



AGENDA
ASHRAE TC 4.7 ENERGY CALCULATIONS – MAIN MEETING
RED LACQUER ROOM, PALMER HOUSE, 3RD FLOOR,
CHICAGO, IL
TUESDAY, JANUARY 23 2018, 6:00-8:30 PM

“Commitment to the ASHRAE Code of Ethics: 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 interest. (See full Code of Ethics: <https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics>)”

1. Roll call and introductions (5 minutes)

Balbach

6:02 PM meeting called to order.

Bass Abushakra read code of ethics

Introductions:

6:04 pm. Chris Balbach call of voting members

Malcom Cook absent.

We have quorum

Jeff Haberl moved to accept minutes. Dru Crawley seconded.

Motion approved 10-0-0 Chair voting.

2. Accept agenda & approve minutes of previous meeting (10 minutes)

Abushakra

3. Announcements/Liaisons (5 minutes)

Abushakra

- Program Submittals:

- o Talk to the Track Chair before submitting
- o Conform to one of the Tracks
- o Physics vs new technology: interest of audience (declining programs). Show new technology used.
- o

Bass mentioned to TC that we need to do a better job of talking with the chair before submitting and confirming to tracks. Our sessions are often being focused on physics vs new technology, and that may affect declination.

Bass states that CEC does encourage suggestion of track and that if CEC accepts a track it will likely go.

Track submittals for Atlanta are due soon. We need to consider those.

Ralph Muehleisen says speaker ratings and attendance are a criteria.

Dennis Wessel(TC liaison):

Houston already has 125 submissions with 109 (I think those were the numbers) spaces so there will be rejections.

The sooner a program is submitted for Houston the better chance it has of getting accepted.

Roster should have been updated. Things are now done completely online.

The activities form is filled out by the chair and the other committees use these to acknowledge activities.

The TC MOP (how to conduct a TC) is available online

PCM members are dropped after no activities in two years. If they are active we should contact them and see if they want to become CM.

ASHRAE was asked to have sessions on resiliency. Talk to TC 2.1 (HVAC security) and TC 2.8 (sustainability) if there is interest.

If you are an officer and not getting emails, check your aliases and email address in

Minutes are due to membership 60 days after meeting not 60 days before the next meeting.

Jeff: The electronic version of the book has no page numbers and no dates. It makes it very difficult to use the electronic version. In the seminar listings the floor is not listed like it is for the TC and SSPC meetings.

Bass: towards the very end, there used to be an alphabetical list of speakers with the seminar

Dennis: there also used to be listings by TC which were useful.

- **Friday, February 9, 2018: Program (Seminar, Forum, Workshop, Debate and Panel) Proposals Due**

- TC should vote on continuing operations under the current scope. The Vote should be put in the TC Activity Sheet, and in the Minutes. Both documents should be sent as usual to the Section Head. Current Scope says the following:
"Technical Committee 4.7 is concerned with identifying, evaluating, developing, and recommending procedures for calculating energy performance of buildings".

Abushakra then began discussion of TC scope change to reflect that we don't just do energy calculations for isolated buildings but groups of buildings and urban scale. He would like to consider changing the word "buildings" to "Built Environment" in anticipation of bringing in urban scale BEM to the TC.

Ralph moved, Joshua seconded. Minor discussion and Ralph agreed to change the motion to state change "buildings" to "the built environment"

Committee approved. Vote: 10-0-0 Chair voting.

- 125th History in a couple of years (Historical Committee). TC's can organize or sponsor a program session for the 2019-2020 meetings.

Jeff mentioned that there have been a number of articles that have been recommended for the ASHRAE journal. There will be a technical session at the meeting before for transactions papers.

- Emergency Rosters can be submitted anytime during the year so that changes in subcommittees or other positions can be made official on the rosters (instead of waiting till after July 1).

Bass mentioned that the purpose for emergency roster changes is for things like people resigning positions mid-term when you need to deal with important positions or voting membership.

