

Global Partnership for Improving the Food Cold Chain in the Philippines

Activity	CCI Hub Technology Training Week																																						
Date/Time	September 6-8, 2022																																						
Venue	Cold Chain Innovation (CCI) Hub, TESDA Central Office, Taguig City																																						
Participants	Total attendees for the 6 sessions – 215 Average per session – 36 Percentage of women attendees – 17.7% Online participants – average per session – 50																																						
Topic/Agenda	Highlights																																						
Welcome remark and acknowledgement of participants	<ul style="list-style-type: none"> Mr. Rizal Bautista, TESDA Regional Director (PASMAK), welcomed the participants in the venue 																																						
Program overview	<ul style="list-style-type: none"> An overview of the sessions was explained by shecco Head of Global Partnerships Mr. Jan Dusek 																																						
Panasonic-Hussman R290 commercial refrigeration	<ul style="list-style-type: none"> Mr. Gregory Malcolm and Mr. Nelson Marques from Panasonic & Hussmann presented CO2 transcritical for food retail Panasonic's acquisition of Hussman provides their clients with more options, back of house equipment including commercial refrigeration and transcritical CO2 condensing units, digital solutions and a more comprehensive range of products Their portfolio includes display cabinets, convenience, cool rooms, food services, digital innovations and systems They presented several examples of their installations which includes low temperature families, multideck cases, delicatessen families and premium series They presented the following comparison of refrigerants used in commercial retail <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Refrigerant</th> <th style="text-align: center;">R134a</th> <th style="text-align: center;">R404A</th> <th style="text-align: center;">NH3</th> <th style="text-align: center;">CO2</th> </tr> </thead> <tbody> <tr> <td>Natural Substance</td> <td style="text-align: center;">NO</td> <td style="text-align: center;">NO</td> <td style="text-align: center;">YES</td> <td style="text-align: center;">YES</td> </tr> <tr> <td>Ozone Depletion Potential (ODP)</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Global Warming Potential (GWP)</td> <td style="text-align: center;">1430</td> <td style="text-align: center;">3920</td> <td style="text-align: center;">-</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Critical point Bar[psi] °C</td> <td style="text-align: center;">40.7 [590] 101.2</td> <td style="text-align: center;">37.3 [541] 72</td> <td style="text-align: center;">113 [1640] 132.4</td> <td style="text-align: center;">73.6 [1067] 31.1</td> </tr> <tr> <td>Triple point Bar[psi] °C</td> <td style="text-align: center;">0.004 [0.06] -103</td> <td style="text-align: center;">0.028 [0.41] - 100</td> <td style="text-align: center;">0.06 [0.87] -77.7</td> <td style="text-align: center;">5.18 [75.1] -56.6</td> </tr> <tr> <td>Flammable or explosive</td> <td style="text-align: center;">NO</td> <td style="text-align: center;">NO</td> <td style="text-align: center;">YES</td> <td style="text-align: center;">NO</td> </tr> </tbody> </table>				Refrigerant	R134a	R404A	NH3	CO2	Natural Substance	NO	NO	YES	YES	Ozone Depletion Potential (ODP)	0	0	0	0	Global Warming Potential (GWP)	1430	3920	-	1	Critical point Bar[psi] °C	40.7 [590] 101.2	37.3 [541] 72	113 [1640] 132.4	73.6 [1067] 31.1	Triple point Bar[psi] °C	0.004 [0.06] -103	0.028 [0.41] - 100	0.06 [0.87] -77.7	5.18 [75.1] -56.6	Flammable or explosive	NO	NO	YES	NO
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	Toxic	NO	NO	YES	NO
	<ul style="list-style-type: none"> • Hussman-Panasonic's contribution to the CCI hub includes the model type MJPE216-4M-3C2U, an open type cabinet using CO2 and a transcritical CO2 condensing unit • The speakers also discussed their quality management 				
Q&A	<ul style="list-style-type: none"> • A participant asked if the equipment and its parts are available locally • Mr. Marques answered that presently the parts are not yet available locally. The solution for this will not depend on one company alone because collective action from the industry is needed to make it marketable and available. It will entail a supply chain approach and support from the government and other organizations such as UNIDO is needed for this to happen. 				
Nihon Netsugen – CO2	<ul style="list-style-type: none"> • Hiroaki Kuroishi and Akiro Nabeshima from Nihon Netsugen discussed Transcritical CO2 for cold storage and food processing • Mr. Nabeshima provided an overview of the company and how they developed the technology • A table was presented providing information on the ODP, GWP, toxicity, flammability and other concerns of commonly used HCFC, HFC and HFO refrigerants in comparison with CO2 • CO2 refrigeration cycle was explained in comparison with the conventional refrigeration cycle. Critical point was also explained as “the upper temperature and pressure limits at which phase transitions between gas and liquid phases can occur.” • The resource speaker discussed their product line and how the units are made. He also added the advantages of CO2 which includes zero Ozone Depleting Potential, Global Warming Potential of 1, No smell, No toxic, No Flammable, Easy handling and CO2 content is only 80kg. in terms of compressor and control, Low and high stage independent compressor, all its compressors are controlled by frequency converter, each compressor controlled by climate or cooling load and it realizes the most energy efficient operation. In terms of the CO2 liquid tank, the cooled liquid CO2 stored in the tank, buffer tank for sudden load fluctuation or climate change and has small effect from hot temperature • The speaker also presented a case study which has shown that the CO2 unit gave 24% energy savings compared to R22 unit. 				
Q&A	<ul style="list-style-type: none"> • One participant inquired about the maintenance interval of the equipment • Mr. Kuroishi replied that it would take once or twice a year depending on the installation • Another participant inquired about the refrigeration cycle • Mr. Nabeshima replied that compared with normal refrigerant, the substance goes inside the gas cooler to the compressor, then evaporator, then expansion valve. He then shows a slide in his presentation stating that the critical point of a pure substance is the upper pressure limits at which phase transitions between phases can occur. The critical point of CO2 refrigerants is at 31.1 degrees or 				

