produce is granted full exemption.

- For generating more employment, an amendment regarding eligibility threshold of minimum 100 workmen has been reduced to 50, is made in the provisions of section 80JJAA of the Income-Tax Act (w.e.f. 01/04/2016).
- The entry "waters, including mineral waters and aerated waters, containing added sugar or other sweetening matter or flavoured" in the Seventh Schedule to the Finance Act 2005 related to levy of additional duty of excise @ 5% has been omitted.

Income Tax

Deduction in Expenditure

- Deduction for expenditure incurred on investment is allowed if the investment is wholly and exclusively for the purpose of any specified business (details given below). However, this deduction is allowed only for the investment made in the previous year and prior to commencement of its operations.
- Business allowed 100% deduction.
  - Setting up and operating a cold chain facility (not available for expansion of the unit).
  - Setting up and operating warehousing facilities for storage of agriculture produce (not available for expansion of unit)
- Business allowed 100% deduction
  - Bee-keeping and the production of honey and beeswax.
  - The setting up and operation of a warehousing facility for the storage of sugar.

Deduction of Tax from Profit

- This tax incentive is available as 100% tax exemption for the first five years' of operation, and after that, at the rate of 25% of the profits being exempted from tax; 30% in case of a company. This benefit is available only for 10 years for new units (i.e. not formed by splitting up or by way of reconstruction of an existing business) in the business of processing, preservation and packaging of fruits or vegetables, meat & meat products, poultry, marine or dairy products provided such business had commenced on or after 01.04.2001.
- If any business relating to meat, meat products, poultry, marine products or dairy products has started after 01.04.2009, the above benefit would be available, but not to the unit operating in such business before 01.04.2009.

Service Tax

Negative List

Service tax is not leviable on items contained in the Negative List. Services including processes carried out at an agricultural farm including tending, pruning, cutting, harvesting, drying, cleaning, trimming, sun drying, fumigating, curing, sorting, grading, cooling or bulk packaging and such like operations which do not alter the essentials characteristics of agricultural produce but make it only marketable for the primary market.

The following services are covered under exempted category from service tax:

- Construction, erection, commissioning or installation of original works pertaining to post-harvest storage infrastructure for agriculture produce including cold storages for such purposes.
- Mechanised food grain handling system, machinery or equipment for units processing agricultural produce as food stuff excluding alcoholic beverages.
- Services of loading, unloading, packing, storage or warehousing of agricultural produce.
- Services of pre-conditioning, pre-cooling, ripening, waxing, retail packing, labeling of fruits and vegetables.
- Services provided by National Centre for Cold Chain development under Department of Agriculture, Cooperation and Farmers Welfare, Government of India by way of knowledge dissemination.
- Services provided by a goods transport agency, by way of transport in a goods carriage of agricultural produce, foodstuff including flours, tea, coffee, jiggery, sugar, milk, products, salt and edible oil, excluding alcoholic beverages.

Customs Duty

Government has extended Project Imports' benefits to the following projects:

- Projects for the installation of mechanised food grain handling systems and pallet racking systems in 'mandis' and warehouses for food grains and sugar.
- Cold storage, cold room (including for farm level pre-cooling) or industrial projects for preservation, storage or processing of agricultural, apiary, horticultural, dairy, poultry, aquatic and marine produce and meat.
- Consequently, all goods related to Food Processing, imported as part of the project, irrespective of their tariff classification, would be entitled to uniform assessment at concessional basic customs duty.
- Concessional Basic Customs Duty as presently available

under project imports for cold storage, cold room (including for farm level pre-cooling) also extended for 'cold chain including pre-cooling unit, pack houses, sorting and grading lines and ripening chambers' from 10% to 5%.

- Customs Duty on Hazelnuts has been reduced from 30% to 10%.
- Customs Duty on De-hulled Oat Grains has been reduced from 30% to 15%.
- Customs Duty on Refrigerated containers has been reduced from 10% to 5%.

Central Excise Duty

Food Products

- Nil excise duty in milk, milk products, vegetables, nuts & fruits- both fresh and dried.
- Against a standard excise duty of 12%, processed fruits and vegetables carries a merit rate of 2% without CENVAT or 6% with CENVAT.
- Soya milk drinks, flavoured milk of animal origin also carry a duty of 2% without CENVAT or 6% with CENVAT.
- Excise duty on waters including mineral waters and aerated waters, containing added sugar or other sweetening matter or flavored has been changed from 18% to 21% in budget 2016-17.

Food Processing Machinery

- Excise duty on machinery for the preparation of meat, poultry, fruits, nuts or vegetables and on presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices or similar beverages and on packing machinery is reduced from 10% to 6% in budget 2014-15.
- All refrigeration machinery and parts used for the installation of cold storage, cold room or refrigerated vehicles for the preservation, storage, transport or processing of agricultural, apiary, horticultural and marine produce as well as dairy and poultry, are exempt from excise duty.
- Excise Duty on machinery including refrigerated containers has been reduced from 12.5% to 6%. (In the Budget 2016-17).
- Nil excise duty on capital goods and spares thereof, raw materials, parts & material handling equipment for cargo vessel of various kinds including refrigerator vessels for the transport of meat, fruit or the like. Whale catchers.
- Nil excise duty on trawlers and other fishing vessels.

