REFRIGERATION TECHNOLOGY COMMITTEE
FOR
COMFORT, PROCESS AND COLD-CHAIN
(REF-CPCC)
2023 WINTER MEETING
MINUTES & NOTES
Release 1

MEMBERS PRESENT:
Dustin Lilya, *Chair – Flight Delayed arrival.*
Steve Kujak, *Vice-Chair – Acting Chair*
Didier Coulomb
Roberto Aguilo
Nicole Dunbar
Kashif Nawaz
Roddam Anish Simha
Harshal Arvind Surange
Apichit Lumlertpongpana
Douglas C. Scott
Xudong Wang
Wade Conlan – BOD ExO

MEMBERS NOT PRESENT:
Wade Conlon, *BOD Ex-O – Double booked w/other ASHRAE meetings.*

Sarah Maston *Coord. Officer – Double booked w/ other ASHRAE meetings*

Ayman Eltalouny

GUESTS PRESENT:
Jeff Warther – Chemours
Petros Dalavouras – General Refrigeration
Mike Saunders – Emerson
Rohit Dhumane – Trane
Michael Petersen – Trane
Brian Fricke – ORNL
Morgan Herried Leehev -Trane
Yirong Jiang – Thermo King
Martin Dieryckx – Daikin Europe
Shitong Zha – Heatcraft
Charles Hon – True Mfg.
Jim Curvin – UNEP
Steve Comstock – UNEP
Adnan Ayub – Isotherm

ASHRAE STAFF:
Mike Vaughn, MORTS

RECOMMENDATIONS FOR TECH COUNCIL APPROVAL: NONE

INFORMATION ITEMS:

1. Chair Lilya reviewed his new MBOs with the full committee. One of the challenges for this committee will be finding suitable meeting times for fall and spring web meetings since the 12 committee voting members span 9 time zones and only two face-to-face meetings are held at Society meetings each year.

2. REF-CPCC also discussed the current subcommittee structure below and possible ways to refresh and encourage new and continued participation as more members learn about the following new subcommittees for REF-CPCC:

   Current REF-CPCC Subcommittee Structure
   1. **Program** - Chair: Kashif Nawaz – Members: Coulomb, Kazachki, Ravi, Miyara,
   2. **Research** – Chair: Kashif Nawaz – Members: Ayub, Chakroun, Xudong Wang
   3. **HVAC** – Chair: Steve Kujak – Members: Hourahan, Abdelaziz, Nicky Dunbar

4. **Cold Chain** – Chair: Harshal Surange – Members: Ayub, Saunders, Hon, Scott, Olama, and Gallaher, Roberto Aguilo
5. **R in ASHRAE** – Chair: Didier Coulomb – Members: Rajan, Selbert, Walter, and Ayub
6. **Refrigeration Bi-Annual Technology Report** – Chair: Dustin Lilya – Members: Eltalouny, Rajendran, Welter, Kazachki, Zha, Ayub, and Olama
7. **Award Subcs** – Chair: Apichit Lumkertpongpana – Members: Charlie Hon, Nicole,Dunbar, Roberto Aguilo

The committee also discussed potentially collapsing or merging some of the Subcommittees in order to better support new initiatives such as Decarbonization and a possible new position document on Sustainable Cold Chain given our limited pool of volunteers to carry out this work. Ref-CPCC also plans to request that the ASHRAE Board consider adding two additional members to the REF-CPCC roster for SY 23-24, which would bring total membership to 14.

ALL subcommittee Chairs will be asked to each finalize their scope statement and identify one or two objectives that they wish to accomplish this Society Year or next using the forms in **ATTACHMENT #1**.

The committee also discussed changing up some of the subcommittee leadership in order in order to allow for new ideas and approaches to develop and outreach efforts to TCs for potential new Subcommittee members. One suggestion was to reach out to CTTC (Chapter Technology Transfer Committee for potential new members or ideas from them on how to better engage with Chapters on the topic of Refrigeration.

Lastly, we plan to share these completed forms for each subcommittee with the REF-CPCC Interested Parties list and with the Section 10 and Section 8 TCs to see if we can recruit additional members from outside REF-CPCC to serve on these new subcommittees as volunteers. In order to make participation easy and inclusive, ALL REF-CPCC subcommittees will meet via web meetings only and all subcommittee members will have a vote at the subcommittee level. Subcommittee Chairs will then report in person to REF-CPCC on subcommittee activities at Society meetings.