Jeff then mentioned that TC 4.7 has made very many contributions and should have more fellows. He's going to work with current Fellows to identify potential new fellows and he thinks that there are more committee members deserving of the honor.

4. Membership (5 minutes)

Abushakra

- By the Manual of Procedures, the maximum number of voting members on a committee is 18. However, the drawback of a high number of VM would be the quorum in meetings.
- We currently have 11 Voting Members.
- Neil Krus will roll on on July 1 2018 (after Houston)
- Joe Huang and Keith Cockerham will roll on, on July 1 2018, bringing the Voting Members number to 12.

Bass discussed voting member changes. Joe is SCM chair and Keith is Chair of programs and will roll on when Neal rolls off. Phil asked for qualification if 12 includes chair (it does). Joel suggests that odd number is better for meeting quorum.

- Provisional Corresponding Members should go to: Onebuilding.org, to Subscribe to the TC4.7 Mailing List (TC47-L). Once subscribed, PCM, will stay up-to-date with the TC4.7 business.

Bass noted that PCM should subscribe to the TC4.7 mailing list because we do not use the ASHRAE system. He also noted that a PCM drops off after 2 years. Bass, Ralph and Chris will go through the PCM to convert any PCM that have attended any TC meeting over the last two years and convert them to CM. There is no limit to how long you can be a CM.

Neal says he thinks he (Neal) should not be rolling off.

5. Subcommittee reports

5.1 Applications (10 minutes)

Judkoff

Ron Judkoff: Applications meeting was today. The most important discussion we had was around including urban scale modeling as a topical area and a rename. Pros and cons were discussed and the attendees were generally in favor. It was noted that the topic area might outgrow the subcommittee but that can be dealt with later. Ron also

noted that the Bass has full discretion to rename the subcommittee and so it does not need a TC vote. Some suggested names Building, Urban, and Multi Scale apps but Ron noted that the acronym becomes BUMS Apps so we need to find another name.

For research, Ron reminded us of RTAR 1813, the attic duct MOT that RAC had rejected. He noted that Mini Malhotra had addressed the concerns and the TC was resent the corrected and updated RTAR and asked for a vote.

Ron moves that we approve resubmission of the RTAR with Mini's changes, Joshua second. Committee approved
Vote: 9-0-0 CNV

5.2 Data-Driven Modeling (10 minutes)

Fontanini

Anthony: we met 7:30-9 with 12 attendees.

Update from WS 1763, development for a new toolkit (inverse model update). This was submitted to RAC as an RTAR and Mike Vaughn noted it was really a WS and not an RTAR. It's now back at RAC as an WS.

Fontanini, Balbach, Muehleisen are willing to serve on PES. [At SCM meeting Mitch Paulus also volunteered]
Joshua asked if there was a co-sponsoring TC. There is not.

Data Driven Models to inform Forward models was discussed

Calibration and Forecasting was discussed. A forecasting shootout was suggested or a data Kaggle competition [Kaggle is a website/organization that helps support data science competitions].

Suggest working with MTG OBD for updating dynamic schedules for simulation
RTAR with 7.6 to develop model for EUI

For programming: Track for Houston. "Are you Normal?" explores non-gaussian residuals for DDM
Using DDM to inform Forward Models

New Business:

DDM is in favor of adding HVAC Optimization track to Atlanta meeting.

5.3 Simulation and Component Models (10 minutes)

Huang

Joe: Met Monday 6-7:30 pm Monday.

Draft RTAR 1748 Ventilation in whole building simulation is still gestating. Tony (author) will work with Jeff to find out the Status. There is confusion as to the time required for response – was it 2017 (in which case the date has passed) or 2018?.

Draft RTAR for Ground calculation Neal and Tim. subcommittee recommends that the full committee approve.

New ideas: Better modeling of night time heat exchange. EnergyPlus and DOE2 were both wrong in an LBNL simulation of Flexlab, and the cause is not clear. Talk with Joe or Phil Haves to help develop an RTAR.

