



Shaping Tomorrow's
Built Environment Today

MINUTES (DRAFT)

Refrigeration Committee (REF)

January 13, 2019

Omni at CNN Center

Atlanta, GA

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

MEMBERS PRESENT:

Martin Dieryckx (MD), *Chair*
Rajan Rajendran (RR), *Vice-Chair*
Walid Chakroun (WC)
Didier Coulomb (DC)
Ayman Eltaloung (AE)
Stephen Gill (SG)
Charles Hon (CH)
Dustin Lilya (DL)
Sarah Maston (SM), *BOD Ex-O*
Barbara Minor (BM)
Mick Schwedler (MS), *CO*
Tony Welter (TW)

MEMBERS NOT PRESENT:

Yunho Hwang (YH)
William Walter (WW)

ASHRAE STAFF:

Steve Hammerling (SH), *MOT*

GUESTS:

Karim Amrane
Casey Briscoe
Eckhard Groll
Glenn Hourahan
Trent Hunt
Rainer Jakobs
Georgi Kazachki
Steve Kujak
Tunde Ogunde
Apichit Pongpana
Gustavo Pottker
Gurunarayana Ravi
Doug Reindl
Jason Robbins
Doug Scott
Elyse Sorenson
Shitong Zha

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MOTIONS

| No. | Motion | Page |
|-----|------------------------------------------------------|------|
| 1 | That the minutes from REF Annual Meeting be approved | 1 |

ACTION ITEMS – Winter 2019

| No. | Responsibility | Action Item | Status |
|-----|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------|
| 1 | Rajendran , Lilya, Hon, Dieryckx, & Rydkin | Explore a change to the name and scope of REF and reorganization of subcommittees. | |
| 2 | Gill , Chakroun, Rajendran, Maston | Review ROB/MOP changes that could incorporate membership on REF from outside other organizations | |
| 3 | Dieryckx , Lilya, Rajendran, Hon, Maston, D. Scott, G. Ravi | to work out a more formal proposal on what to do and how to do it for REF's for next meeting | |
| 4 | Staff | Share draft ASHRAE strategic plan and four initiatives with REF | |
| 5 | Gill | Consider program(s) relate to Refrigeration Day for future conference | |
| 6 | Coulomb | Develop a program with Peter Domansky for Kansas City on IIR activities | |
| 7 | REF, Staff | Propose which TC/SSPC they participate on and can serve as REF liaison to. | |
| 8 | Coulomb | Send harmonized IIR/ASHRAE to REF | |
| 9 | REF | Review ASHRAE/GCCA MOU and prioritize list of activities. | |

ACTION ITEMS – Annual 2018

| No. | Responsibility | Action Item | Status |
|-----|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------|
| 1 | Staff | Collect Briley Award articles and send to judges | Complete |
| 2 | Staff | Send Wolf past GCCA liaison reports | |
| 3 | REF | Determine which ASHRAE committees should be included for input on RTOC | Complete |
| 4 | Staff | Send TC, SSPC committee list to Dieryckx and Rajendran | Complete |
| 5 | Lilya, Rajendran, Hon, Dieryckx, and Rydkin | REF formed ad hoc to further study scope and purpose and recommend changes | |
| 6 | REF | Invite interested parties on REF scope discussion and R in ASHRAE to 1 hour meeting during REF meeting in Atlanta | |

LIST OF ATTACHMENTS

| No. | Attachment |
|-----|------------------------|
| A | BOD Ex-O report |
| B | CTTC presentation |
| C | Regulatory Issues |
| D | ASHRAE/UNEP activities |

LIST OF ACRONYMS

| | | | |
|--------|---------------------------------------------------------------------------|--------|-------------------------------------------------------------------------|
| AC | Air Conditioning | IIR | International Institute of Refrigeration |
| AI | Action Item | IoR | Institute of Refrigeration |
| ALI | ASHRAE Learning Institute | ISHRAE | Indian Society of Heating, Refrigerating and Air-conditioning Engineers |
| ASHRAE | American Society of Heating, Refrigerating and Air-conditioning Engineers | MBO | Management by Objectives |
| BOD | Board of Directors | MOP | Manual of Procedures |
| CNV | Chair Not Voting | MOT | Manager of Technical Services |
| CRC | Chapters Regional Conference | MOU | Memorandum of Understanding |
| CTTC | Chapter Technology Transfer Committee | PD | Position Document |
| Ex-O | Ex-Officio | RatRU | Refrigerants and their Responsible Use |
| GFCCC | Global Food Cold Chain Council | REF | Refrigeration Committee |
| GCCA | Global Cold Chain Alliance | RP | Research Project |
| GRMI | Global Refrigerant Management Initiative | RTOC | Refrigeration Technical Options Committee |
| GWP | Global Warming Potential | SSPC | Standing Standard Project Committee |
| HVAC | Heating, Ventilating, Air Conditioning | TC | Technical Committee |
| IAR | International Institute of Ammonia Refrigeration | UNEP | United Nations Environment Programme |

1. CALL TO ORDER

Chair Martin Dieryckx called the meeting to order at 8:00 AM. Members and guests introduced themselves. Staff confirmed quorum.

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 additions or changes were made to the agenda sent ahead of meeting.

4. MINUTES

A. It was moved (BM) and seconded (WC) that,

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

MOTION 1 PASSED: 9-0-0, CNV

BACKGROUND: Minutes were distributed in July 28th email.

5. CHAIR'S REPORT – Dieryckx

A. Motions from Past Meetings Requiring Higher Body Approval

There were no motions from past REF meetings required higher body approval.

B. New Information Items for REF

1. RTOC report – ASHRAE comment and feedback

Dieryckx notes that REF had participated in a technical review of the UNEP Refrigeration Technical Options Committee (RTOC) report. Comments were well received and will be incorporated into the RTOC report when completed in March or April 2019. IIR and other organizations participated and commented too and it is important for ASHRAE to participate and have a voice as well. ASHRAE will be recognized as a reviewer in the RTOC document. Rajendran noted all sections were commented on in the review with 50-200 editorial and substantive comments per chapter so outside review is critical to optimizing the report. Dieryckx suggested ASHRAE participate in the review of this document when it is revisited every 4-5 years

This review process can be improved and serve as a model for ASHRAE to participate in future technical reviews. REF can reach out to related ASHRAE Technical Committee and other experts. Rajendran noted that for ASHRAE to do these reviews effectively, ASHRAE cannot wait until a request is received from an organization. There is typically only a 30 day window to review so it is crucial that REF seek and be aware of such reviews and that the plan and structure be in place to start immediately when a request is received.