It is expected that this new subcommittee structure will also make it easier to identify and recruit Board elected members for REF-CPCC by creating a large pool of interested volunteers that vote and work at the subcommittee level only, but don't receive transportation reimbursement from ASHRAE since all REF-CPCC subcommittees meetings will be held via web meetings.

One of the challenges for the REF-CPCC committee is that membership spans 9 time zones.

See **ATTACHMENT #1** for further information on each Subcommittee.

REF – CPCC Winter 2023 Action Items

Action Item #	Assigned to	Action Item Task
1	**Lilya**	Request that two new permanent voting members be added to the REF-CPCC roster
2	**All Subc. Chairs**	Work to update and expand your Subcommittee roster between now and Spring meeting in March. Work with staff to reach out to Section 8 and Section 10 TCs for volunteers
3	**Lilya**	Combine Research and Program Subcommittee into one new Subc.
4	**Volunteer?**	How can we start a new Position Document (PD) on sustainable Cold Chain? Next conference on Food Fraud and supply chain management is in Istanbul Turkey on Feb 15, 2023. Responsible use of refrigerants is good example PD. Are any REF-CPCC members planning to attend this conference and can report back to REF-CPPC on conference call at ASHRAE our spring meeting ?
5	**Staff**	Update Liaison list & Roles of Committee Liaisons – revise list as needed
6	**Staff**	Send Bi-Annual Refrigeration Technology report to all REF-CPCC members for review, feedback, and possible suggestions for improvement.
7	**Lilya**	Send Ref-CPCC REF Manual to all meeting attendees and request feedback and suggestions and provide to Dustin feedback on how to improve the Manual in early November
8	**All Subc. Chairs**	Have at least one Subc. Meeting Between each REF-CPCC face to face meeting to better track work of Subc.
9	**All Subc. Chairs**	Try to have Subcommittee rosters updated before Feb Ref-CPCC meeting in Atlanta.
10	**R in ASHRAE Subc**	Merge R in ASHRAE Subc. w/ Cold Chain Subc. Or provide better definition of what we want the R in ASHRAE to do. List tasks and duties of two Subcs. Vote on possibly merging the two Subcommittees into one Subcommittee at February meeting
11	**Staff**	Staff will be assigned the responsibility of keeping the R-in-ASHRAE web page up to date.
12	**Dustin**	Dustin will reach out to all Subc. Chairs on how to get meetings scheduled with help from staff.
13	**Harshal**	Rep to GCCA also working to update the MOU between ASHRAE and GCCA
14	**Anish Simha**	Involved with World Refrigeration Day. He also wants to join the Cold Chain Subc.
15	**Kashif**	Volunteered to chair the new combined Program and Research Subc.

ATTACHMENT 1

Refrigeration Technology Committee for Comfort, Process and Cold-Chain (REF-CPCC)

Subcommittee Rosters & Descriptions

Refrigeration Technology Committee for Comfort, Process, and Cold Chain (REF-CPCC)

Program Subcommittee			
Draft Scope:	REF-CPCC **Program Subcommittee** will develop technical programs of various types (Technical Paper Sessions, Conference Paper Sessions, Seminars, Debates, Forums, Panels, and workshops) for the REF-CPCC committee that can be presented at Society meetings or at other organizations conferences. The subcommittee will also work with other Society committees and other organizations to co-sponsor programs that jointly benefit both committees or organizations.		
Chair:	**Kashif Nawaz –– PH: 865-241-0972**		
SY 22-23 Objectives:			
Objective #1	**Develop Winter and Annual Programs. Work with World Refrigeration Day partners to develop an international webinar to celebrate World Refrigeration Day, which is celebrated each year on June 26.**		
Objective #2	**Obtain a list of TC Program Subc. Chairs for TCs with an interest in comfort, process, and cold-chain and initiate a working group where TCs in this group can coordinate, share, and co-sponsor each other's programs.**		
Subc. Members:			
Name	**Email**	**Phone Number**	**Affiliation**
Kashif Nawaz	nawazk@ornl.gov	(217) 377-1528	**ORNL**
Didier Coulomb	d.coulomb@iifiir.org	33142273235	**IIFIIR**
Dr. Georgi Kazachki	kazachki@comcast.net	(937)203-9226	**Cryotherm**
Gurunarayana Ravi	gurunarayana.ravi@lennoxind.com	(281)907-2901	**Lennox Intl.**
Prof. Akio Miyara	miyara@me.saga-u.ac.jp	81952288623	**Saga Univ.**
Prof. Yunho Hwang	yhhwang@umd.edu	(301) 405-5247	**U. Maryland**