	<p>7.38 MPa (a). When ambient temperature reaches around 30 degrees, it cannot be turned liquid.</p>
Guntner - Evaporator	<ul style="list-style-type: none"> • Mr. Han Piao Ngo from Guntner gave an overview of the company and their product line • He presented basic heat exchange principles in relation to their product line. He also explained key parameters to select the evaporator such as dimension, fin spacing, power supply and sound of the fan. Motor technology, defrosting and accessories • He explained common issues on the evaporator which include: moisture, defrost cycle, fin spacing, aircooler location, ensure good air flow, space and heater replacement, fan ring heater and thermal product
Q&A	<ul style="list-style-type: none"> • In the cold storage space in Manila, ammonia is the most common. Moving from ammonia evaporators to CO2 transcritical, with the same capacity, is the system lighter compared to others? • For ammonia substitutes, our system is smaller and more compact.
AHT	<ul style="list-style-type: none"> • AHT's Ms. Sumitra Eksithichai gave an overview of the company and its operations worldwide. She also discussed the benefits of their units which include very low refrigerant charge in the system, industrially manufactured multi-decks and extremely low leakage rate demonstrating high product quality • Vento waterloop system's Heat Emission will be released through the condenser on top of the Vento Air. There is no other installation except the drainage connected to the store main drain. If more units is used, increase of air conditioning capacity is a must. • The speaker presented case studies of their products worldwide.
Q&A	<ul style="list-style-type: none"> • One participant asked how the R290 system is decommissioned • Ms. Eksithichai answered that releasing the R290 refrigerant in the atmosphere is only one percent which is very low compared to conventional ones
Guntner presented its BaseSys Heat Converter Unit	<ul style="list-style-type: none"> • Mr. HanPiao Ngo from Guntner presented its BaseSys Heat Converter Unit • He explained that Simple plug-and-play solution Easy system and setup of devices • Every unit with its own control, plant availability, optimal working point, flexibility after setup, easy to add or replace cooling devices, lower service know-how and costs, small amount of refrigerant, separate refrigeration circuits in each single cooling device, IEC approved A3 and A2L limit to 500g, less leakage problems, low-pressure brine or water circuit, refrigerant only in cooling devices, refrigeration with Propane (R290), 100% green and efficient cooling devices, filled and tested in factory and plug-and-play system • He also explained that parameters for selecting dry cooler include H/X capacity, pump capacity, site condition, noise, power consumption and footprint. His presentation added that The combination of EC fans with GMM creates an intelligent heat exchanger system for an energetically optimized operation and additionally, efficient maintenance and servicing. • He also discussed that Guntner motor management include large display, parameter up/download, intuitive usage, easy update,