2. R in ASHRAE BOD ad hoc committee

Trent Hunt reported on work done to date with the R in ASHRAE ad hoc committee he chairs noting he'd issued a draft report to the BOD ahead of the Winter Meeting.

Hunt summarized there is some confusion among groups within ASHRAE as to what R in ASHRAE really means. It is specifically related to cold chain or would it include HVAC as well? These differences can lead to confusion and fragmentation. A common definition for society of refrigeration may be helpful. There was differing views among REF members if the

focus should include HVAC or just cold chain. Hunt noted ~7,000 ASHRAE members (~15%) indicated they had an interest in refrigeration but it wasn't clear if their interest was cold chain or HVAC. The ad hoc plans to re-poll these members to clarify.

Hunt noted his draft report lists nine (9) potential action items. The report will be made available to REF and the committee may eventually be asked to help implement.

Based on the Ad Hoc reviewing the 'R in ASHRAE', REF will consider a change the name and scope of REF and rename and reorganize subcommittees. Goal to make future proposal. Rajendran would lead effort with help from Lilya, Hon, Dieryckx, & Rydkin (**AI #1**).

3. Liaison status

Dieryckx noted we currently have voting members who are with UNEP, IIR IOR. In the recent past REF has had members from IIAR and other organizations. These are valuable connections and he wished to examine how to make these permanent standing members so for example a UNEP liaison stays a voting member of REF.

Schwedler suggested ad hoc review MOP/Reference Manual in two scenarios: 1) liaisons to the committee (no fiscal impact), or 2) consultants or voting members of REF (fiscal impact for travel)

REF will evaluate the current membership structure and status. Outside organizations (IOR, IIR, UNEP, GCCA, IIAR, etc.) that have a MOU with ASHRAE may become permanent members. TC chairs could become non-voting members instead of liaisons in order to assure a better link with REF.

An ad hoc committee was appointed (**Gill**, Chakroun, Rajendran, Maston) to look at ROB/MOP changes that could incorporate membership on REF from these other organizations (**AI #2**).

4. Idea on state of art of refrigeration document

Dieryckx brought up an idea for REF to develop, perhaps two times per year, a report on global technology updates for different applications. This could include information on technology (components, expansion, piping, compressors, etc.) for various applications (capacity control, regulations, etc.). The report could even summarize factors driving technologies and could be used as a tool to update the handbook and to promote the ASHRAE 'R' activities of the REF committee.

Schwedler suggested working with Publications, or Special Publications committees, pointing to TC 9.9 as example of a publication series

Dieryckx agreed to lead a task force including REF members (Lilya, Rajendran, Hon, Maston) and guests (Doug Scott, Guru Ravi) to work out a more formal proposal on what to do and how to do it for REF's for next meeting (**AI #3**).

Maston challenged REF and TCs to rewrite refrigeration handbook and to think about what the refrigeration volume could be and should include. What would it look like if it were to start from scratch? The RP-1634 final report includes some new material and part of its intent was to identify new things that can be used for handbook or future research.

6. VICE-CHAIR'S REPORT – Rajendran

A. Fiscal Report

Rajendran reviewed latest budget and had no recommendations for additions or changes.

B. MOP/ROB/Reference Manual

No changes to these documents were suggested at this time. However, the new task groups looking at the REF name and scope and liaison membership options may eventually suggest some changes.

7. BOD/TECH COUNCIL REPORTS

A. BOD EX-Officio – Maston

Maston presented the Ex-O presentation (**Attachment A**). Highlights for REF include:

- New ASHRAE membership models will roll out, possibly for Society Year 2020-21
- Maston asked anyone rolling off REF to suggest to her which committees you may wish to participate on in the next society year
- The spring ASHRAE membership ballot will include bylaws changes to consider
- New UNEP sponsored ALI courses on refrigerants are expected to be available soon

B. Coordinating Officer – Schwedler

Schwedler thanked REF members for their work and emphasized he wanted to make sure they had whatever resources they need for success. He noted standing committees of Tech Council are being asked to consider two questions: 1) lean assessment - can REF change current programs/budgets to do things more efficiently/effectively, 2) are there ways to increase revenues?

Schwedler also noted ASHRAE is developing a new strategic plan with four initiatives. A draft is available and staff would share (**AI #4**). Schwedler asked REF to review and identify REF programs (and associated budgets) that can contribute to these strategic plan initiatives.

8. AWARDS

A. Milt Garland & Comfort Cooling Awards

Staff noted the deadline for new Milt Garland or Comfort Cooling Award nominations is May 1st deadline. Members should forward any project nominations to staff to assure they are considered.

B. Briley Award

The 11th annual George C. Briley Award for the best refrigeration-related article published in the ASHRAE Journal was presented to Stephen Kujak and Elyse Sorenson for their article "*Haloolefins Refrigerants*".

9. SUBCOMMITTEE REPORTS

A. Refrigeration Education & Outreach Learning Institute (MBO #1) – Chakroun, Hon, Welter

No report was given. New education subcommittee members will review MBO.

B. Programs – Hwang

1. Atlanta

Hwang was not in attendance but it was reported that REF co-sponsored Seminar 23, *Advances in Low-GWP Refrigeration System Applications* in Atlanta.

2. Kansas City

Chakroun suggested REF sponsor tracks at the specialty conference in Kuwait, possibly even at ASHRAE CRCs.

Georgi Kazachki offered to develop a program on the state of art in low GWP refrigerant refrigeration technologies for a future ASHRAE Meeting.

Stephen Gill suggested a program for Refrigeration Day on June 26. This is the last day of the ASHRAE Conference in Kansas City and would consider proposing (**AI #5**). Another seminar was suggested for after Refrigeration Day summarizing celebration activities throughout the world.

Coulomb agreed to develop a program with Peter Domansky for Kansas City on IIR activities (**AI #6**).

C. Position Document (PD) Updates

1. *Refrigerants and their Responsible Use* PD

The revised *Refrigerants and their Responsible Use* (RatRU) PD was published in July. REF should now review the *Ammonia as a Refrigerant* PD to see if it should be reaffirmed, revised, withdrawn, or incorporated into the RatRU PD. The *Ammonia as a Refrigerant* PD expires in January 2020.

10. OTHER REPORTS

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

Hon attended CTTC meetings in Atlanta and gave a presentation on behalf of REF (**Attachment B**). Hon agreed to start reporting on European and other international developments and advancements of the state of the art.

B. Regulatory Issue Update – Amrane

Amrane summarized a presentation on regulatory issues (**Attachment C**).

C. GRMI update – Chakroun

Chakroun updated REF on GRMI activities noting they've not met recently but are meeting tomorrow. The refrigeration driver license program has been established and will consider approved via letter ballot in the next couple weeks.