Refrigeration Technology Committee for Comfort, Process, and Cold Chain (REF-CPCC)

Research Subcommittee			
Scope:	REF-CPCC **Research Subcommittee** will develop research projects for bid that support and advance the scope of REF-CPCC (via RTARs, WS, TRPs, and RPs) The subcommittee will also work with other Society committees and outside organizations to co-sponsor research projects that jointly benefit both committees and organizations.		
Chair:	**Kashif Nawaz –- PH: 865-241-0972 E-Mail:** nawazk@ornl.gov		
SY 22-23 Objectives:			
Objective #1	**Recruit TC Research Subcommittee members, to brainstorm research topics, and develop RTARs**		
Objective #2	**Reach-out to specific TC research subcommittee chairs and work towards developing cooperative research program Staff can provide contact information for current TC Subcommittee Chairs.**		
Subc. Members:			
Name	**Email**	**Phone Number**	**Affiliation**
Kashif Nawaz	nawazk@ornl.gov	865-241-0972	ORNL
Adnan Ayub	adnan@iso-therm.com	(817) 472-9922	Isotherm Inc.
Walid Chakroun	wchakroun@gmail.com	+965-24985804	Kuwait Univ.
Kashif Nawaz	nawazk@ornl.gov	865-241-0972	ORNL
Yunho Hwang	yhhwang@umd.edu	3014052025	U. Maryland

Research Ideas:

Walid Refrigerant leakage

1 Evaluate the HVAC system performance degradation due to refrigerant leakages

2 A comprehensive study on the HVAC components that further contribute to leakages

3 Determination and analysis specific improvements that can reduce specific leakages within the vapor-compression cycle.

- Thermal performance prediction and analysis on the economized vapor injection air-source heat pump in hot climate region of Middle East.
- Application characteristics of variable refrigerant flow heat pump system with vapor injection in severe hot region
- Analysis and optimization of two-stage vapor injected system for cooling applications
- Charge-sensitive modeling of vapor compression systems for off-design performance simulation
- Rooftop air-conditioning unit performance improvement using refrigerant circuitry optimization
- Investigation of Nano-lubricants Applied to Residential Air Conditioning System

Kashif

4 Integrated refrigeration and air conditioning system for commercial facilities

5 non-VC systems for refrigeration (magneto-caloric, thermo-elastic etc.)

6 Charge reduction in equipment to accommodate emerging refrigerant

	7	Refrigeration system for flexible/integrated grids
Adnan	8	The use of flooded and spray evaporators for oil & gas and petrochemical applications.
	9	Analysis of separation velocities of CO2 for use in risers of flooded evaporators and for low pressure receivers.
Yunho	10	Electrochemical compression

Refrigeration Technology Committee for Comfort, Process, and Cold Chain (REF-CPCC)

HVAC Subcommittee			
Scope:	REF-CPCC **HVAC Subcommittee** will research, and study current topics related to comfort cooling in the refrigeration spectrum and disseminate this information to a broader audience through collaboration with the Program, Research subcommittees or through other organizations.		
Chair:	**Steve Kujak – skujak@trane.com – Ph. (608) 787-3766**		
SY 22-23 Objectives:			
Objective #1	Identify councils, committees, subcommittees, and other entities within ASHRAE that may help in meeting the scope of the HVAC subcommittee		
Objective #2	Work with ASHRAE CEC and other organizations to document and disseminate HVAC workshops, seminars and conferences related to comfort cooling.		
Subc. Members:			
Name	**Email**	**Phone Number**	**Affiliation**
Steve Kujak	skujak@trane.com	(608) 787-3766	Trane
Glenn Hourahan	ghoura@comcast.net	(703) 625-2522	Hourahan Consulting, LLC
Omar Abdelaziz	omar.abdel.aziz@gmail.com	(865)387-0725	Oak Ridge National Lab

