



Shaping Tomorrow's
Built Environment Today

MINUTES (DRAFT)

Refrigeration Committee (REF)

June 28, 2017

Hyatt Regency

Long Beach, CA

These minutes have not been approved and are not the official, approved record until approved by this committee.

MEMBERS PRESENT:

Karim Amrane, *Chair*
Nick Shockley, *Vice-Chair*
Roberto Aguilo
Didier Coulomb
Martin Dieryckx
Charles Hon
Glenn Hourahan, *Consultant*
Barbara Minor
Shamila Nair-Bedouelle
Rajan Rajendran
Jason Robbins
William Walter, *BOD Ex-O*

MEMBERS NOT PRESENT:

Pat Graef, *Coordinating Officer*
Richard Royal
Dave Rule

ASHRAE STAFF:

Steve Hammerling, AMORTS

GUESTS:

Adnan Ayub
Zahid Ayub
Atul Bagai
Jim Caylor
Walid Chakroun, *Incoming Member*
Ayman Eltaloung
Brian Fricke
Stephen Gill, *Incoming Member*
Derek Hamilton
Yunho Hwang, *Incoming Member*
Allen Karpman
Georgi Kazachki
Tatsuro Kabayashi
Dustin Lilya
Ivan Rydkin
Daryl Stauffer
Jim Wolf
Shitong Zha

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MOTIONS

No.	Motion	Status
1	the minutes from the REF Winter Meeting be approved	PASSED

ACTION ITEMS – Annual 2017

No.	Responsibility	Action Item	Page
LB-1	Chakroun	Chakroun agreed to find out where discount for ASHRAE members to loR publication currently stands with ASHRAE	2
LB-2	Staff	Staff agreed to determine if REF should more formally approve loR discount to ASHRAE members	2
LB-3	REF and Staff	REF will review what can be done to generate more Milt Garland and Comfort Cooling nominations.	2
LB-4	Staff	Collect Journal articles eligible for Briley Award and send to judging subcommittee for their review	3
LB-5	Shockley	Shockley agreed to inquire with Royal and report on status of refrigeration related ALI course	3
LB-6	REF	REF was asked to nominate Distinguished Lecturers related to flammable refrigerants	4
LB-7	Staff	Submit Ivan Rydkin name as volunteer to be DL on flammable refrigerants	4
LB-8	Shockley	Review EPA/DOE RFI to see if/how REF should participate	5
LB-9	Hamilton	Prepare and work with REF chair to give a presentation on natural refrigerant perspective to REF at a future meeting	5
LB-10	Shockley	Review REF's strategic planning issues and include prioritized list for 2017-18 SY as appropriate.	5

ACTION ITEMS – Winter 2017

No.	Responsibility	Action Item	Status
LV-1	Staff	Promote awards as has typically been done in Insights, Members First, contacting non-winning submissions, etc.	Complete
LV-2	REF	Help identify projects that may be submitted for REF awards	Complete
LV-3	Rajendran, Minor, Nair-Boudelle	Start to develop draft revisions to <i>Refrigerants and their Responsible Use PD</i>	Complete
LV-4	REF	Suggest DL speakers on new refrigerants to Hon/CTTC	See AI # LB-6
LV-5	Staff	Seek outcome of activities listed in strategic plan	Ongoing
LV-6	Hon, Rajendran, Minor, Walters	Discuss how REF can be promoted as a technical resource and how process would work	Ongoing
LV-7	Shockley, Aguilo, Martin and Royal	Explore and develop a plan for how REF can outreach and participate with international refrigeration events and conferences.	Ongoing

LV-8	Royal and Robbins	Attend Associate Society Alliance meeting in Las Vegas and report to REF in spring.	Ongoing
LV-9	Amrane	Develop a presentation from REF to outside groups such as USNC IIR and ASHRAE Associate Society Alliance organizations on how REF can liaise and interact with these sorts of groups	Ongoing

ACTION ITEMS – Fall 2016

No.	Responsibility	Action Item	Status
FA-7	Amrane	Amrane to discuss REF more involvement on regulatory matters impacting refrigeration with Walter and take to Tech Council as appropriate	Ongoing

ACTION ITEMS – Spring 2016

No.	Responsibility	Action Item	Status
SP-2	Amrane, Dierczyk	Summarize energy efficiency HVAC&R programs/standards in Europe, Middle East, Australia, Japan, India and elsewhere in the world for a presentation in St. Louis.	Ongoing

DRAFT

LIST OF ATTACHMENTS

No.	Attachment
A	BOD Ex-O Presentation
B	UNEP/ASHRAE work plan presentation
C	CTTC report
D	Regulatory Issue Update
E	MBOs 2016-2017
F	MBOs 2017-2018

LIST OF ACRONYMS

AHRI	Air-conditioning, Heating & Refrigeration Institute	IIAR	International Institute of Ammonia Refrigeration
AI	Action Item	IIR	International Institute of Refrigeration
ALI	ASHRAE Learning Institute	IoR	Institute of Refrigeration
AMORTS	Assistant Manager Research & Technical Services	MBO	Management by Objectives
AREA	Air conditioning and Refrigeration European Association	MOP	Manual of Procedures
ASHRAE	American Society of Heating, Refrigerating and Air-conditioning Engineers	NIST	National Institute of Science and Technology
BOD	Board of Directors	PD	Position Document
CNV	Chair Not Voting	REF	Refrigeration Committee
CTTC	Chapter Technology Transfer Committee	RFI	Request for Information
DL	Distinguished Lecturer	ROB	Rules of the Board
DOE	Department of Energy	RP	Research Project
EPA	Environmental Protection Agency	RVC	Regional Vice Chair
Ex-O	Ex-Officio	SSPC	Standing Standard Project Committee
GCCA	Global Cold Chain Alliance	TC	Technical Committee
GRMI	Global Refrigerant Management Initiative	UNEP	United Nations Environment Programme
GWP	Global Warming Potential		

1. CALL TO ORDER

Chair Karim Amrane called the meeting to order at 8:00 AM. Members and guests introduced themselves. Amrane confirmed quorum was met.