D. ASHRAE 2L research updates

No specific updates on the research projects were offered but the MTG is overseeing these projects is meeting four times here in Atlanta. So there will be research updates after this meeting. Hon participates on the MTG and agreed to update REF on research for next meeting.

E. Liaisons

1. TCs & SSPCs

Dieryckx noted the MOP states that REF should have liaisons with TCs. This has been done in the past but not recently. REF used to have a spreadsheet of TCs, liaison assignments, and reporting information. Dieryckx asked all to propose what TC/SSPC they participate on. Staff to complete, ID gaps, and ask in KC formal assignments (**AI #7**).

Minor noted TAC is consideration a consolidation plan of TCs that could eventually change the TC structures.

2. International Institute of Refrigeration (IIR) - **Coulomb**
Coulomb noted the task to harmonize five terms in the IIR/ASHRAE dictionary was complete and would share with REF (**AI #8**).

IIR will hold their 25th Congress of Refrigeration in Montreal in August 2019. Almost 1000 abstracts invited. Still seeking sponsors. Information available at www.iifiir.org.

3. UNEP – Eltalouny
Eltalouny gave a presentation summarizing ASHRAE/UNEP cooperation (**Attachment D**) highlighting current activities and the 2019-20 work plan:
 - ASHRAE/UNEP online courses developed on Refrigerants Literacy and Sound Management of Refrigerants to be made available to members soon
 - ASHRAE will give presentation at REFCOLD
 - Submissions for UNEP/ASHRAE award for Innovation in Refrigerant Management are being accepted til May 15
 - University course developed on Refrigerant Management for Future Engineers
4. Global Cold Chain Alliance (GCCA) liaison report
Wolf resigned as GCCA liaison and Doug Scott agreed to serve. Scott suggested sending the MOU, which has been around for ten years, to REF seeking opinions on what the top three priorities should be (**AI #9**).
5. IOR – Gill
Gill noted the affiliate membership program for ASHRAE and IOR is now open. 20 members took advantage of this on the first day it was available (Aug. 1). Gill would send event dates and publications to staff for inclusion in REF minutes.
6. Other
Rajendran noted he would be REF's liaison to the Global Food Cold Chain Council (GFCCC) going forward. Information on the organization can be found at www.foodcoldchain.org.

11. STRATEGIC ISSUES

- A. MBO Updates – MBO leaders
Dieryckx noted many of the MBOs were discussed through meeting. Updates on MBOs will be reported to the Operations Subcommittee of Technology Council.
- B. Tech Council Innovative Ideas
No new suggestions for the list were provided.
- C. REF Strategic Planning
Dieryckx summarized REF's earlier discussions, action items and ad hoc committees that took place during the chair's report.

12. NEXT MEETING

REF will hold a spring web meeting if warranted. REF will next meet face to face at the ASHRAE Annual Meeting in Kansas City, MO on Sunday, June 23, 2019 from 8a-12pm.

13. ADJOURNMENT

Committee adjourned at approximately 12:00 PM.



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."*



Attend Presidents Lunch



Monday, January 14



ASHRAE President 2018 - 2019
Sheila J. Hayter, P.E.

Photo Courtesy Dennis Schroeder/NREL



ASHRAE Wants You!

- Nominations for appointed standing committees are sought annually
- Speak with your committee ExO if your appointed term is ending and you wish to be nominated for another Committee - **beginning July 1, 2019**
- Self-nomination is also encouraged
- Nominations are due by **mid-February 2019**
- Councils are elected by the Board of Directors, but nominations are needed

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.

| | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Board Officer and Director Recommendations:</p> <p>Link closes for the following Society year each September 29th</p> <p>ashrae.org/about/leadership/ashrae-board-of-directors/recommendations</p> | <p>Board-elected Standing Committee and Council Nominations:</p> <p>Link closes for the following Society year each September 15th</p> <p>ashrae.org/bodnom</p> | <p>Standing Committee Nominations, Appointed by the President-Elect:</p> <p>Link closes for the following Society year each February 15th</p> <p>ashrae.org/commnom</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



Presidential Ad Hoc


Standards Membership Model Ad Hoc

- Three new membership models under consideration
- Final recommendation to go before the BOD – **during 2019 Annual Conference**
- New model placed – **2020-21 (Projected)**

Smart Grid Design Guide Ad Hoc

Scope: Oversee the development and publication of a Smart-Grid Application Guide that will provide building owners, managers, and designers the guidance they need to understand the smart grid and applicable standards and regulations, and to design and operate systems in this new smart-grid environment. The guide will focus on the concrete steps needed to prepare a building for the smart grid.

- Overseen by a Presidential Ad Hoc Committee
- Chair: Steve Bushby



Proposed ASHRAE Bylaws Changes on Spring Ballot

- Nominations may be made in writing by not fewer than one percent of ASHRAE members eligible to vote. The minimum number of members required shall be based on the membership roster of the first day of that Society year. No more than 10% of the minimum number of signatures required shall be from one chapter and no more than 30% of the minimum number of signatures shall be from one region.
- One year of credit maximum for ASHRAE Certified Professional credential(s).



ASHRAE's Commercialism Policy

ASHRAE's Commercialism Policy allows for Society activities that fulfill the mission of technological advancement with adherence to business plans that generate income to offset operational expenses such as AHR Exposition, ASHRAE periodicals, website, and Society conference events such as the Welcome Party, luncheons, registration kits and receptions.

Principles for Managing Advertising and Sponsorships

Content should be labeled as advertising or sponsored.
 Use of commercial names and logos shall not imply ASHRAE endorsement, approval or certification of products or services.
 The inclusion of commercial information shall be fair and unbiased so as to avoid explicit promotion of a product or commercial entity.
 Content shall adhere to accepted business practices specified by the U.S. Federal Trade Commission and recognized publishing authorities.
 Activities including events at chapter meetings shall be managed to prevent an atmosphere in which commercial entities are encouraged to critique one another in the public forum.

As the business environment and communication technologies evolve, the policy is under continuous review with the aim to strike the right balance to help fulfill ASHRAE's mission.

For additional guidance:
ashrae.org/about/governance/ashrae-commercialism-policy-and-guidelines



ASHRAE HQ Update

ASHRAE has purchased a building at **180 Technology Pkwy**, approximately 10 miles north of our current location. The building will be renovated to serve as ASHRAE's new headquarters. We are excited to demonstrate leadership in our industry by transforming an existing building into a state-of-the-art built environment.