Investment Opportunities

- Fruits and vegetables: preserved, candied, glazed and crystallised fruits and vegetables, juices, jams, jellies, purees, soups, powders, dehydrated vegetables, flakes, shreds and ready-to-eat curries.
- Food preservation by fermentation: wine, beer, vinegar, yeast preparation, alcoholic beverages.
- Beverages: fruit-based, cereal-based.
- Dairy: liquid milk, curd, flavoured yoghurt, processed cheese, cottage cheese, swiss cheese, blue cheese, ice cream, milk-based sweets.
- Food additives and nutraceuticals.
- Confectionery and bakery: cookies and crackers, biscuits, breads, cakes and frozen dough.
- Meat and poultry: eggs, egg powder, cut meats, sausages and other value added products.
- Fish, seafood and fish processing – processing and freezing units.
- Grain processing – oil milling sector, rice, pulse milling and flour milling sectors.
- Food preservation and packaging: metal cans, aseptic packs.
- Food processing equipment: canning, dairy and food processing, specialty processing, packaging, frozen food/ refrigeration and thermo-processing.
- Consumer food: packaged food, aerated soft drinks and packaged drinking water.
- Spice pastes.
- Supply chain infrastructure – this niche has investment potential in food processing infrastructure, the government's main focus is on supply chain related infrastructure like cold storage, abattoirs and food parks.
- The establishment of food parks – a unique opportunity for entrepreneurs, including foreign investors to enter in the Indian food processing sector. ■

Source
Make in India

Extech 45170CM: 5-in-1 Environmental Meter

The 45170CM is a convenient 5-in-1 Environmental Meter which measures Air Velocity, Air Volume, Humidity, Temperature and Light. Ergonomic housing design with a large dual "smart" LCD where characters on display reverse direction depending on the function in use.

This multi-functional meter is ideal for professional or home use in testing the environmental quality in a building. Featuring Data Hold, Min/Max, Auto Power Off functions. Complete with built-in sensors, wrist strap and 9V battery.

- Low friction vane wheel improves accuracy of Air Velocity and Air Flow measurements
- Utilizes precision photo diode and color correction filter for light measurements
- Thin-film capacitance humidity sensor for fast response
- Thermistor measures ambient Temperature

Type K input allows to measure temperature up to 2372°F (1300°C). Type K thermocouple probe sold separately ■

Email: www. flirindia@flir.com.hk

Kelvion Adds Condensers Line for Refrigeration Industry

'Taking Heat Off Around The World' is more than slogan for Kelvion, it is its passion. Since 1920, Kelvion has been experienced partner designing smart solutions for efficient heat transfer in refrigeration with outstanding reliability, availability, and an unyielding pursuit to reduce your operating costs.

The company is now taking this one step further by installing this new dedicated production line in United States' headquarters and manufacturing facility in Catoosa, thereby, making it faster to receive products for the plant. "Although this is a new production line in the US, the air cooled condensers have actually been produced for many years in England by our sister company,

Kelvion Ltd. We are proud to bring their expertise and product development to the US," said Jacob Wolfe, Executive Director for Business Development in the US. "This additional production line will complement our existing range of gasketed and brazed heat exchangers currently being manufactured in the US for all industries," continued Wolfe.

The Kelvion Air Cooled Condenser is a tried and true product and is available now in standard and custom flatbed and in the near future V-Bank designs. The flatbed design can be up to 39' long with a duty range of 5 - 240 tons. Kelvion Air Cooled Condensers are UL listed for the US and Canada and are compatible with CO2, R448A, R449A, and R410A refrigerants.

The full line of Kelvion refrigeration heat exchangers is expertly suited for the following markets:

- Agricultural Greenhouses
- Data Centers
- Display Cases & Counters
- Distribution Centers
- Supermarkets
- Fruit/Vegetable Storage
- Food Processing ■

Website: www.kelvion.com

Optimized Heat Pumps for Heating

The new i-NRG heat pump provides exactly the energy required by the system, perfectly following the real load of the building, thanks to the modulation of the DC inverter fan. One single unit for the highest efficiency, sustainability and huge savings, thanks, to the advantages of DC frequency driven fans and circulating pumps (inverter) for both plant and domestic hot water circuits. i-NRG is the new generation heat pump for all year round operation in any operating mode: single cycle (air conditioning, heating, domestic hot water) as well as combined cycle in total heat recovery (domestic hot water together with cooling). Domestic hot water production is guaranteed by the dedicated exchanger for heat recovery: total, for free domestic hot water production, or partial. Domestic hot water is stored in a properly dimensioned storage tank. The unit can be installed indoor or outdoor. Extended operating limits for all year, especially, in heating: -Maximum flow temperature 60°C -Maximum external air temperature 45°C -Minimum external air temperature -15°C. Structure and base in hot-dip galvanised steel with epoxy powder paint finish. High efficiency and low pressure drop stainless steel AISI 316 plate exchangers . It is positioned next after the compressor.