2. ASHRAE CODE OF ETHICS COMMITMENT

'In this and all other ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, integrity and respect for others, and we shall avoid all real or perceived conflicts of interests.' (See full Code of Ethics: www.ashrae.org/about-ashrae/ashrae-code-of-ethics.)

3. REVIEW OF AGENDA

No changes were suggested to the agenda sent prior to meeting.

4. MINUTES

A. It was moved (NS) and seconded (JR) that,

- (1) the minutes from the REF Winter Meeting in be approved.

MOTION 1 PASSED: 6-0-0, CNV

BACKGROUND: Minutes were distributed in March 10th email.

5. CHAIR'S REPORT – Amrane

A. Motions from Past Meetings Requiring Higher Body Approval

The following motions from past REF meetings required higher body approval:

- The REF motion to approve the revision to *Ammonia as a Refrigerant* position document (PD) was passed by Tech Council and the BOD. The revised PD was posted to the ASHRAE website.
- The REF motion to approve a reaffirmation of *Refrigerants and their Responsible Use* PD was approved by Tech Council. The PD was posted to the ASHRAE website.
- The REF motion to initiate a revision to the *Refrigerants and their Responsible Use* PD was approved by Tech Council and BOD ExCom.
- The REF motion to appoint a PD committee for *the Refrigerants and their Responsible Use* PD was approved by Tech Council and was formally appointed.

B. New Information Items for REF

1. 2L Research

Amrane reported on the 2L research efforts currently underway. There are three AHRTI projects complete and available at www.ahrinet.org. The DOE is conducting a project related to evaluating and optimizing refrigerant charge in various systems which is expected to be complete in September. A NIST project will be completed in 2018 or 2019. The following ASHRAE projects are expected to be done in early 2018:

- 1806-RP, *Flammable Refrigerants Post-Ignition Simulation and Risk Assessment Update*
- 1807-RP, *Guidelines for Flammable Refrigerant Handling, Transporting, Storing and Equipment Servicing and Installation*
- 1808-RP, *Servicing and Installing Equipment using Flammable Refrigerants: Assessment of Field-made Mechanical Joints*

2. Global Refrigerant Management Initiative (GRMI) updates

Chakroun is ASHRAE representative to GRMI effort and noted group last met at ASHRAE's Las Vegas meeting and there have been no updates since then. The GRMI

plans to next meet in July at Montreal Protocol meetings and Chakroun agreed to update REF after that time.

3. Thank you letters

Members can request ASHRAE thank you letters to your employer if interested. Please refer to email from Hammerling for process.

4. Institute of Refrigeration (IoR)

Stephen Gill updated REF on a plan for ASHRAE and IoR to work together by offering ASHRAE members access to 200+ IoR publications, online material, etc. for a nominal add on fee. This would be a tremendous benefit to ASHRAE members with an interest in refrigeration related issues. REF confirmed their support of this program.

Chakroun agreed to find out where this stands with ASHRAE, if it is finalized, and to report to REF on status (**AI #1**). Staff agreed to determine if REF should more formally approve (**AI #2**).

6. VICE-CHAIR'S REPORT – Shockley

A. Fiscal Report

Shockley noted the budget has been short on funds for member travel reimbursements but REF can ask for more at Tech Council's Operations and Planning Subcommittee meeting.

B. MOP/ROB/Reference Manual

No changes for this meeting to these documents.

7. BOD/TECH COUNCIL REPORTS

A. BOD EX-Officio – Walter

Walter presented the Ex-O presentation (**Attachment A**). Highlights include:

- Members are asked to nominate REF members at www.ashrae.org/nominate
- ASHRAE Code of Ethics emphasized at start of all meetings
- Introduced incoming ASHRAE President, Bjarne Olesen
- Presentation features list of new and enhanced ASHRAE resources, publications and conferences

Chakroun added that ASHRAE now has a staff office in Dubai to help support chapters and members in the region.

Walter thanked all for time and service to ASHRAE activities and asked for any feedback from committee members to take to the BOD.

Graef was not in attendance.

8. AWARDS

A. Milt Garland & Comfort Cooling Awards

No nominations were received for the Milt Garland or Comfort Cooling Awards by the May 1st deadline. REF will review what can be done to generate more nominations. Suggestions included contacting Refrigeration Vice-Chairs (RVCs) to send solicitations to chapter refrigeration chairs. Also, it was suggested the awards be better highlighted on website. These will be added to current promotion check list (**AI #3**).

B. Briley Award

Articles for the next George C. Briley Award will be collected by staff, reviewed by chair for eligibility, and sent to a subcommittee for voting in the fall (**AI #4**). Incoming members Chakroun, Gill, and Hwang were asked to review and judge. The award will be presented at the REF meeting in Chicago.

9. SUBCOMMITTEE REPORTS

A. ASHRAE Learning Institute (ALI) – **Royal**

Royal was not in attendance but had reported at the Winter Meeting a course was nearing completion. Shockley agreed to inquire and report on status (**AI #5**).

B. Programs – **Dieryckx**

1. Long Beach

Dieryckx noted the following were approved and would take place at the Annual Meeting in Long Beach:

- Workshop 7 - Status of Standards and Codes in the USA, In View of the Application of Low GWP Refrigerants
- Seminar 50 - High Efficiency Commercial Refrigeration Systems with Natural Refrigerants

A third program submission on international standards was not accepted.