- ASHRAE is now in the beginning stages of a major capital campaign to fund these renovations.
- Move by October 2020



ashrae.org/newhq



New and Enhanced Resources

- Building EQ Web Portal – **December 2017**
- Advanced Energy Design Guide for K-12 School Buildings – Achieving Zero Energy – **January 2018**
- Redesigned Website (ashrae.org) – **February 2018**
- ASHRAE 365 year round app – **May 2018**
- Handbook PDFs Now in Technology Portal – **June 2018**
- New Online Comments Database – **September 2018**
- HVAC Designer certification launch – **June 2019**



Certified HVAC Designer (CHD) Certification

Industry Need & Demand

In an "Industry Need" survey, ASHRAE Member respondents agreed:

- "The level of competence among HVAC Designers varies greatly" – 95%
- "HVAC Designer certification is a worthwhile professional development goal" – 85%
- "It is a tool to identify competent new hire prospects" – 74%

Next Steps

- CHD Candidate Guidebook Available – **February 1**
- CHD Application Launch – **March 1**
- CHD Practice Exam Launch – **May 1**
- Computer-based Testing Worldwide – **June 1**



Expanded Government Outreach Days

- "Days on the Hill" rebranded to "Government Outreach Days" to make more relevant for different types of government visits and regions of the world
- Expanded to Federal Outreach and Local Outreach
- All ASHRAE Members are invited to participate – Get Involved!**
- Meetings with Government Officials are growing:
 - SY 2016-17: 8
 - SY 2017-18: 16
 - SY 2018-19: 24 (anticipated)



2019-2024 Strategic Plan

Timeline

- November 2017 - December 2017: Select Strategic Plan consultant & negotiate contract (*Complete - McKinley Advisors*)
- January 2018: Consultant presentation to BOD at ASHRAE Winter Meeting (*Complete*)
- March 2018: Board strategic planning session (*Complete*)
- June 2018: Board reviews first draft of Strategic Plan (*Complete*)
- November 2018: Board reviews and approves revised draft of Strategic Plan (*Complete*)
- December 2018-March 2019: Stakeholder review of and feedback on revised draft of Strategic Plan – Including Stakeholder development of Budgets and Fiscal Impact
- April/May 2019: Work Plan Planning Sessions with Responsible Committees & Councils
- May 2019: BOD approves Final Strategic Plan 2019-2024 at Spring 2019 Board Meeting
- July 2019-June 2024: Plan is implemented, tracked, and updated as necessary with status reported with Dashboard



Recent Publications

- 2018 International Green Construction Code (IgCC)
- ANSI/ASHRAE Standard 188-2018, Legionellosis: Risk Management for Building Water Systems
- ANSI/ASHRAE/IES Standard 202-2018, Commissioning Process for Buildings and Systems
- Stakeholder's Guide to Commissioning
- A Practitioner's ASHRAE Guideline 32-2018, Management for Sustainable High-Performance Operations and Maintenance
- Guide to Engineering Management
- ASHRAE Position Document on Climate Change
- ASHRAE Position Document on Refrigerants and Their Responsible Use
- ANSI/ASHRAE Standard 222-2018, Standard Method of Test for Electrical Power Drive Systems
- Revised editions of the following method of test standards: 32.2-2018, 41.9-2018, 72-2018, 158.2-2018, 174-2018
- ANSI/ASHRAE Standard 29-2015 (RA 2018), Method of Testing Automatic Ice Makers
- ASHRAE Guideline 11-2018, Field Testing of HVAC Controls Components
- ASHRAE Guideline 38-2018, Guideline for Using Metal Pressure Vessels to Test Materials Used in Refrigeration Systems
- Spanish Translations: ASHRAE Guideline 1.3-2018, The Strategic Guide to Commissioning



Upcoming Publications

- District Cooling Guide, 2nd edition (*Spring 2019*)
- District Cooling Owners' Guide (*Spring 2019*)
- Design Guide for Multifamily Residential Buildings (*Spring 2019*)
- Data Center Infrastructure Management (Datacom Series) (*Spring 2019*)
- Design Considerations for Datacom Equipment Centers, 3rd ed. (Datacom Series) (*Spring 2019*)
- Design Guide for Combustion Turbine Inlet Air Cooling Systems, 2nd ed. (*Summer 2019*)
- High-Performance Buildings Simplified textbook (*Summer 2019*)
- Advanced Energy Design Guide for Small to Medium Office Buildings: Achieving Zero Energy (*Summer 2019*)
- Smart Grid Application Guide for Building Professionals (*Summer 2019*)
- Design Guide for Duct Systems (*Fall 2019*)
- Design Guide for Cool Thermal Storage, 2nd ed. (*Winter 2019*)



New ASHRAE Learning Institute Courses

- Choosing the Right Energy Code for Your Project-IECC or ASHRAE 90.1-2016
- How Smart, Efficient, Sustainable Systems Lead to Improved Resilience
- Solar PV & Thermal Systems Analysis and Design
- ASHRAE 90.1 Code Compliance & Plan Review for Authorities Having Jurisdiction
- Introduction to Refrigerants
- Refrigerant Selection
- Refrigerant Management
- Designing for IAQ: Complying with the Requirements of Standard 62.1 (MENA) (Dubai Training Center)
- HVAC Design: Level II-Applications (MENA) (Dubai Training Center)
- New Developments in Lower GWP Refrigerants (MENA) (Dubai Training Center)
- Standard 90.1: HVAC/Mechanical Design and Appendix G (MENA) (Dubai Training Center)



Upcoming ASHRAE Learning Institute Courses

- Safe and Energy Efficient Laboratory Exhaust Stacks
- Guideline 36 Control Sequences
- The New IgCC®
- Improved Presentation Skills
- Installing DDC Control Systems
- Cold-Climate Design Guide
- Hot-Climate Design Guide



Publishing/Education Strategies to Improve Content Access

Enhance member access using online delivery

- Technology Portal for *ASHRAE Journal*, Research Reports, Conference Papers, Seminars
- Handbook PDFs added to Technology Portal to eliminate CDs
- 90.1 Portal syncs the 2016 standard with the user's manual plus red-line version

Expand content available electronically

- Free Online Access to *Science & Technology for the Built Environment*, ASHRAE's journal of archival research

Use web-based tools to optimize volunteer time

- Handbook Chapter Authoring Teams using Authoring Portal for 2019 Handbook

Customize training and translate publications applying business models

Trackable delivery of Handbooks to more countries



See You There!

- ACREX India 2019
February 28-March 2, 2019 – BEC, Mumbai, India
- 2019 China Refrigeration Expo
April 9-11, 2019 – Shanghai, China
- 2019 ASHRAE Annual Conference
June 22-26, 2019 – Kansas City, MO
- International Congress of Refrigeration 2019
August 24-30, 2019 – Montréal, Québec, Canada



Questions?