Refrigeration Technology Committee for Comfort, Process, and Cold Chain (REF-CPCC)

Cold Chain Subcommittee			
Scope:	REF-CPCC **Cold Chain Subcommittee** will research, and study current topics related to temperature-controlled supply chain and disseminate this new information to a broader audience through collaboration with the Program, Research subcommittees or through other organizations.		
Chair:	**Harshal Surange - harshalsurange@gmail.com – Ph.** 9370648458		
SY 22-23 Objectives:			
Objective #1	Recruit and form the Subcommittee membership and define roles and responsibilities for the committee members.		
Objective #2	Reach out to cold chain community and collect information on relevant current topics of interest. Communicate the relevant topics to the other stakeholders (Research and Program Committees)		
Subc. Members:			
Name	**Email**	**Phone Number**	**Affliation**
Harshal Surange	harshalsurange@gmail.com	9370648458	Consultant
Adnan Ayub	adnan@iso-therm.com	(817) 472-9922	Isotherm Inc.
Michael Saunders	Mike.Saunders@emerson.com	(937)726-4928	Emerson
Charles Hon	chon@truemfg.com	(636) 240-2400 x1383	True Mfg.
Doug Scott	dscott@vacomtech.com	(909) 374-1113	VaCom Technologies
Alaa Olama	alaaolama@gmail.com	201006099950	Montreal Protocol Ref. & AC Tech Options Committee
Harshal Arvind Surange	harshalsurange@gmail.com	9370648458	ACR PROJECT CONSULTANTS PVT LTD
Adnan Ayub	adnan@iso-therm.com	(817) 472-9922	Isotherm Inc.

The REF-CPCC Cold-Chain Subcommittee was the only REF-CPCC subcommittee meeting that occurred prior to the 2023 Winter meeting.

Note Cold Chain Subc. Was the only REF-CPCC Subc. that met prior to the 2023 Winter meeting.

Chair – Harshal Surange

Subcommittee Members as per Roster: Adnan Ayub, **Charles Hon, Doug Scott**, Alaa Olama, **Mike Saunders**; Special Invitee: **Didier Coulomb,** Dustin Lilya

Staff Liaison: **Mike Vaughn**

Agenda:

1. Meeting called to order 10 AM EST by Chair Surange
2. Round of introductions
3. Brainstorming on new ideas for subcommittee activities
    a. Seminar Representation
        i. The R in ASHRAE Subcommittee Chair Didier remarked on is at the United Nations level regarding Cold Chain, UNEP, and Montreal Protocol. Efforts like Cool Coalition and many other such teams are working on
        ii. Better to see what ASHRAE can do with other organizations like GCCA.
        iii. Charlie commented :
        iv. Agrees with Didier, changes are being seen
        v. He is on IIAR committee working on CO2 and other natural refrigerants
        vi. Organisations are changing their concepts of working
        vii. New standards for large charge HC type chillers are being formulated
        viii. Heat pumps being used for various purposes, ammonia being used in groceries there is a lot of cross over applications
        ix. Cold chain is a beneficiary of all these cross overs
    b. Trainings
        x. Suggested topics list
            1. What is the cold chain?
            2. What are the various routes
            3. Global trends of sustainability and reducing food waste
            4. (other topics have been discussed in earlier meetings and can be referred to here)
    c. ASHRAE DLs : Action Item discussed on this topic
    d. **AI#1** – Staff Get list CTTC of DLs that focus on Refrigeration - Complete see below.

AI#2 – R-in ASHRAE merge w/cold chain Subc. Host Social Event once a year at conferences

AI#3 – Research Possible event in World Bank event in Bangladesh Jointly with GCCA – Harshal Rep this year for GCCA. Didier to send documents on event to Harshal

Harshal asked Didier if any new training in cold chain Sector that IIR can Share?

Didier Responded Cold Chain Training is on IIR website, but no new trainings have come up. ISHRAE India is also doing work in cold chain.

e. Suggested Topics

Mike Saunders asked What can ASHRAE do as part of training - Def. of "Cold chain "?