	<p>industrial ethernet, control up to 5 circuits and operational reliability function.</p>
Q&A	<ul style="list-style-type: none"> • We know that R290's performance is very good but how about the investment side? • Mr. Ngo expressed that business decisions on such investments should be based whether the company decides to move in the right direction because these technologies will surely take over business in the future and opportunities to invest on these early on to maximize savings
Cold Front - Commercial refrigeration installation and operation at Royal Duty-Free-Subic	<ul style="list-style-type: none"> • Mr. Emilio Gonzalez La'ο and Mr. Jaypee Cabañas of Cold Front presented its case study on the R290 waterloop system in Royal Duty Free. Royal Duty Free is located in Rizal Hi-way, Subic Bay Freeport Zone, Zambales. He said that before the R290 installation, Royal Duty Free had eight (8) plug in units, three (3) upright chillers, two (2) glassdoor freezers and seven (7) serve-over chillers. The plug-in units used R404A. The rehabilitation of the refrigeration system started in 2019. • Currently, there are six (6) plug-in chillers, two (2) upright chillers, one (1) glassdoor freezer, three (3) serve over chillers for cheese and four (4) serve-over chillers for meat. • The R290 waterloop system has the following components: expansion valve, evaporator, compressor, pump, dry cooler and heat exchanger. The waterloop system is centralized and connected to each R290 system. Water glycol acts as condensing medium of the system. • R290 Waterloop Project installation equipment include: one set 3 Fans Outdoor Dry Cooler; one set twin Pump; eight units Upright Chillers; one Unit Glass Door Freezer; seven Units Serve Over Chillers. He added that pumps are inverter type for energy efficiency. • Royal Duty Free has a total sales area of 1,600 sqm. The chilled/frozen goods selling area is around 782 sqm. and the cold storage area is 624 sqm. • The electrical plan of the store was updated when the system was installed. R290 requires a good electrical system. Hangers and stainless pipes were installed for the R290 system. The pump and drycooler were installed outdoors. Air pressure, pumps and dry cooler were tested before installation. The R290 compressor was installed on a remote waterloop showcase. • Each compressor circuit use 150 g of R290. • Charging of R290 Freon – Proper handling of refrigerant includes: ensuring good room ventilation at floor level; using only grounded apparatus; taking measures against electrostatic charge; keeping vessels away from electric devices; using safety clothing; do not add anything to the refrigeration system except a flushing agent, Nitrogen, R290 and Refrigerant Oil.
Q&A	<ul style="list-style-type: none"> • Were technicians who installed the system certified by TESDA? • Mr. La'ο said yes