Jeff: There is a potential mashup of HVAC01 and HVAC02 RTAR. Keep it on the list.

Chris Balbach: VRM modeling?

Joe: Water modeling with TC 6.6

Subcommittee is also in favor that the TC expresses support for the Optimization in building simulations track:

5.4 Research (15 minutes)

Haberl

5.4.1 Research Projects

- Completed Projects
 - Update of any.

Bass: No projects completed since last time.

- Awarded Projects
 - 1741-RP, "Understanding Fan Coil Components and how they relate to Energy Consumption and Energy Modeling"; Responsible Committee: TC 5.3 (Room

Air Distribution); Co-sponsoring TCs: TC 4.7. Neal Krus is a member of the PMSC. Latest status on progress report.

Neal: This project was awarded to U-LA Lafayette + collaborator at Baylor. One of the outcomes is a Standard 205 representation of fan coil units. Things are going along fine.

- 1661-RP Development of Near-Optimal Control Sequence for Chiller Plants with Water Side Economizer using Dynamic Models (PES Report). Project moved from U. of Miami to Colorado. PMSC met on Sunday afternoon for about an hour and a half with a full attendance from the reviewers and the contractor was resent with two people. They reviewed progress to date including reviewing an updated report sent to PMSC late last year. They reviewed the technical issues surrounding the 5 tasks identified for their project. The contractor is making good progress. Their next review of the report is scheduled for late February 2018, with a conference call / web meeting right after this.

Keith: 1661 is making good progress. Contract with U. of Colorado – Boulder with move of PI from U. Miami.. Everything on track after move.

- Approved RTAR
 - 1763-RTAR, "Development of an Improved Inverse Model Toolkit (RP1050) and Diversity Factor Toolkit (RP1093) for Analyzing Bldg Energy Savings from Time Series Data" (RTAR accepted July 29, 2015). Author (Haberl). A WS was written taking into consideration the comments the authors received on the RTAR. Sent to ASHRAE and was added to the draft agenda for the RAC 2018 Spring Meeting for consideration by the RAC Chair for inclusion.

Updated and sent back to RAC as discussed above in SCM report.

- 1816-RTAR, "Reporting the Energy Use and Heat Gain from Imaging Equipment". Responsible Committee: TC 9.6 (Healthcare Facilities); Co-Sponsors: None; Status: Accepted with comments. Developed into a WS. Contact Glenn Friedman (gfriedman@taylor-engineering.com) if interested in serving on the project evaluation and project monitoring committees once the WS is approved by RAC.

We are cosponsoring..

- Approved WS
 - Update if any.
- Returned WS with Comments
 - 1748-WS, "Assess and Implement Natural and Hybrid Ventilation Models in Whole-Building Energy Simulations - Phase 2". Authors (Huang and Fontanini) DDM Update.

Discussed in SCM report

- Rejected RTAR to be Revisited
 - 1813-RTAR, "Development of an Accuracy Test Method for Residential Attic Duct System Simulations in Whole-Building Energy Simulation Programs". (Mini). Some progress on rewriting has been achieved since.

Approved for resubmission by TC vote as discussed in HVAC apps report.

- WS, RTAR, Requests for Co-sponsorship
 - Update if any.
- New RTAR
 - Xxxx-RTAR "Improved simplified methodology for describing and calculating heat conduction through the ground". McDowell and Krus.

No number yet. Apps and SCM had some comments and recommended that it get submitted with those changes. Balbach, moves to approve with changes. Seconded by Jeff

Motion: 8-0-1, CNV, Krus abstains. Neal wants this to have a home in applications and Ron agrees. Joe suggests that the best home is in SCM. Ron says we should do what the main author wants to do.

- o xxxx-RTAR “Toolkit for Passive Solar and Whole Building Simulations”. The tool will be independent from commercial software; like hvac01, and hvac02 toolkits. How to get to netzero”. Lead author is Montana State University. Update.
- o

Update from Jeff: They have thought about it and not done much but we want to keep it on the docket.