Series of Training Classes:

- What is "Cold chain "?
- Transport
- Storage
- Supermarkets

Harshal remarked that ASHRAE Global Training Center in Dubai Offers a training session (conducted by him) called "Emerging Trends and Sustainable Design in Refrigeration and Cold Chain". This training uses some portions of the ASHRAE Sustainable Refrigeration Guide and also covers the topic of 'What is Cold Chain'

Mike Saunders remarked that Cold Chain is huge part in reducing food waste. Course on Tech for removing field heat.

AI#4 – Mike S. will get contact on the program for Harshal

AI#5- TCs involved in food info. Doug Scott mentioned TC 10. 2

Refrigeration Technology Committee for Comfort, Process, and Cold Chain (REF-CPCC)

R in ASHRAE Subcommittee

Scope:	REF-CPCC **R in ASHRAE Subcommittee** will be responsible for maintaining the "R in ASHRAE" web page on the ASHRAE website and with developing new content for this webpage on a regular basis.
Chair:	**Didier Coulomb** – **d.coulomb@iifiir.org – Ph. 33142273235**
SY 22-23 Objectives:	
Objective #1	Identifying ASHRAE technical committees involved in refrigeration issues and their activities. Use content from TCs involved in refrigeration to update R-in-ASHRAE Webpage on ASHRAE Website.
Objective #2	Create links between these activities and Subcommittee activities

Subc. Members:			
Name	**Email**	**Phone Number**	**Affiliation**
Didier Coulomb Chair	d.coulomb@iifiir.org	33142273235	Intl. Institute of Refrigeration
Rajan Rajendran	Rajan.Rajendran@emerson.com	(937) 726-0620	Emerson
Rachel Selbert	rachel.selbert@icf.com	(202) 791-8879	EPA/ENERGY STAR
Bill Walter	Bill.Walter@carrier.com	(315) 657-7407	Carrier
Adnan Ayub	adnan@iso-therm.com	(817) 472-9922	Isotherm Inc.

Refrigeration Technology Committee for Comfort, Process, and Cold Chain (REF-CPCC)

Refrigeration Technology Bi-Annual Report Subcommittee	
Scope:	REF-CPCC **Bi-Annual Refrigeration Technology Report Subcommittee** will develop every other year the bi-annual Refrigeration Technology Report for publication and distribution.
Chair:	Dustin Lilya– dlilya@dcengineering.net **Ph. (208) 288-2181**
Objective #1	Build upon the work by Martin Dieryckx on the basic structure of the bi-annual report

Objective #2	Recruit the required membership of the subcommittee to prepare the 1st edition of the report in SY23-24 by also reaching out to appropriate TCs at the 2023 Winter meeting in Atlanta		
Subc. Members:			
Name	**Email**	**Phone Number**	**Affiliation**
Martin Dieryckx	Dieryckx.m@daikineurope.com	0477663625	Daikin
Rajan Rajendran	Rajan.Rajendran@emerson.com	(937) 726-0620	Emerson
Tony Welter	tony.welter@hendersonengineers.com	(913) 742-5484	Henderson Engineers
Georgi Kazachki	kazachki@comcast.net	(678)576-7135	CRYOTHERM Consulting
Shitong Zha	shitongzha@gmail.com	(470) 328-9018	
Adnan Ayub	adnan@iso-therm.com	(817) 472-9922	Isotherm Inc.
Alaa Olama	alaaolama@gmail.com	201006099950	Montreal Protocol Ref. & AC Tech Options Committee

Refrigeration Technology Committee for Comfort, Process, and Cold Chain (REF-CPCC)

Refrigeration Awards Subcommittee			
Scope:	REF-CPCC **Awards Subcommittee** will develop award recipient recommendations each year for the Briley and Garland awards and possibly develop new refrigeration related awards.		
Chair:	**Apichit Lumkertpongpana – Phone# 66818162834 – Email: Apichit.lpana@itc-group.co.th**		
SY 22-23 Objectives:			
Objective #1	Ensure wider engagement of Ref. Committee members in the process of judging the Briley and Garland Awards		
Objective #2	Map existing ASHRAE awards and recommend other award categories in relation to the scope of the Refrigeration Committee		
Subc. Members:			
Name	**Email**	**Phone Number**	**Affiliation**