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



CTTC REF Report
ASHRAE Winter Conference Atlanta 2019

January 11, 2019

ASHRAE Refrigeration Committee (REF)
 Liaison Report to
Chapter Technology Transfer Committee
 2019 Winter Conference Atlanta GA

Refrigeration Liaison: Charlie Hon
 chon@truemfg.com

1

CTTC REF Report
ASHRAE Winter Conference Atlanta 2019

Regulatory Activities on Refrigerants - EPA
 Lawsuit - U.S. EPA SNAP

Supreme Court refused to hear the case striking down HFC replacements

EPA lacks sufficient authority to regulate HFCs under Section 612 of CAA

The EPA is proposing to remove Leak Restrictions on HFCs

2

CTTC REF Report
ASHRAE Winter Conference Atlanta 2019

EPA SNAP Requirements for Leak Reductions
 Annual Leak Rate Reductions Effective 1/1/2019

| Appliance Type | Current Leak Rate | 2019 Allowable Leak Rate |
|----------------------------------|-------------------|--------------------------|
| Industrial Process Refrigeration | 35% | 30% |
| Commercial Refrigeration | 35% | 20% |
| Comfort Cooling | 15% | 10% |
| All Other Appliances | 15% | 10% |

3

CTTC REF Report
ASHRAE Winter Conference Atlanta 2019

California is moving forward with the same regulations as those struck down by the court

California new regulations will be on the same schedule as the original SNAP regulations.

4

CTTC REF Report
ASHRAE Winter Conference Atlanta 2019

A consortium of States have formed the
 "United States Climate Alliance"
 (The "Alliance" includes 16 states and Puerto Rico)

New York had the first round of Webinars to go forward with implementing the same rules as California

(Maryland, Connecticut, Washington, Oregon, New Mexico and Colorado are considering the same actions.)

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Technical References:

REF Webpage: www.ashrae.org/refrigeration

Recent Meeting Minutes

Manual of Procedures, Rules of the Board, REF Reference Manual
 Members First! Newsletters

UN information and Useful Links Index

http://www.iifir.org/medias/medias.aspx?INSTANCE=exploitation&PORTAL_ID=portal_model_instance_News_dossiers_thematiques_en.xml&SYNCMENU=DOSSIER_THEMATIQUE&SETLANGUAGE=EN

The next two slides contain recent additions to this UN information base

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There are many new ideas and products in HVAC&R being developed outside of the North American market. The Refrigeration Committee plans start introducing these ideas and products so that the regional committees are made aware of innovations.

Topics to be considered will include:

- Refrigerants not presently approved for particular applications by SNAP
- New Applications for "Natural Refrigerants"
- New Technologies being reviewed outside of the North American Market
- Special applications in adverse environments

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UN Cold Chain Technology Briefs (2018)

Food Production and Processing

http://www.iifir.org/userfiles/file/webfiles/in-depth_files/Brief_RefrigerationFoodProductionProcessingBD.pdf

COLD STORAGE AND REFRIGERATED WAREHOUSES

http://www.iifir.org/userfiles/file/webfiles/in-depth_files/Brief_ColdStorageRefrigeratedWarehouseBD.pdf

Commercial, Professional and Domestic Refrigeration

http://www.unep.fr/ozonaction/information/mmcfiles/7940-e-Commercial_professional_and_domestic_refr.pdf

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UN Cold Chain Technology Briefs (Continued)

Transport Refrigeration

http://www.iifir.org/userfiles/file/webfiles/in-depth_files/Brief_TransportRefrigerationBD.pdf

Fishing Vessel Applications

http://www.iifir.org/userfiles/file/webfiles/in-depth_files/Brief_FishingVesselApplicationBD.pdf

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CTTC REF Report
ASHRAE Winter Conference Atlanta 2019

Seminar 23: Advances in Low-GWP Refrigeration System Architectures

Monday, January 14

8:00 AM–9:30 AM

Location: GWCC, 4th Floor, Building A, A410

The seminar introduces new refrigeration system architectures in line with the new design trends aiming at reducing the refrigerant charge, increase in energy efficiency, and extending the temperature application range

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Advances in Low-GWP Refrigeration System Architectures
 Seminar 23: Presentation 1: Micro-Distributed Systems

Advances in Low-GWP Refrigeration System Architectures
 Application of CO2 Transcritical Advanced Technologies in Hot Climates

Advances in Low-GWP Refrigeration System Architectures
 Combining HFO's with Various System Architectures to Reduce Energy Use and Emissions in Commercial Refrigeration

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CTTC REF Report
ASHRAE Winter Conference Atlanta 2019

Seminar 40: Update on Global Policies and Programs for Best Use of Refrigerants

Monday, January 14

2:15 PM–3:45 PM

Location: GWCC, 3th Floor, Building B, B313b

This session provides updates on global refrigerant regulations and efforts to best use of refrigerants throughout lifetime.

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Seminar 40: Update on Global Policies and Programs for Best Use of Refrigerants

- Presentation 1: An Overview of Refrigerants Related Policies in Article 5 Countries and UN Environment Partnerships to Support Compliance with the Protocol
- Presentation 2: The Application of the EU F-Gas Regulations: An Example for Other Regions?
- Presentation 3: IIR Actions to Reduce Refrigerant Emissions
- Presentation 4: US GHG Regulation and EERE Program Update

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CTTC REF Report
ASHRAE Winter Conference Atlanta 2019

- **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)**
 - Kindred Refrigeration Organizations

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CTTC REF Report
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- **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 Winter Conference Atlanta 2019

- **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 Winter Conference Atlanta 2019

- **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 Winter Conference Atlanta 2019

- **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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Regulatory Update

Refrigeration Committee Meeting - January 13, 2019

Karim Amrane

Regulatory Outlook - DOE

- Pending final rules
 - Commercial water heaters
 - Definitions for residential water heaters
- Pending Notices of Proposed Rulemaking (NPRM)
 - Certification & compliance of various heating and cooling consumer products & industrial equipment
 - Process rule
 - Residential furnaces (SNPRM)
 - Test procedure interim waiver
 - Test procedure waiver
 - Test procedure commercial A/C and Heating equipment
- ASRAC negotiations
 - VRF products
- Pre-rulemaking stage
 - Walk-in coolers/freezers (energy efficiency & test procedure)
 - Commercial icemakers (test procedure)
 - Commercial refrigeration (test procedure)
 - 3-phase commercial unitary < 45 kBTU/h (test procedure)
 - Furnace fan (test procedure)
 - Direct heating equipment (energy efficiency & test procedure)