2. Chicago

REF discussed a number of programs for the Winter Meeting. The following programs were approved and would need to be submitted before Aug. 1st deadline:

- Recent Advances in Solid State Cooling Technologies (Hwang)
- F-gas updates (Kigali) and relevant policies (Robbins)
 - Dieryckx would assist on Japan, Europe policies,
 - Ayman on Kigali and developing countries
 - Robbins on USA.
 - There would be a maximum 5 speakers but the program would be at the Expo so a large space would be needed and additional time or double session could be requested.
 - UNEP to cosponsor
- Resubmission of program on International Standards that was not accepted for Long Beach.

Noted Track 9 on refrigerants will be at Expo so there will be much exposure and much space available.

3. Future Meetings

The following ideas were listed as other program ideas:

- State of Art in Design and Application of Equipment w/Flammable Refrigerants
 - Kazachki, Dieryckx, Bagni, Shockley to provide speakers
- Not in kind technology ideas
 - Ayman to coordinate

C. Refrigeration Handbook – **Shockley**

Shockley noted chapters in need of reviews found reviewers and reviews are complete. Shockley proposed this be removed from agenda going forward.

D. Position Documents (PD)

1. *Refrigerants and their Responsible Use* PD

Rajendran noted PD committee was appointed and held some meetings already. After an initial review, the committee concluded a major substantial rewrite was appropriate versus what was initially thought. The goal is to complete the PD in fall. The committee will ask REF to review a draft and offer feedback in 2 weeks, likely in August.

Amrane noted negative vote related to representation from chemical manufacturers. PD committee agreed to discuss on how to better balance roster if possible or ensure participation of all interests.

2. *Ammonia as a Refrigerant* Position Document – **Rule**

Ammonia on agenda due to concerns over withdrawal plan and to merge with *Refrigerants and their Responsible Use* PD. Robbins noted the current revision to the *Refrigerants and their Responsible Use* PD would not address ammonia so the possible merge would be more than three years off. The ammonia, and other refrigerants, could be included as annex to eventual Refrigerants and Responsible Use PD if there are issues specific to other refrigerants that need addressing from a policy perspective.

E. UNEP/ASHRAE Partnership – **Nair-Bedouelle**

REF remains supportive of the updated Work Plan of ASHRAE-UNEP Global Cooperation Agreement. Many of REF's MBOs focused on the implementation of these goals. Ayman Eltaloung updated REF on UNEP/ASHRAE relationship noting that the new Work Plan with a presentation (**Attachment B**). The main theme is 'Working Beyond High-GWP Refrigerants'. The emphasis will be the following two main goals and related actions:

- Advocacy and Knowledge Sharing
 - Global Conferences and Events
 - Refrigerants Awareness Package
 - Low- GWP Innovation Award Program
 - Issues related to Buildings Sector
- Training, Education and Practice
 - Online Training Program on Refrigerants
 - Contemporary Learning Tools for Universities
 - Assessment Program for RAC Plants

10. OTHER REPORTS

A. Chapter Technology Transfer Committee (CTTC) Liaison Report (Hon)

Hon attended CTTC meetings in Long Beach and gave a REF report to CTTC (**Attachment C**). CTTC noted they are seeking information on speakers on flammable refrigerants (use, application, handling, restrictions, service, etc.). REF was asked to nominate Distinguished Lecturers on the subject (**AI #6**). Ivan Rydkin volunteered to be DL on topic (**AI #7**) and staff would send information.

B. Consultant Report

Doug Scott provided written report on RP-1634, *Guide for Sustainable Refrigerated Facilities and Refrigeration Systems*, noting the following:

- The principle investigator (Richard Love, Massey University) is behind schedule, losing two months from the schedule set in January
- Overall completion is approximately 90%
- One chapter (Chapter 7 - Energy Modeling and Performance Analysis) remains to be completed; with substantial changes required from the initial draft
- The load calculation and energy modeling tools required merging and are still outstanding

- The intent is to finish, approve and provide to REF for (if possible) letter ballot so the Guide can be in the bookstore in January.

UNEP's Ayman Eltaloung added that UNEP is discussing how they can develop and translate the final product for use in developing countries. This is part of new UNEP/ASHRAE work plan.

C. Regulatory Update – **Amrane**

Amrane presented report on Refrigerant Issues at the meeting (**Attachment D**). Highlights include updates on the following:

- DOE final rules under review
- EPA and DOE RFI inviting comments
- EPA regulations
- California regulations
- Montreal Protocol developments
- Flammable Refrigerant research

Amrane noted he could broaden summary to international issues if desired in future. It was asked if ASHRAE did, or if and how they should participate in EPA /DOE comment periods. Grassroots Government Advocacy Committee (GGAC) responded that they didn't offer comments. REF may wish to make a recommendation to GGAC and offer comments, then GGAC decides how/if to make comments as appropriate. Shockley agreed to review the EPA and DOE RFI's to see if REF can participate (**AI #8**).

Guest Derek Hamilton offered to give presentation on natural refrigerant perspective to REF at a future meeting (**AI #9**).

D. Liaisons

1. TCs & SSPCs

REF will continue to liaison with relevant ASHRAE TCs and SSPCs. Please continue to attend meetings and report as appropriate.

2. International Institute of Refrigeration (IIR) - **Coulomb**

Coulomb was not in attendance.

3. International Institute of Ammonia Refrigeration (IIAR) – **Rule**

Rule was not in attendance.

4. Global Cold Chain Alliance (GCCA) liaison report

No liaison report from GCCA was submitted.

11. STRATEGIC ISSUES

A. Management by Objectives (MBO) Updates – MBO leaders

Amrane reviewed MBOs for the current Society Year. Updates will be reported to Tech Council (**Attachment E**).