- o xxxx-RTAR “Merged HVAC01, HVAC02, Loads toolkit”. Lead author TAMU. Haberl and Muehleisen. Jason Glazer expressed interest in this RTAR and suggested some script languages to be used. Update on progress toward an RTAR.

Update from Jeff. Thought about it not much progress, keep on docket.

- o Xxxx-RTAR “Improved Submodels of Air-to-Air Energy Recovery Exchangers for Use in Building Energy Modeling Software”. TC5.5, Air-to-Air Energy Recovery, is asking us for a co-sponsorship. (D. Crawly).

No one speaking for it, we remove from the docket.

- o Xxxx-RTAR “Occupancy-based thermostats”. Hyojin Kim has some ideas towards a useful RTAR from some recent work done in D.C.

Jeff: This was discussed in MTG OBB. Rob Hitchcock has one that was approved and this needs to be considered to avoid conflict But, this should be kept on the docket.

Michael Pouchak, Section 4 research liaison. Any RTAR to be submitted to RAC should also be emailed to Michael rl4@ashrae.net. All project committee minutes (like for 1661-RP) should also be copied to Michael. Keith will send the minutes for the current projects.

- o Xxxx-RTAR: “Baseline Modification when a Building Behavior Changes”. Carlos B., and Bass A. from DDM, and 2 members of MTG-OBB will write the RTAR.

5.5 Handbook (10 minutes)

Pruett

John Pruet is new chair for Handbook committee. John mentioned the subcommittee did meet 5-6 pm this meeting. Much of the meeting was discussing using the new portal which has some major limitations for Mac users. Anyone contributing can use portal or edit offline and email to John.

There was discussion of new items to review and add to the handbook. These included Thorough update of references/citations, added info for standard 205 and 209, and other project data. John challenges TC members to review the chapter and suggest additions.

Ralph noted that you can access the site without IE using chrome extensions that make your browser say its IE. [In particular, Chrome users can install the User-Agent Switcher extension and with it you can access the portal with Chrome.]

5.6 Program (15 minutes)

Cockerham

Endorsement of Optimization in HVAC&R Track for 2019 (added item).

Zheng Oneal, requested. DDM and SCM both support the track.

Ralph move, Chris seconded

9-0-0 CNV

Chicago, January 2018

1. Tuesday 8AM – 9:30AM, Seminar 37, Use of Energy Modeling Tools to Support Building Asset Ratings: Screening Analysis, Simplified Modeling and Retrofit Analysis. Sponsor: 4.7 Energy Calculations. Chair: Chris Balbach.

Chris: Almost full room with 65 attendees.

- Monday 9:45 AM - 10:45 AM, Seminar 27, Urban-Scale Energy Modeling, Part 7.
Sponsor: 1.5 Computer Applications, 9.12 Tall Buildings, 4.7 Energy Calculations.
Chair: Joshua New.

Joshua: 1 through 6 were all accepted. This session had two speakers Luke Leung spoke on weather , Duncan Phillips who have applied CFD for microclimates on tall building. 80 People.

Joshua withdrew Urban Scale modeling part 8 but plans to resubmit in future.

- Sunday 1:30 – 3 PM, Building Energy Modeling for Power Grids and Energy Code Compliance. Sponsor: 4.7 Energy Calculations. Chair: Ralph Muehleisen.

About 90 to 100 attendees: We will correct the number in the final minutes.
Houston, June 2018, and beyond

Chris Balbach: We have 3 speakers for VRF modeling of components.

Tony: Are you Normal? (discussed earlier). Ralph with Chair, Tony and Qi Li (Ralph's postdoc will speak).

Perhaps a 3rd speaker.

Ron: Erik Kolderup will do a session on 209 in Houston.

Joel and Ron will do a session on 140 in Houston. Ralph will chair and submit.