Regulatory Activities on Refrigerants - EPA


- Lawsuit - U.S. District Court of Appeals decision to limit use of HFCs under SNAP
 - EPA lacks sufficient authority to regulate HFCs under Section 612 of CAA
 - Petition for rehearing *en banc* of the panel decision was denied
- SNAP Rule 20 was officially vacated ***"to the extent it requires manufacturers to replace HFCs with a substitute substance."***
- Supreme Court decided not to hear case

Regulatory Activities on Refrigerants - EPA

- U.S. EPA Section 608
 - Two industry coalitions have filed for judicial review and one has submitted a petition for reconsideration of final rule on refrigerant management requirements under Section 608 of the CAA.
 - On August 14, 2017, EPA announced its intention to propose revisions to certain aspects of the final rule.
 - On October 1, 2018, EPA issued a proposed rule
 - Revise appliance maintenance and leak repair provisions so they would apply only to ozone depleting substances and not HFCs
 - Comment period ended on November 15, 2018.

Regulatory Activities on Refrigerants - California

- SB 1013, the "California Cooling Act" (September 2018)**
 - Adopted SNAP Rules 20 and 21 prohibitions into State law
 - Establishes an incentive program for low-GWP technologies
 - Effective date Jan 1, 2019 (new equipment only)
- Rulemaking 1 – Stationary Air conditioners**
- Rulemaking 2 – Stationary Refrigeration & Amendments to refrigerant Management Plan**



Rulemaking 1 – Stationary AC

- Prohibit refrigerants with a GWP ≥ 750 in all new air conditioners beginning **January 1, 2023**
 - Based on date of manufacture
 - 6 month sell-through period
 - Allow distribution through California to other states
 - Exclude chillers—Implement the SB 1013 bans on certain HFCs in chillers (2024)
- Timetable**
 - Public workshops and Stakeholder meetings Winter 2018 – Summer 2019
 - Economic Impact Assessment June 2019
 - Staff Report (ISOR) October 2019
 - 45-Day public comment opens October 2019
 - Board Meeting December 2019
 - Regulation Effective Date January 2023

Rulemaking 2 – Stationary Refrigeration & RMP Amendments

- January 1, 2022: no sales or installation of **new systems** containing a refrigerant with a GWP of 150 or greater (applies to systems containing more than 50 lb of refrigerant)
 - Potential exemption – hybrid systems (case-by-case)
- January 1, 2022: no sales, distribution, or import for use in California, of **virgin refrigerants** with a GWP of 1500 or greater
 - Potential exemption 1 – Reclaimed refrigerants allowed
 - Potential exemption 2 – R-410A for servicing stationary AC
- Some changes to existing RMP regulation
 - Technician requirements
 - Improve clarity
 - Add definitions
 - Align with federal rule 608

Rulemaking 2 – Stationary Refrigeration & RMP Amendments

- Timetable
 - 1st workshop: October 2018
 - Technical working group meetings late 2018 – Mid 2019
 - Economic Impact Assessment September 2019
 - Staff Report February 2020
 - 45-Day public comment opens February 2020
 - Board Meeting March 2020
 - Regulation Effective Date January 2022

Regulatory Outlook – Safety Codes and Standards

- ASHRAE 15 requirements for 2L refrigerants approved in October 2018
 - 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 expected in 2019
- UMC
 - 2021 cycle underway – SSPC 15 filed comments consistent with addendum d and addendum h
 - Comments will be reviewed on April 29-May 2, 2019 in Denver
- IEC 60335-2-40
 - 2018 version published in January
 - Includes requirements on 2L refrigerants
 - WG 16 working on new requirements for A2 and A3 refrigerants
- IEC 60335-2-89
 - Revisions completed to increase charge limit of class 3 refrigerants to 500g
 - FDIS currently balloted – Publication expected first quarter of 2019

Montreal Protocol Developments

- Kigali Amendment
 - Entered into force on January 1, 2019
 - Has been ratified by 67 countries (as of Jan 7th)
 - U.S. Senate ratification unlikely under current administration
- Open Ended Working Group (OEWG) – Vienna (July 11-14, 2018)
 - Energy efficiency workshop
- Meeting of the Parties (MOP) – Quito (November 5-9, 2018)
 - Report by the Technology and Economic Assessment Panel on energy efficiency in the refrigeration, air conditioning and heat pump sectors
 - Unexpected emissions of CFC-11
 - Destruction technologies for controlled substances
 - MLF guidelines for financing the phase-down of HFCs
- Next OEWG meeting – Bangkok (July 1-5, 2019)
- Next MOP meeting – Rome (November 4-8, 2019)



Questions & Discussion



ASHRAE - UN Environment Cooperation
Follow-up on 2017 & 2018 Work Plan
Introduction 2019 & 2020 Work Plan

Refrigeration Committee Meeting
Atlanta
12 January 2019

Background of ASHRAE – UNEP Cooperation

1. Cooperation agreement signed in 2007
2. Why ASHRAE; ability to bring key industry experts under one roof, global confidence and acceptance for ASHRAE references plus ASHRAE presence in different countries regions
3. Biennial work-plans established since 2009, **current plan for 2017-2018 launched in Jan-2017. 2019-20 work plan to be signed at AASA meeting.**
4. Many joint events and session organized jointly with ASHRAE
5. Leadership Committee established to ensure timely implementation and follow-up on the work plans and activities.

Main theme of 2017-2018 Work Plan
Working Beyond High-GWP Refrigerants

| Main Goals | Actions |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advocacy and Knowledge Sharing | <ul style="list-style-type: none"> • Global Conferences and Events • Refrigerants Awareness Package • Low- GWP Innovation Award Program |
| Training, Education and Practice | <ul style="list-style-type: none"> • Online Training Program on Refrigerants • Contemporary Learning Tools for Universities • Assessment Program for RAC Plants |

Examples - Cooperation in conferences and events with partners




1. International Conference on Sustainable Technologies of RAC in Marine/Off-Shore Fisheries Sectors, Bangkok (April 2017)
2. International Conference on District Cooling for Urban Development, Sharm Al-Sheikh, Egypt (Sept 2017)
3. ASHRAE Developing Economies Conference, Delhi (Nov 2017)
4. Side Event at Montreal Protocol Meetings, Montreal (2017)
5. ASHRAE presentation at UNEP Seminar at REFCOLD in India Nov 2018 on Cold Chain in Article 5 Countries and at 2019 AHR with UNIDO & AHRI on Low GWP Actions in Developing countries.