B. REF Strategic Planning

REF's strategic planning issues would be kept on agenda but reviewed by Shockley (**AI #10**) to determine if a revised or prioritized list for 2017-18 SY is appropriate.

1. Themes for next Society Year

- codes/standards issues

- refrigerant transition to 2L
 - focus on developing economies
 - energy efficiency
2. International Participation
- ASHRAE's involvement in international discussions?
 - ASHRAE involvement in outside organizations?
 - International members participation in ASHRAE

12. NEXT MEETING

REF will hold a fall web meeting if needed in September. REF will next meet face to face at the ASHRAE Winter Meeting in Chicago, IL on Sunday, January 21, 2018 from 8a-12pm.

13. HANDOVER TO NEW CHAIR

A. Recognize Outgoing Members

Amrane recognized outgoing REF members Roberto Aguilo and Glenn Hourahan and welcomed new REF chair Nick Shockley. Shockley recognized Amrane with a certificate of appreciation for his service to REF and ASHRAE.

B. Recognize Incoming Members

Shockley recognized incoming members Stephen Gill, Walid Chakroun and Yunho Hwang to REF.

C. Subcommittee Assignments

Shockley noted he appointed Yunho Hwang as Program chair next Society Year. He would make other subcommittee assignments shortly.

D. 2017-18 MBOs

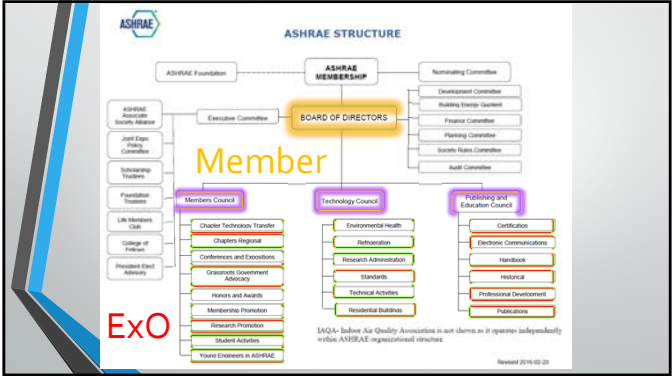
Shockley will submit his MBOs for upcoming Society Year (**Attachment F**) to Tech Council at upcoming meeting.

14. ADJOURNMENT

Committee adjourned at approximately 11:45 AM.


2017 ANNUAL MEETING

Long Beach, California
June 24-28

What is an ExO?

- Assignment of Board Directors made by President-Elect
- Commonly for the duration of your BOD term (3 yrs)
- Non-voting member of Council Standing Committee
- Voting member of Council
- Liaison between the Committee and the BOD



ASHRAE Nominations

ASHRAE website links are always active for member nominations to Board-elected Standing Committee and Council Positions, Appointments to Committees, and Board Officer and Director Recommendations. Once the deadline has passed, your recommendation will be held until the following year's election or appointment session.

When submitting your nominations, please include in the "comments" section the reason you recommend an individual for service in a particular position or committee. Complete qualifications are listed in the Rules of the Board and job descriptions are available on the ASHRAE.org website.

<p>◆ Board Officer and Director Recommendations: Link closes for the following Society year each September 29th https://www.ashrae.org/iec-bod</p>	<p>◆ Board-elected Standing Committee and Council Nominations: Link closes for the following Society year each September 15th https://www.ashrae.org/bodnom</p>	<p>◆ Standing Committee Nominations, Appointed by the President-Elect: Link closes for the following Society year each February 15th https://www.ashrae.org/commom</p>
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In all your interactions at these meetings please remember...

Code of Ethics

"As members of ASHRAE or participants in ASHRAE committees, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct."

Upcoming Conferences

- **ASHRAE 2017 Building Performance Analysis Conference:** September 27-29, 2017 – Atlanta, GA. ASHRAE.org/BuildPerform2017
- **2017 Developing Economies Conference:** November 10-11, 2017 – Delhi, India. ASHRAE.org/Developing2017
- **2018 ASHRAE Winter Conference and AHR Expo:** January 20-24, 2018 – Chicago, IL. ASHRAE.org/Chicago and ASHRAE.org/AHRExp2018
- **Feasible Low-GWP Alternatives for Developing Economies:** Spring 2018 - Dubai, UAE



Attend President's Luncheon Monday, June 26



Who is incoming President Bjarne Olesen?



ASHRAE Wants You!

- Standing committee appointments sought for 2017-18
- Speak with your committee ExO if you are rolling off and want to be nominated for another Committee or Council (beginning July 1, 2018)
- Self-nomination is also encouraged
- Nominations due by mid-September




www.ashrae.org/nominate




New and Enhanced Resources

eLearning Portal + Courses
www.elearning.ashrae.org



Building eq POWERED BY ASHRAE

NEW Building EQ Portal + Course
www.ashrae.org/BuildingEQ
www.ashrae.org/educationalresources



Science and Technology in the Built Environment
www.ashrae.org/stbe


Connect-a-Colleague
www.ashrae.org/connect




Updated TC Websites
www.ashrae.org/tcsites
ashraepcs.org




New Technology + Authoring Portal
www.ashrae.org/technologyportal
www.ashrae.org/authoringportal

Website Redesign Has Begun...



...update by January 2018




Flammable Low GWP Refrigerants


- Multi-disciplinary Task Group (MTG) Low GWP is sponsoring 3 research projects aimed toward safety:

- \$80k 1806-RP Flammable Refrigerants Post-ignition Simulation of Severity and Risk Assessment Update (\$80k)
- \$80k 1807-RP Compile Existing Guidelines for Flammable Refrigerants Handling, etc. (\$80k)
- \$120k 1808-RP Assessment of Field-made Mechanical Joints for Safe Use With Flammable Refrigerants (\$120k)

The MTG will communicate their findings to Standards and Codes bodies once the research is complete.