	<ul style="list-style-type: none"> • Mr. Azucena added that a training regulation will be rolled out by TESDA soon • One participant asked what are the installation requirements • Mr. La'o said that it includes water and glycol, among others
Day 2	
Welcome remarks	<ul style="list-style-type: none"> • Mr. Edward M. Dela Rosa, Chief TESD Specialist of TESDA's Technology Research and Development Division also welcomed and acknowledged all the speakers and participants.
Panasonic-Hussman R290 commercial refrigeration	<ul style="list-style-type: none"> • Mr. Gregory Malcolm and Mr. Nelson Marques from Panasonic & Hussmann presented CO2 transcritical for food retail (same with the previous day's presentation).
Nihon Netsugen – CO2	<ul style="list-style-type: none"> • Hiroaki Kurishz and Akiro Nabeshima from Nihon Netsugen discussed Transcritical CO2 for cold storage and food processing (same with the previous day's presentation).
GNQ/JCI' - Energy Efficiency Solutions for ammonia refrigeration systems	<ul style="list-style-type: none"> • GNQ/JCI' Jayson Mercado on Energy Efficiency Solutions for ammonia refrigeration systems. He gave an overview of the company and their mission. • The speaker explained that a refrigeration system efficiency decreases over time which leads to an increase in energy consumption. elements that affect the performance of refrigeration plants include water and non-condensable gases such as air, nitrogen, hydrogen and hydrocarbons. Water is the most damaging element in refrigeration. • Water can enter refrigeration plants during construction and start up phase, during normal operations and during equipment servicing. Water can get into an ammonia refrigerating system through leaking valves, piping joints, safety relief valves, pump and booster compressor seals, evaporators, inadequate evacuation, pressure test and ammonia tank • To avoid this, the Water, Dirt and Oil (WDO) Purifier for ammonia refrigeration system may be used. It cleans oil and removes dirt and water from the system which makes needed oil changes fewer.
Single screw ammonia compressors design and operation presented - American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)	<ul style="list-style-type: none"> • Arnold Caabay of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) started his presentation by explaining that compressors used for industrial, commercial and domestic application consume approximately 17% of the world's electrical output. Screw compressors are generally preferred where power requirements are high and capacities are relatively large. He also explained its features, history, design and operation, as well as its application on industrial heat pumps.
Ammonia safety lecture for industrial refrigeration - Kilojoules Consultants International	<ul style="list-style-type: none"> • Mr. Cesar Lim of Kilojoules Consultants International presented an ammonia safety lecture for industrial refrigeration. He started by explaining that ammonia Refrigerant (R-717) is the Most Energy Efficient Refrigerant available in the Market Since the 1800's, R-717 is Green Refrigerant with an ODP and GWP of Zero, Ammonia Refrigerant is Cheap Compared to Halocarbon and Hydrocarbon Refrigerants. • He also explained that Fabrication of Ammonia Pressure Vessel and Installation Welding Procedure is the key to Ammonia Safety.

	<p>Vessel should be design using ASME Unfired Pressure Vessel Code and manufactured using the Automatic Submerged Arc Welding. Pipes, Fittings, and Valves should Bevel Welded with 1st Pass using GTAW (TIG) Welding and Subsequent Pass using SMAW with 7018 Welding Rods.</p> <ul style="list-style-type: none"> • He also explained emergency response in operations involving ammonia.
	<p>Day 3</p>
<p>Conditioned Transport with Natural Refrigerants</p>	<ul style="list-style-type: none"> • Cold Front's Emilio Gonzalez La'o explained that this unit naturally cools, heats better, more sustainable and more efficient. It is a compact unit with the lowest amount of refrigerant (<140g) in a hermetically sealed refrigeration circuit. It is modular and scalable. Ecos is installed on the roof once or on the wall of an electric vehicle connected directly to the traction battery. • He also presented how the unit was made.
<p>Nexty - cold chain monitoring system</p>	<ul style="list-style-type: none"> • Nexty's Ramesh Gangahanumaiah presented their cold chain monitoring system. He started his presentation by discussing that the lack of a functioning cold chain causes considerable food loss - up to almost 20% throughout the world, according to the International Institute of Refrigeration. Meat, poultry, dairy products, seafood, agricultural produce, various chemicals and pharmaceuticals, flowers, and many other daily consumed goods require temperature monitoring during transportation to ensure that they are delivered to end-users in usable condition. • To solve the challenges , we use the SPECIAL category GPS tracker with integrated CAN Bus data reading processor and EYE Sensor (BLE based) with smart features and extensive functionality set including ID signal transmission, temperature, humidity, and internal battery level tracking. • He then presented their company overview, mission and product line which include tools and equipment used for automotive, industrial, consumer, communication and computing.
<p>Hydrocarbon solutions for food retail - Epta</p>	<ul style="list-style-type: none"> • Epta's Jeno Palencia presented hydrocarbon solutions for food retail. Epta is a Large Industrial Group specialized in commercial refrigeration solutions for Retail, Food & Beverage and Hospitality, present in 5 continents. It is an independent global player, fully focused on commercial refrigeration, a key partner for designing, producing and selling sustainable cold technologies of the future. • Their hydrocarbon for commercial retail benefits include: hydrocarbon has zero (0) ODP (Ozone Depletion Potential) and almost zero (0) GWP (Global Warming Potential) – HC does not harm the Ozone layer and has a positive climate impact; hydrocarbons have equal or better heat transfer performance and lower pressure drop compared to its predecessors – Definitely a much better alternative; hydrocarbons has a better combination with mineral oils both in the liquid and vapor forms- this can help avoid the use of synthetic oils; hydrocarbons are substantially less expensive than other HFC's: production and raw material sourcing; a refrigeration system designed for hydrocarbons will need 50-60% less refrigerant by mass when charged with hydrocarbons. This is