Website: www.climaveneta.com

Forthcoming Events At A Glance

India Cold Chain Show 2017
Venue: Bombay Exhibition Centre, Goregaon, Mumbai
Date: 12th to 14th December 2017
Website: www.indiacoldchainshow.com

2018 AHR Expo
Venue: Chicago
Date: 22nd to 24th January 2018
Website: ashrae.org/AHRExpo2018

ACREX 2018
Venue: BIEC, Bengaluru
Date: 22nd to 24th February 2018
Website: www.acrex.in

FoodTech Pune 2018
Venue: Pune
Date: 23rd to 25th February 2018
Website: http://foodtechpune.com

Global Logistics show
Venue: Bombay Exhibition Centre, Mumbai
Date: 22nd to 24th February 2018
Website: http://globallogisticsshow.com

Indoor Air 2018
Venue: The Pennsylvania Convention Center, Philadelphia
Date: 22nd to 27th July 2018
Website: http://mms.isiaq.org

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TERI with State Govt to develop Smart City Amravati

A Memorandum of Understanding (MoU) was signed between the Capital Region Development Authority of Andhra Pradesh (APCRDA), State Energy Efficiency Development Corporation of Andhra Pradesh (APSEEDCO) and The Energy and Resources Institute (TERI) for implementation of Green Buildings and Sustainable Habitat at the upcoming new capital township of Amaravati. The MoU was signed by Dr Sreedhar Cherukuri, Commissioner, APCRDA, A Chandra Sekhara Reddy, APSEEDCO and Dr Ajay Mathur, Director General, TERI in the presence of N Chandrababu Naidu, Chief Minister of Andhra Pradesh. Amaravati, the People's capital of Andhra Pradesh, is envisioned to be a city of world-class standards with a vision of increasing Andhra Pradesh's prominence in the world. The new capital township aims to provide cutting edge, sustainable & smart urban infrastructure, comfortable livelihood and immense

prosperity for the people of Amaravati. TERI shall support APCRDA in design of upcoming new buildings and infrastructure at Amaravati as green buildings and sustainable habitats. In addition, TERI will also provide technical assistance to APCRDA in all aspects of sustainable urban and infrastructure development and act as a sustainability partner. ■

Raisina Hills Gets Makeover with LED Lights

The three iconic buildings - are soon to get a permanent makeover. Three National importance buildings Rashtrapati Bhawan, North Block and South Block - located at Raisina Hills have been adorned with dynamic - LED lights. The colour of these lights will keep changing every few seconds, making it a visual treat. Taking a cue from the Prime Minister's Bijli Bachao Abhiyaan, the lighting has been done with energy saver LED. It has indeed made these heritage buildings more appealing both to the residents of Delhi and to the tourists who visit the capital.

The Ministry of Urban Affairs and the Central Public Works Department (CPWD) worked on this project for almost a year now. One-time capital expenditure in the entire project would come up to over Rs 30 crore. The lights have started functioning at the Prime Minister's Office and the South Block. However, work

is still in progress in the North block, which houses Ministry of Home Affairs and Ministry of Finance and Rashtrapati Bhavan. ■

Singapore's Ministry of Finance Recognized for Energy-Efficiency Practices

THE Ministry of Finance (MOF) has appreciated for Best Energy Efficiency Practices in the public sector in the large-building category for The Treasury building, which houses several ministries and departments of the government. This award category recognises outstanding public-sector agencies that have demonstrated exemplary commitment in adopting good energy-efficiency practices and have been proactive in implementing energy-efficiency improvements for their buildings.

MoF was the first ministry to adopt the Guaranteed Energy Savings Performance (GESP) contracting model for its chiller retrofit in 2010. It has so far implemented two GESP projects and has also demonstrated efforts in educating and raising the awareness of its tenants. This includes designing its own posters and participating in Earth Hour. Its efforts and tenant participation in its energy-savings programmes has resulted in a 28 per cent reduction in The Treasury's electricity consumption since 2002. Following the implementation of the second GESP this year, The Treasury can potentially reduce its electricity consumption by another 7 per cent. Wong Siew Fong, head (Admin, Security & Preparedness) at MOF says that there are various ways to improve energy efficiency such as using energy-efficient equipment (air-conditioning system, lighting, etc) and reducing energy wastage. The facilities team has implemented many initiatives through the years, including adopting measures under the Public Sector Taking the Lead in Environmental Sustainability initiative which fulfilled the resource-management plans. ■

The New Generation of Butterfly Valves and Actuators

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Charkop Kandivali West, Mumbai 400067, India
Tel: +91 22 4025 4800 E-mail: info.india@belimo.ch
www.belimo.com
Regional offices: Bengaluru, Chennai, Delhi & Kolkata

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