AHRI has sponsored a number of risk assessments to evaluate the probability of ignition events occurring as a result of refrigerant leaks.




Recent Publications


Standard 55 User's Manual
Standard 62.1-62.2 User's Manuals


Superheat Calc App (iTunes & Google Play) (HOL)



ASHRAE Duct Fitting Database




UFAD Owner Guide




Standard 214 – Determining and Expressing Building Energy Performance in a Rating Program

Standard 62.1 – Ventilation for Acceptable Indoor Air Quality
Standard 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings







Upcoming


<p>Publications</p> <ul style="list-style-type: none"> • ASHRAE GreenGuide, 5th edition • ASHRAE Design Guide for Cleanrooms • ASHRAE Design Guide for Duct Systems • ASHRAE Design Guide for Air Terminal Units • ASHRAE Design Guide for Dedicated Outdoor Air Systems • ASHRAE Design Guide for Sustainable Refrigeration Facilities and Systems • Advanced Energy Design Guide for K-12 School Buildings (Achieving Zero Energy) • Principles of Heating, Ventilating and Air-Conditioning, 8th edition • Standard 189.3 – Design, Construction, and operation of Sustainable High Performance Health Care Facilities 	<p>Courses</p> <ul style="list-style-type: none"> • Variable Refrigerant Flow System Design & Application • Refrigerants Literacy • School of Hard Knocks: Controlling Moisture & Humidity in Buildings • Ethics for the Built Environment Professional Engineer • Building EQ: Benchmarking and Assessment of Building Energy Performance
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Social Media Engagement

Society Year 2016-2017


	<u>Followers</u>	<u>Jan 2017</u>	<u>Annual Increase</u>	
	47,908	20%		<div style="border: 1px solid black; border-radius: 50%; padding: 10px; display: inline-block;"> <p style="font-size: 8px; margin: 0;">Member Review: ASHRAE is the best source to find solutions for designing HVAC!</p> <p style="text-align: center; margin: 0;">★★★★★</p> </div>
	13,965	18%		
	25,390	38%		
	1,649	120%		



Questions?

Thank You For All You Do!

Please let your ExO know how and where you'd like to serve next.



**2017-2018
ASHRAE-UNEP Joint Work Plan**

Suggested Main theme

Working Beyond High-GWP Refrigerants

Goals of the 2015-2016 Work Plan

REF Minutes 17.A - Attachment B

Goal 1: Emissions Reduction, long-term Refrigerants and Energy Efficiency

Action 1

Building bridges between industry and policy-makers on feasibility of alternative refrigerants and equipment efficiency including addressing specific needs of the developing countries

Action 2

Compile research findings, resulted from ASHRAE Research Program, about Zero ODP & Low GWP alternatives and disseminate it to research centers, institutions and researchers in the developing countries

Action 3

Explore opportunities to promote responsible and sound management of refrigerants

Action 4

Cooperate and coordinate efforts related to energy efficiency in the buildings sector

Goal 2: Expertise and Technological Information Exchange

Action 1

Use the Distinguished Lecturer (DL) program at collaborative activities between UNEP and ASHRAE chapters/sections

Action 2

Explore the possibility of building list of experts categorized according to their specialties in the refrigeration and HVAC sectors, to assist developing countries

Action 3

Consider launching special Initiative to support the establishment and/or strengthening of local refrigeration and/or HVAC societies in developing countries

Action 4

Consider building an online tool/page to ensure outreaching the outcomes of the cooperation between ASHRAE and UNEP and facilitate communication with different stakeholders in relation to the cooperation

2017-2018 Work Plan

Working Beyond High-GWP Refrigerants

What's different in the new work plan?

- Thematically oriented to one main goal to offer more focus in delivery
- Product based work plan i.e. no broad goals or action items
- Covers wide spectrum of beneficiaries within the main goal of the work plan
- Offer products and services that are not available in the field
- Include appropriate visibility for ASHRAE-UNEP cooperation through incorporating the outreach dimension in all goals and activities
- Ensure involvement and engagement of governments and ASHRAE teams around the globe

Main theme

Working Beyond High-GWP Refrigerants

Main Goals

Actions

Advocacy and Knowledge Sharing

- Global Conferences and Events
- Refrigerants Awareness Package
- Low- GWP Innovation Award Program
- Issues related to Buildings Sector

Training, Education and Practice

- Online Training Program on Refrigerants
- Contemporary Learning Tools for Universities
- Assessment Program for RAC Plants

CTTC REF Report
ASHRAE Summer Conference – Long Beach 2017

June 23, 2017

ASHRAE Refrigeration Committee (REF)
Liaison Report to
Chapter Technology Transfer Committee
2017 Summer Conference, Long Beach

REF Liaison: Charles Hon
chon@truemfg.com

1

CTTC REF Report
ASHRAE Summer Conference – Long Beach 2017

TOPICS

- Refrigeration Update
- Chapter Program Support
- Advance Chapter Interest in Refrigeration

2

CTTC REF Report
ASHRAE Summer Conference – Long Beach 2017

Sunday June 25 8:00- 9:00 am Room: 201B

Status of Standards and Codes in the USA, In View of the Application of Low GWP Refrigerants

Chair: Steven Eckels, Ph.D.,

Status of ASHRAE 15, Related Codes and SNAP
Phillip Johnson, P.E., Member, Daikin Applied, Staunton, VA

Status of UL Standards and Related Codes
Bill Hansen, P.E., Member, Ingersoll Rand, La Crosse, WI