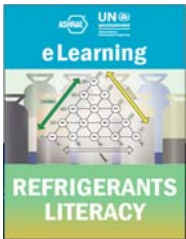
MOP Side Event
ASHRAE-UN Environment Cooperation; Tools for A5 Countries

ASHRAE and UN Environment engaged in a cooperation agreement since 2007 where they conducted together several key events and initiated different tools focusing on promoting alternative technologies and sound management of refrigerants. Over the last two years, both partners worked together to take the cooperation to different level where new set of tools and products are jointly developed and offered to A5 countries to use as part of their ongoing country programs and phase-out projects under the Montreal Protocol. This session will launch additional new tools that are recently developed by ASHRAE and UN Environment – OzonAction while presenting an overview of key achievement of the 2017-2018 joint work plan and plans for next workplan.

1. Launch of the ASHRAE UN Environment Low GWP Award
2. Review Highlights from 2017-18 year Work Plan
3. Release of Refrigerants Literacy Spanish Translation
4. Release of Sound Management of Refrigerants Course
5. Outline of Objectives for 2019 20 Work Plan

ASHRAE - UNEP Online Courses



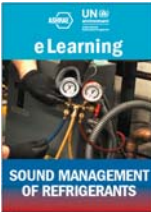


Vital Statistics

| | |
|-------------------------|-----------|
| Course Launch | July 2017 |
| Course Modules | 4 |
| Course Length | 4.5 hrs |
| Participating countries | 49 |

Participating Countries

| | |
|------------|-----------------------|
| Egypt | Korea |
| Albania | Kuwait |
| Armenia | Kyrgyzstan |
| Bahrain | Lesotho |
| Belarus | Maldives |
| Bosnia | Moldova |
| Brazil | Montenegro |
| Chile | Nepal |
| Costa Rica | Nigeria |
| Croatia | Oman |
| Cuba | Pakistan |
| Egypt | Republic of Macedonia |
| France | Romania |
| Georgia | Russia |
| Germany | Serbia |
| Grenada | Sierra Leone |
| Haiti | South Africa |
| Hungary | Spain |
| India | St. Lucia |
| Iran | Syria |
| Italy | Tonga |
| Kenya | Turkey |
| Zimbabwe | Turkmenistan |
| Ukraine | |
| Zambia | |

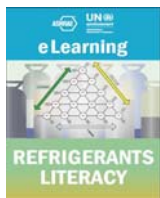


Vital Statistics

| | |
|----------------------|---------------|
| Course Launch | December 2018 |
| Course Modules | 5 |
| Course Length | 6.5 hrs |
| Knowledge Checks | 44 |
| Final Exam Questions | 40 |

Module #

| Module # | Module Titles |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module 1 | Environmental Issues and Refrigerant Management |
| Module 2 | ASHRAE Refrigerant Designation, Numbering and Classification |
| Module 3 | Lubricants Oils for Refrigeration Systems |
| Module 4 | Good Service Practice: Part 1: Refrigerant Recovery, Recycle, and Reclaim (3 R's), Equipment and Cylinders Part 2: Tools and Equipment for Service and Repairs Part 3: HVACR Systems |
| Module 5 | Safety Aspects for Refrigerants and Containers |





ASHRAE, UN Environment and National Ozone Unit of Costa Rica carried out the translation into **Spanish** and the technical revision of the course.

Next Actions

- Announce to OzoneAction network
- Announce to ASHRAE members in Spanish speaking countries (with emphasis on developing countries)
- Begin translation into **French**

| N.º de lección | Título de la lección |
|----------------|--------------------------------|
| Lección 1 | Tipos de refrigerantes |
| Lección 2 | Clasificación de refrigerantes |
| Lección 3 | Selección de refrigerantes |
| Lección 4 | Manejo de refrigerantes |





ASHRAE – UN Environment Portal (Planned for 2019-2020 Work Plan)

- Grouping of all the eLearning courses in one convenient location.
- Free course access to ASHRAE members with targeted promotion to members in developing countries
- Automated access for UNEP contacts
- Promotion of partnership within ASHRAE
- Opportunity to draw attention to other news and opportunities

UNEP/ASHRAE Assessment Program

Sustainable Operations and Maintenance of Refrigeration and Air Conditioning Plants



This ambitious project would entail the compilation of best practices related to the following areas related to the operation and management of air-conditioning and refrigeration systems/plants:

- Safe storage and proper handling of refrigerants
- Periodic leak checking and proper documentation
- Checklist for maintaining equipment to extend life and maintain energy efficiency
- Fault detection and preventative maintenance
- Proper commissioning and recommissioning practices to optimize system performance
- Minimum required servicing equipment and tools
- Proper disposal of equipment and reclamation of refrigerant at end of product life.
- Competencies of personnel/companies responsible of operating and/or maintaining the refrigeration and air-conditioning plants

UN Environment / ASHRAE Award Program

Innovation in Refrigerant Management

- INNOVATION** – UN Environment and ASHRAE developing an international award for innovative design, research or practice of lower-GWP technologies for refrigeration and air-conditioning applications in developing countries.
- AWARENESS** – Purpose is to increase awareness of how sound refrigerant practices contributes to mitigation of climate change through recognition of individuals who design and/or conceive innovative technologies in refrigeration management.
- COMMUNICATION** – Important output is communication of innovation techniques through ASHRAE publishing vehicles and chapter/member network so the innovation can be adopted industry wide.

Official Launch Jan 12 2019

UN Environment / ASHRAE Award Program
Innovation in Refrigerant Management

2019 AWARD

- **SUBMISSIONS** – January 1 to May 15, 2019
- **JUDGING** – Judges selected by the Liaison Committee
- **SELECTION** – Selection reported to ASHRAE Honors & Awards Committee, June '19
- **PRESENTATION** – To be determined by UN Environment at one of its meetings.
- **PUBLICITY** – Displays at conferences, news for UN and ASHRAE use and dissemination, ASHRAE Journal technical article
- **BENEFITS**
 - Dissemination of successful ideas that can be replicated in developing countries
 - Encouragement of innovation through peer recognition
 - Recognition of ASHRAE commitment to low GWP refrigerants use
 - Fulfillment of UN Environment objective of capacity building

UN Environment/ASHRAE Award Program
Innovation in Refrigerant Management



- ▶ Promotional flyer
- ▶ Web page
- ▶ Link from ASHRAE & UN Environment
- ▶ Online submission form
- ▶ ASHRAE & UN Environment announcements
- ▶ Reach out to stakeholders

Announced at MOP with flyers

Promoted at ASHRAE Conference

University Course



Refrigerant Management

**Special University Course
for Future Engineers**



Free Refrigerant Management for Future Engineers Course

Seeking Instructors to Pilot Refrigeration Management Course

ASHRAE has been chosen to distribute a university-level course developed by UNi-Government on Refrigerant Information for engineering students.