Apichit Lumkertpongpana Chair	Apichit.lpana@itc-group.co.th	(668) 18162834	I.T.C. Company Ltd.
Martin Dieryckx	dieryckx.m@daikineurope.com	477663625	Daikin
Charles Hon	chon@truemfg.com	(636) 240-2400 x1383	True Mfg.
Carlos Mitroga	cmitroga@danfoss.com	56228978811	Danfoss

REFRIGERATION COMMITTEE 2022-2023 MBOs
Dustin Lilya, Chair
Date: 7/29/2021

MBO #	MBO	Status	Date Due	Assigned to	Applicable Initiative #	MBO Comments	Success Metric	Fiscal Impact
1	Work with partnership organizations to identify and implement collaboration opportunities to promote HVAC&R	On-going	June 2021	Dieter C; Ayman E; Stephen G.	#1a, #1b, #2b	Starting with list of interested parties, IIR, IOR and UNEP, and working with the Research Subc. to identify suggested research topics focused on refrigeration technology and pass on to new RAP for consideration.	• New REF-CPCC Research Subc. formed and first task will be to develop list of suggested research topics for consideration by the new Research Advisory Panel	None
2	Take ownership of the new "R" in ASHRAE webpage for further implementation and on-going maintenance. Promote the new REF committee organization and name throughout society; put together the plan for a bi-annual report on refrigeration technology	On-going	June 2021	Didier C; Michael V; Rajan R, Martin D;	#2c; #3a, b, c	Establish a subcommittee and work closely with ASHRAE staff to continue highlighting the R in ASHRAE; expand and add new content as relevant; at mid-year, revisit the website and looking for ways to improve; develop a plan and start implementation of the bi-annual Refrigeration	• Update the R ASHRAE web page in fall 2020 & Spring 2021 with new content and information on Refrigeration Technology related conferences. • Complete outline of Bi-Annual Report	None

						Technology report		
3	Create working group within REF to help develop a proposed 1st draft of work plan between ASHRAE & IIAR for inclusion in new ASHRAE/IIAR MOU prior to the MOU being finalized by ASHRAE and IIAR	On-going	June 2021	TBD	#2	Utilize technical experts within network of REF members and interested ASHRAE members that work for IIAR and serve on SSPCs 15 & 34 to develop a draft work plan prior to a new MOU being finalized.	• REF-CPPC & IIAR Work with Gary Schrift and other from IIAR to develop draft work plan as basis for a potential new MOU with IIAR.	None
4	Cooperate on Research and Program with TCs and communicate REF activities and information to ASHRAE Chapter Refrigeration Committees.	New	June 2021	Yunho H; Stephen G.; Kashif N.	#3b	Communicate and participate in relevant TC Subc. meetings; Prepare short report after each Society meeting that goes to all Chapter Refrigeration Committee Chairs including upcoming Winter meeting Refrigeration program track, upcoming refrigeration conferences, and ASHRAE research in development, underway, or completed related to refrigeration technology.	• Goal is to communicate with relevant TC Subc. chairs and issue the 1st REF-CPPC activity summary to Chapter Refrigeration Committees after Winter meeting.	None

Goals and Initiatives for 2019-2024 Society Strategic Plan

Initiatives:

#1 Resilient Building and Communities
#2 Indoor Environmental Quality
#3 Organizational Streamlining
#4 Improve Chapter Engagement, Capacity, and support

Goals:

Goal 1: Position ASHRAE as an Essential Knowledge Resource for a Sustainable, High-Performance Built Environment

#1a Position ASHRAE as an Essential Knowledge Resource for a Sustainable, High-Performance Built Environment

#1b Expand capabilities globally to create, aggregate and disseminate essential information and knowledge focusing on emerging market trends and transformative approaches

Goal 2: Maximize Member Value and Engagement

#2a Infuse enthusiasm, vitality, and diversity throughout ASHRAE events and services

#2b Expand the impact of collaboration and partnerships with industry organizations, universities, and government agencies

#2c Leverage technology to increase member engagement, awareness, and value

Goal 3: Optimize ASHRAE's Organizational Structure to Maximize Performance

#3a Prototype and launch new approaches that will increase ASHRAE's relevance and speed to market for key offerings

#3b Optimize ASHRAE's organizational systems and structures to increase capacity, efficiency, and effectiveness

#3c Cultivate industry and member philanthropy to extend ASHRAE's impact and reach