3

CTTC REF Report
ASHRAE Summer Conference – Long Beach 2017

Wednesday, June 28 8 – 9:30 AM Room: 201A

High Efficiency Commercial Refrigeration Systems

1. Doing It All Efficiently with CO2 Refrigeration Anywhere in the World Klaas Visser, P.E.,
2. Design and Performance Validation of Ultralow Charge Ammonia Cascade System for Retail Food Environment Masood Ali
3. Opportunities for Utilizing Two-Phase Ejectors to Increase with Natural Refrigerants Chair: Georgi Kazachki, Ph.D.,
4. Efficiency of Commercial Refrigeration Systems Using Natural Refrigerants Stefan Elbel, Ph.D.,
5. Packaged Ammonia/CO2 Systems for Refrigeration Scott Mitchell

4

CTTC REF Report
ASHRAE Summer Conference – Long Beach 2017

- **REF Review of Position Documents**
“ASHRAE Position Document on Refrigerants and their Responsible Use” (under review)
Expires July 2, 2017
ASHRAE Guide for Sustainable Refrigerated Facilities and Refrigeration Systems (1634 RP)
Due to be Published Soon

5

CTTC REF Report
ASHRAE Summer Conference – Long Beach 2017

- **REF Webpage with Links**
 - Members First! Tech Council Newsletter
- **REF Operations**
 - Recent Meeting Minutes
 - Manual of Procedures, Rules of the Board, REF Reference Manual
 - Members First! Newsletters
 - REF Liaison Report to CTTC

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CTTC REF Report
ASHRAE Summer Conference – Long Beach 20 2017

- **REF Webpage with Links**
 - REF Resources/Chapter Program Support
 - To Support Chapters, REF has Developed Refrigeration-themed Program Materials
 - "Tips on Hosting Successful Refrigeration-focused ASHRAE Chapter Meeting"
 - ASHRAE Distinguished Lecturers (DL) list (edited to include only Refrigeration Topics)
 - ASHRAE Refrigeration Speakers list (expanded for improved geographic coverage in developing countries)
 - Sister Refrigeration Organizations

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CTTC REF Report
ASHRAE Summer Conference – Long Beach 20 2017

- **REF Webpage**
 - **Refrigeration Technology Awards by REF**
 - Recognize the Designer and Owner of the Refrigeration Project exhibiting the Best Innovation and/or New Technology with Links to:
 - "Milton W. Garland Commemorative Refrigeration Award for Project Excellence"
 - "Refrigeration Comfort Cooling Award for Project Excellence"
 - Awarded at Plenary Session during Annual Conference

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CTTC REF Report
ASHRAE Summer Conference – Long Beach 20 2017

- **REF Webpage**
 - **Member Resources**
 - REF Assists Technical Committees (TCs) with Refrigeration Oriented Goals and Provides links to:
 - Refrigeration TC Webpages
 - Refrigeration TC Activity Report
 - Refrigeration-related ASHRAE Research
 - Refrigeration-related Standards and Guidelines

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CTTC REF Report
ASHRAE Summer Conference – Long Beach 20 2017

- **Chapter Program Support – Efforts Underway**
 - Encourage Expert Refrigeration Speakers for DL Program
 - Encourage Refrigeration Programs with broad appeal to Chapters
 - Develop list of Refrigeration Programs and Speakers with wide appeal

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CTTC REF Report
ASHRAE Summer Conference – Long Beach 20 2017

- **Advance Chapter Interest in Refrigeration**
 - REF seeks to promote Refrigeration Education and Training for Students and Seasoned Practitioners
 - **Technology Transfer Programs**
 - Refrigeration Programs at ASHRAE Conferences
 - "George C. Briley ASHRAE Journal Award"
 - Best Refrigeration-related Article
 - Awarded at REF Meeting, Winter Conference

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CTTC REF Report
ASHRAE Summer Conference – Long Beach 20 2017

- **Advance Chapter Interest in Refrigeration**
 - REF continues to work with and thru CTTC to Identify and Develop Resources and Implement Programs to enhance Chapter Refrigeration Activities including:
 - Work with the TCs to develop Hands-on, Low Cost Refrigeration Projects for College Lab Classes
 - Present Seminars at ASHRAE Conferences on Refrigeration Topics
 - Promote and solicit applications for Milt Garland, Comfort Cooling, and George Briley Refrigeration Awards
 - Submit recommendations to CTTC for PAOE criteria for Chapter Refrigeration Activities
 - Strongly encourage RVCs to actively promote strong Chapter participation in the recently approved "R in ASHRAE" Award

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CTTC REF Report
ASHRAE Summer Conference – Long Beach 20 2017

THANK YOU

**For your Participation & Support
of ASHRAE Activities**

January 29, 2017



Regulatory Update

June 25, 2017

Karim Amrane – Chair Refrigeration Committee

Regulatory Outlook - DOE Final Rules Under Review

- Residential central ACs and HPs – Test Procedures
 - Effective date postponed to July 5, 2017
- Walk-in coolers and Freezers – Test Procedures
 - Effective date postponed to June 26, 2017
- Walk-in coolers and Freezers – Final rule on minimum efficiencies
 - Final rule pre-published for 45-day review (according to error correction rule)
 - Subject to review and approval by new DOE appointees
 - Rule was negotiated

Regulatory Outlook - DOE

- Final rules expected in 2017
 - Commercial fans & blowers (test procedure)
- Rulemakings expected to start in 2017
 - VRF products
 - ASHRAE 90.1 products (Datacom, DOAS)
 - ULE evaporatively and water-cooled
 - Commercial refrigeration equipment
 - Walk-in coolers and freezers

Regulatory Outlook – RFI on Existing Rules


- EPA and DOE RFI inviting stakeholders to provide comments on existing regulations and other regulatory obligations that can be modified or repealed
 - U.S. EPA
 - +50,000 comments were filed
 - DOE – Comments due on July 14th.