Jeff will chair New advances in simulating fenestrations. Layer by layer window modeling.

Surface water heating co with TC 6.6. Jim Lutz (jdLutz@hotwaterresearch.net) from TC 6.6 who was speaking.: This is to spur a discussion between modelers and the people who use design systems that use them. How do we validate a model. We should try to get a program in Houston. We should start this discussion now even if the program doesn't go

Ron: Why isn't this going through research? Jim: we are just starting a conversation. We don't know that there is a research need yet. Jeff: this is definitely becoming important as envelope loads are being reduced. Maybe we can do a Forum. Bass and Jeff: This is definitely a good thing for a forum. Joe will work with Jim to submit a Forum. Neal and Tim volunteer to participate the Forum.

- SPC 205 (Seminar. Standards Subcom. Barnaby, McDowell)??

Drop in future. They did one before, no more interest

- Historical Committee (Seminar. Haberl)??

This is not a planned submission for Houston, discussed earlier.

- Aging Grid and Power Lines Reaching Normal Rating Capacity – Load Growth Projection Modeling (Seminar. DDM Subcom. Abushakra)??

Moved to future.

- New Advances in Simulating Fenestration Systems (Seminar. SCM Subcom. Haberl)??

See note above

- SPC 209 Energy Simulation Aided Design (Seminar. Standards Subcom. Kolderup)??

See note above

- Data Visualization (Seminar. Application Subcom. Balbach)??

Chris will wait until later.

- What does the difference between data driven models and measurements mean? (Seminar. DDM Subcom. Chair)??

Will discuss again in Houston

- So you think you're Gaussian Normal? Many regression models assume normal distributions (Seminar. DDM Subcom. Fontanini)??

Postpone because Houston is full

- How to remove outliers from data before using DDM (Seminar. DDM Subcom. Chair. Potential Speakers: Bass, Chris B., Juan Carlos B., using data from Cornell U.)??

Bass: Chris mentioned that Cornell has large data sets.

Phil: what is special about this that it notes a seminar? Will this be attractive?

Ralph: This needs to be fleshed out before we submit

Jeff: Houston is already nearly full. We need to prioritize our program.

Decision to postpone

Houston: Program for Vote

1. New advances in fenestration (Haberl)
2. 209 Energy Simulation aid ddesign (Kolderup)
3. VRF TC 8.7 Cosponsor (Balbach)
4. Airside HVAC Besttest (seminar) (Ralph)
5. UBEM part 8 (seminar) TC 1.5 Sponsor. (New)
6. Service Water Heating (TC 6.6 Forum) (Huang Moderator)

Ralph moved, Jeff, second
8-0-0 CNV

Future:

Aging Grid and Power Lines Reaching Normal Rating Capacity – Load Growth Projection Modeling (Seminar. DDM Subcom. Abushakra)??

Data Visualization (Seminar. Application Subcom. Balbach)??

So you think you're Gaussian Normal? Many regression models assume normal distributions (Seminar. DDM Subcom. Fontanini)??

Joel and Ron will do a session on 140 in Houston. Ralph will chair and submit.

1. Other Ideas??

5.7 Historical (5 minutes)

Haberl

- Historical Committee - 125 Anniversary.

5.8 Standards (15 minutes)

Neymark

- SSPC 140 SMOT for Evaluation of Building Energy Analysis Computer Programs

Neymark

Neymark: Completed continuous maintenance revision. This merges updates from 2014. ASHRAE has sent this to printer so publication will come in a few weeks. Look for it on the bookshelves. This standard is cited by 90.1, 189.1, IECC, and others reference it. Updating thermal fabric tests. The range of disagreements is reducing as engines get better and people get better at modeling the tests. Ron: We had a briefing from the validation and uncertainty project at LBL, NREL, and ORNL, we are 4 months into the final year of the project. LBL has created a draft specification, ORNL has done same and will also deliver draft specification. NREL has performance maps for very high performance RTU. SEER 17 and IEER 23 6 ton, fully variable everything and very interesting controls that are hard to represent in the standard mapping tables.