ASHRAM is seeking instructors willing to pilot the course in their curricula. Instructors will be provided with lecture notes, activity sheets, and course presentations. There is no cost to access the course.

Over the last two decades, UN Environment has been involved in training programmes offered to field engineers and service technicians in refrigeration and air conditioning, including emission reduction with a focus on hands-on practices.

Course Outline


 MODULE 1 - 4 WEEKS
REFRIGERATION & AIR CONDITIONING INDUSTRY, EVOLUTION OF
REFRIGERANTS & ENVIRONMENTAL IMPACTS

MODULE 2 - 3.5 WEEKS



ALTERNATIVE REFRIGERANTS FOR DIFFERENT SECTORS & LUBRICANTS

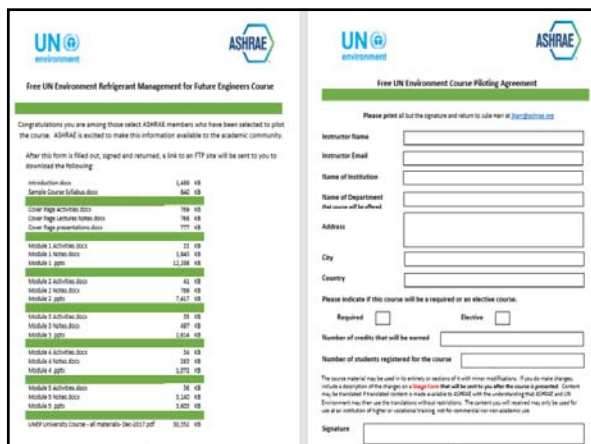
 MODULE 3 - 3 WEEKS
CONTAINMENT OF REFRIGERANTS, SERVICE & MAINTENANCE OF

 **CONDITIONING & REFRIGERATION SYSTEMS**

MODULE 4 - 2 WEEKS
SAFE USE & HANDLING OF REFRIGERANTS

UNEP environment is especially interested in identifying institutions in developing countries.

Unauthorized posting online is a violation of www.jones.edu with your name, email, institution, city, country and unless you indicate that you would like to be added to the next class course.



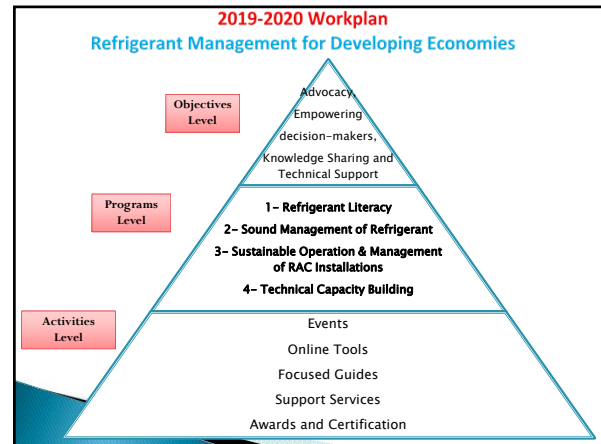
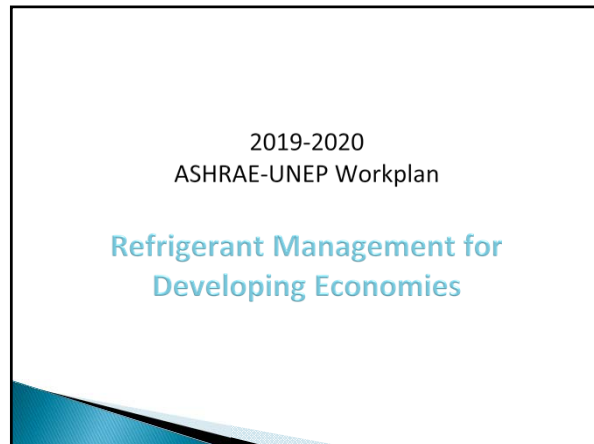
Beyond the 2017-2018 ASHRAE-UNEP Workplan...



Twinning of National Ozone Officers & National Energy Policymakers

- Cooperation on delivery of workshops for 147 developing countries in both 2018 and 2019
- Training of NOOs and Energy Officials on EE and RAC
- Development of Online Course in EE in RAC
- Production of supporting publications
- ETC





| | Events | Online Tools | Focused guides | Support Services | Award and Certification |
|--------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------|
| Refrigerant Literacy | Development of Instructor Led version of Refrigerant Literacy course | Dedicated Web Site for Access all tools | Series of Fact Sheets and quizzes using Refrigerants Literacy course | Master Trainers for F2F Literacy Session | Recognition and Certification Products |
| | Train-the-trainers Sessions for F2F Training | Online promotional campaigns | | | |
| | Special F2F Sessions, at ASHRAE Conferences, for ASHRAE Chapters in A5 countries | Latin American Spanish Translation (Completed) + African French Translation (Ongoing) | | | |
| Sound Management of Refrigerants | Development of Instructor Led version of Sound Management Refrigerant course | Dedicated Web Site for Access all tools (Same as above) | Series of Fact Sheets and quizzes using Sound Management Course | Master Trainers for F2F Sound Management Course Sessions | Recognition and Certification Products |
| | Train-the-trainers Sessions for F2F Training | Online promotional campaigns | | | |
| | Special F2F Sessions, at ASHRAE Conferences, for ASHRAE Chapters in A5 countries | Latin American Spanish + African French Translation | | | |
| Sustainable O&M of RAC Installations | Special sessions at ASHRAE Conferences/Events | | Interational Guide for Sustainable O&M of RAC Installations | | Certified Individuals completed the program |
| | Special events at MOP/OEWG | Online version with step-by-step guide on how to implement the guide | | Master Trainers Program | Low-GWP Innovation Award Program |
| | Promotional events at local level in A5 countries (NOHs and ASHRAE Chapters) | | Development of quick guides extracted from the Guide | | Certificate program for facilities that have achieved sustainable O&M practices |
| Capacity Building | High Ambient Symposium | Special Mobile App on Refrigerants designation, classification and selection against applications | Update regularly the Refrigerants Classification and Designation factsheet for policy makers. | Promotion Campaign on the University Course and feedback tool | Promotion of women in ACAR program by identifying ASHRAE members as role models. |
| | Local events in A5 countries to be led by ASHRAE Chapters in cooperation with NOHs | Special Mobile App on Refrigerants and Safety Standards | Fact sheet on Sustainability research and relevant standards | | |