EPA Regulations

- SNAP de-listing of High GWP refrigerants
 - Commercial Refrigeration (July 2015)
 - Chillers, cold storage warehouses (September 2016)
 - Lawsuit ongoing
- Refrigerant management - Extension of section 608 to HFCs (September 2016)
 - Lawsuit ongoing
- Next steps
 - Unclear given change of administration
 - Montreal Protocol, SNAP

Regulatory Outlook - California Short-Lived Climate Reduction Strategy

- Proposed to reduce HFC emissions by 40% by 2030
 - First published in April 2016
 - Approved on March 23, 2017
- Strategy:
 - Includes incentive programs to defray cost of low-GWP
 - Stresses importance of energy efficiency for low-GWP refrigerants
 - Proposes ban on sale of high GWP refrigerants $\geq 2,500$ and



Stationary Refrigeration or Stationary Air-Conditioning Sector	Refrigerants Prohibited in New Equipment with a 100-year GWP Value:	Proposed Start Date
Non-residential refrigeration	120 or greater	Unable to further evaluate
Air conditioning (non-residential and residential)	750 or greater	CRS to further evaluate

- Regulation expected to start fall 2017- Board approval in 2018/2019

Regulatory Outlook – Safety Codes and Standards

- ASHRAE 15 proposed requirements for 2L refrigerants
 - Addendum d addresses "high-probability systems" in applications for human comfort
 - Addendum h, addresses machinery room applications
 - New requirements to address residential applications (ASHRAE 15.2)
 - Completion by end of 2017 unlikely
- UMC
 - 2018 cycle underway – Task force established to develop requirements on 2L refrigerants
- IEC 60335-2-40
 - Revisions underway to include 2L refrigerants
 - Completion by end of 2017 unlikely
- IEC 60335-2-89
 - Revisions underway to increase charge limit of class 3 refrigerants
 - Completion expected in 2018

Montreal Protocol Developments

- Kigali Agreement
 - U.S. Senate ratification, unclear
- Multi Lateral Fund
 - ExCom Meeting - Bangkok (July 3-7)
 - ExCom Meeting - Montreal (November 13-17)
- Safety standards workshop - Bangkok (July 10)
- Open Ended Working Group (OEWG) – Bangkok (July 11-14)
- Meeting of the Parties (MOP) – Montreal (November 20-24)
- Issues
 - Energy efficiency
 - Refrigerant management
 - HFC-23 destruction
 - Codes and standards
 - MLF funding/implementation



Flammable Refrigerants Research

- AHRI Conducting (\$1.0 million) – (CARB \$0.3 million):
 - AHRTI-9007: Benchmarking Risk by Real Life Leaks and Ignitions Testing
 - AHRTI-9008: Investigation of Hot surface Ignition Temperature (HSIT) for A2L Refrigerants
 - AHRTI-9009: Leak Detection of A2L Refrigerants in HVACR Equipment
- ASHRAE conducting (\$1.2 million):
 - ASHRAE-1806: Flammable Refrigerants Post-Ignition Simulation and Risk Assessment Update
 - ASHRAE-1807: Guidelines for Flammable Refrigerant Handling, Transporting, Storing and Equipment Servicing, Installation and Dismantling
 - ASHRAE-1808: Servicing and Installing Equipment using Flammable Refrigerants: Assessment of Field-made Mechanical Joints
- DOE funding (\$3.0 million):
 - ORNL: Investigate the proper basis for setting charge limits of A2L, A2, and A3 for various types of products
 - NIST: Modeling tools for low-GWP refrigerant blends flammability

AHRTI 9007: Benchmarking Risk by Real Life Leaks and Ignitions Testing

- Objectives
 - Conduct A2L refrigerant leak and ignition testing under realistic conditions
 - Understand the risk relative to the A1 refrigerants while considering ambient conditions and refrigerant lubricants.
- Significant findings
 - R-410A with lubricant is not flammable
 - Factors having no effect on event severity
 - Refrigerant burning velocity
 - Temperature and humidity
 - Lubricant
 - Factors leading to increased event severity
 - Refrigerant concentration
 - Liquid refrigerant present in the room – many times as a fog
 - High Leak rate and low release height
 - Obstruction
 - Residue is highly corrosive (HF liquid acids and gases)

Future Work on Flammable Refrigerants

- A3 Refrigerants - \$0.3 Million funding from CARB
- Characterize refrigerant leak scenarios with actual equipment in "on" and "off" states
- Real world ignition sources
 - Ignition energy
 - Quantity
 - Spatial location throughout the room
 - Activation frequency