	<p>one of the best ways in sustaining a longer use of your equipment; because of the lower pressure levels, Hydrocarbon compressors run more quietly than comparable R134a units; the energy efficiency of hydrocarbon units is claimed to be up to 30-40% better than comparable HFC units which means lower electricity consumptions.</p>
<p>Solar PV Powered Freezer</p>	<ul style="list-style-type: none"> • TESDA's Gary Taroy presented the R600a solar freezer. He started his presentation by discussing a brief history of solar energy and solar photovoltaic applications • He explained how a solar PV system works in terms of off-grid, grid-connected and hybrid set up • Main components of a solar pv system include solar module, charge controller, battery circuit protection and conductors. He discussed how these parts work • He also discussed a calculation of solar pv simple return of investment

PHOTO DOCUMENTATION









TECHNOLOGY WEEK

6-8 SEPTEMBER 2022
CCI-HUB BUILDING
TESDA TAGUIG

OPENING
CEREMONY:
6TH SEPT
8-8.30AM

- PRAYER & NATIONAL ANTHEM
- WELCOME REMARKS: DIR. FLORENCIO SUNICO, JR
- MESSAGE FROM SHECCO: MR. JAN DUSEK
- MESSAGE FROM TESDA: DIR. DAVID BUNGALLON

SESSION 1:
6TH SEPT
9-12PM
CO2 TC

- CO2 TC FOR FOOD RETAIL - PANASONIC & HUSSMANN
- CO2 TC FOR COLD STORAGE AND FOOD PROCESSING - NIHON NETSUGEN
- CO2 EVAPORATOR, KEY FEATURES (EFFICIENCY, INSTALLATION, MAINTENANCE), CASE STUDY - GÜNTNER

SESSION 2:
6TH SEPT
1-4PM
HC

- R290 WATERLOOP SYSTEM FOR FOOD RETAIL - COLDFRONT / AHT
- BASESYS HEAT CONVERTER UNIT, KEY FEATURES (EFFICIENCY, INSTALLATION, MAINTENANCE), CASE STUDY - GÜNTNER
- HC SOLUTIONS FOR FOOD RETAIL - EPTA
- HC SOLUTIONS FOR LIGHT COMMERCIAL REFRIGERATION (TBC) - EMBRACO

SESSION 3:
7TH SEPT
9-12PM
CO2 TC

- CO2 TC FOR FOOD RETAIL - PANASONIC AND HUSSMANN
- CO2 TC FOR COLD STORAGE AND FOOD PROCESSING - NIHON NETSUGEN

SESSION 4:
7TH SEPT
1-4PM
NH3

- ENERGY EFFICIENCY SOLUTIONS FOR AMMONIA REFRIGERATION SYSTEMS - GNQ / JCI
- SINGLE SCREW AMMONIA COMPRESSOR - ASHRAE
- INDUSTRIAL REFRIGERATION AMMONIA SAFETY - KILOJOULES CONSULTANT

SESSION 5:
8TH SEPT
9-12PM
TRANSPORT

- R290 REF TRUCK - COLDFRONT
- COLD CHAIN MONITORING SYSTEM - NEXTY
- NATURALINE - CARRIER TRANSICOLD & CCI-HUB

SESSION 6:
8TH SEPT
1-4PM
HC

- HC SOLUTIONS FOR FOOD RETAIL (TBC) - EPTA
- R600A SOLAR FREEZER - VESTFROST & CCI-HUB
- HC SOLUTIONS FOR LIGHT COMMERCIAL REFRIGERATION (TBC) - EMBRACO