Questions & Discussion

Refrigeration Committee

Karim Amrane, Chair

Date:6/26/2017

Item #	MBO	Status	Date Due	Assigned To	Applicable Strategy #	MBO Comments	UPDATE
Included in Definition of Roles							
1	Develop and Expand Refrigeration Education & Outreach	OPEN	1/31/2017	Royal, Shockley, Rule	1c, 3d	<ul style="list-style-type: none"> i) Broadcast information on Milton Garland comfort cooling & Briley Awards in ASHRAE Insights and Members Newsletter. ii) Organize ALI Subcommittee. Assist in the development of programs for regional chapters on refrigeration concepts. Liaise with YEA. Royal developing course proposal with ALI. iii) Continue to support Handbook Subcommittee to assist with Refrigeration Handbook chapters. Shockley working with Don Fenton. iv) Update position document on ammonia v) Old version reaffirmed with full revision underway v) revise Refrigerants and their Responsible Use PD 	<ul style="list-style-type: none"> i) Awards were publicized. Briley Award presented at Winter Meeting ii) REF outlined ALI course for future completion iii) Handbook chapter reviews complete iv) PD on ammonia revision approved v) Old version reaffirmed with full revision underway
2	Support of ASHRAE Developing Economy Objectives	OPEN	1/31/2017	Dieryckx, Minor, Coulomb	4a, 4b, 3b	<ul style="list-style-type: none"> i) Training on environmental and safety concerns of alternative refrigerants for developing countries ii) Develop guidance on available alternatives or resources which promote energy efficient alternatives iii) Support dissemination of GRMI principles to developing countries 	<ul style="list-style-type: none"> i) Programs relevant to developing economies planned for Las Vegas. ii) REF exploring deliverables requested from Ad Hoc report. iii) ASHRAE is on GRMI steering committee.
3	Implementation of UNEP Partnership Goals	OPEN	Ongoing	Nair-Bedouelle, Aguilo, Robbins	4a, 4b	<ul style="list-style-type: none"> i) ASHRAE & UNEP will explore opportunities to promote responsible and sound management of refrigerants ii) ASHRAE and UNEP to cooperate and coordinate efforts related to energy efficiency in the buildings sector iii) ASHRAE through its Distinguished Lecturer (DL) program will work with UNEP to provide speakers to collaborative activities between UNEP and ASHRAE chapters/sections 	<ul style="list-style-type: none"> i) Joint ASHRAE, UNEP, IIR conference on sustainable management of refrigeration technologies in mobile marine and fisheries sectors (Bangkok 2017). ii, iii) UNEP course and new work plan approved.
4	Serve as the Technical Experts for Refrigeration related issues for ASHRAE	OPEN	Ongoing	Hon, Rajendran, Dieryckx, Minor	3c, 4a	<ul style="list-style-type: none"> i) Provide technical input to Tech Council and/or ASHRAE staff on refrigeration related legislative and regulatory issues ii) Act as a technical resource to RAC and the MTG on Lower GWP refrigerants on the ASHRAE research effort addressing flammable refrigerants 	<ul style="list-style-type: none"> i) REF will approach GGAC for input on relevant legislative and regulatory issues ii) REF continues to monitor A2L and other low GWP refrigerant research and issues.
5	Effective communication and operation of the REF Committee	OPEN	Ongoing	Amrane, Shockley, past Chairs	2a, 2b, 2c	<ul style="list-style-type: none"> i) Assure Technical Committee alignment ii) Development of a Planning Subcommittee for REF (current and future leadership) iii) Continued collaboration with other REF related organizations 	<ul style="list-style-type: none"> i) REF established subcommittee structure to help coordinate liaison activities and assignments. ii) ongoing iii) Liaisons with IIR, IAR, GCCA, UNEP assigned.

Refrigeration Committee
Nick Shockley, Chair
Date:6/26/2017

Item #	MBO	Status	Date Due	Assigned To	Applicable Strategy #	MBO Comments	UPDATE
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1	Develop and Expand Refrigeration Education & Outreach	OPEN	1/21/2018	Royal, Rule	1c, 3d	<ul style="list-style-type: none"> i) Broadcast info on Milton Garland comfort cooling & Briley Awards in ASHRAE Insights and Members Newsletter. Solicit award submissions from Chapters ii) Organize ALI Subcommittee. Assist in the development of programs for regional chapters on refrigeration concepts. Liaise with YEA. Royal developing course proposal with ALI. iii) Update position document on ammonia iv) revise Refrigerants and their Responsible Use PD 	Awards will be publicized in Insights, on website, Members 1st newsletters. REF exploring ALI course for Chicago PD on Ammonia revision approved by BOD Requested reaffirmation of current Refrigerants PD and request to revise PD is approved.
2	Support of ASHRAE Developing Economy Objectives	OPEN	6/24/2018	Minor, Coulomb	4a, 4b, 3b	<ul style="list-style-type: none"> i) REF and UNEP co-sponsored workshops and/or seminars on environmental and safety concerns of alternative refrigerants for developing countries ii) Develop guidance on available alternatives or resources which promote energy efficient alternatives iii) Support dissemination of GRMI principles to developing countries 	REF exploring deliverables requested from Ad Hoc report. Programs relevant to developing economies planned for Houston. ASHRAE is on GRMI steering committee.
3	Implementation of UNEP Partnership Goals	OPEN	Ongoing	Nair-Bedouelle, Robbins	4a, 4b	<ul style="list-style-type: none"> i) ASHRAE & UNEP will explore opportunities to promote responsible and sound management of refrigerants ii) ASHRAE and UNEP to cooperate and coordinate efforts related to energy efficiency in the buildings sector iii) ASHRAE through its Distinguished Lecturer (DL) program will work with UNEP to provide speakers to collaborative activities between UNEP and ASHRAE chapters/sections 	Joint ASHRAE, UNEP, IIR conference on sustainable management of refrigeration technologies in mobile marine and fisheries (Bangkok 2017). Linked to MBO#2 deliverables Refrigerants awareness package low GWP program
4	ASHRAE policy commentary on REF related issues	OPEN	24-Jun-18	assign in Chicago		<ul style="list-style-type: none"> i) Recommend what positions, if any, ASHRAE should take on public policy where feedback is sought by the governing agency (EPA, DOE, etc.) ii) Present recommendations to Tech Council and/or ASHRAE BOD for review and approval 	For refrigeration related policy
5	Effective communication and operation of the REF Committee	OPEN	Ongoing	Shockley, Dieryckx, past Chairs	2a, 2b, 2c	<ul style="list-style-type: none"> i) Assure Technical Committee alignment ii) Development of a Planning Subcommittee for REF (current and future leadership) iii) Continued collaboration with other REF related organizations 	REF established subcommittee structure to help coordinate liaison activities and assignments. Liaisons with IIR, IAR, GCCA, UNEP assigned. Liaising with ASHRAE TCs, SSPCs as well