- Internal Revenue Service Section 179D Tax Deductions – Citation of Std 140

Judkoff

We are not sure if the tax deductions will survive. But, people want to be on the list because they want to be qualified.

- SPC 205 Standard Representation of Performance Simulation Data for HVAC and Other Facility Equipment

Barnaby

Advisory draft with 65 comments and committee has plans to address all and hope to have something to publish soon.

- SPC 209P Energy Simulation Aided Design

Kolderup

Went to 3rd public review with no comments to it's DONE!

5.9 Web Site (5 minutes) (<https://tc0407.ashraetcs.org/>)

New

Up to date when we add this agenda and minutes.

We have the longest running list of minutes going back to 1995.

6. Related activities reports (10 minutes)

SPC 191 Standard for the Efficient Use of Water in Building and Mechanical Systems

Jim Lutz: Out for public review with comments address and should be for 2nd public review before next meeting

MTG O&MEE Operations and Maintenance Activities That Impact Energy Efficiency

No one to speak – Bass to follow up and suggest removal.

MTG OBB Occupant Behavior in Buildings

Bass: This has been very active. Jim Lutz. This has lots of TCs involved and might become its own TC. Handbook committee has approved a new chapter.

MTG.BIM Building Information Modeling

Chip: Longest lived MTG. They have permission to do lots of activities. There is a new standard 224, application of BIM procedures. To standardized BIM data so it is more useful Joint with NIBS

MTG ACR Air Change Rates (Contact Dennis Knight to join this MTG)

No one to update. Bass will confirm status.

TC 2.8 Building Environmental Impacts and Sustainability

No one this time.

TC 4.1 Load Calculation Data and Procedures

Nothing new to report.

TC 4.2 Climatic Information

Huang: New project 1745 to look at reanalysis data to see if it can be used for ASHRAE

WS for approval for periodic update of tables

One other new RTAR

TC 4.3 Infiltration & Ventilation Requirements

None

TC 4.5 Fenestration

None

TC 6.5 Radiant Heating and Cooling

None

TC 7.5 Smart Building Systems

None. Jeff: This is well attended and very active. A lot of grid related activities.

TC 7.6 Building Energy Performance

Balbach: Finally published SPC 211 defining 1, 2, 3 level audit. Also the committee for BEQ products is now including an operations rating. Will launch an envelope “as designed” rating

BuildingSMART (formerly IAI International Alliance for Interoperability)

None

IBPSA: USA, Canada, World

Erik: Had a meeting Sat evening (as usual). Simbuild in Chicago Sep 24-27. ASHRAE/IBPSA Modeling and SimBuild. 400 abstract about 250 papers accepted. Seminars submissions still open.

Chip: BS2017 in San Francisco. Papers are now all up for download.

BPI-2400-S-2011 Standardization Qualification of Whole-house Energy Savings Est.

Remove from list (this will be in Guideline 14)

Guideline 14

Jeff Actively revising. A lot of discussion of just first page of definitions

Bass: RP1404 came from 2.7 and would be useful to add some results to Guideline 14

IEA Annex 60 Modelica for Building Simulations

Wangda : Officially concluded. Final project report due out soon.

IBPSA Project 1 to continue research. Second meeting in Feb .

First american modelica conference at MIT Oct 9-10. Submission deadline is May 1. There will be many workshops.

Remove Annex 60 and add IBPSA Project 1 report.

IEA Annex 66 Occupant Patterns

Jim Lutz. He says they are finished and will finalize final report. They are proposing a follow-on project.

7. Awards Nomination

2018-2019 Hightower Award: Nominations due to Section head by September 1, 2018

2018-2019 Service to ASHRAE Research Award: Nominations to RAC Liaison by September 1, 2018

Bass: Also talk with Jeff about Fellows.

8. Old Business

Abushakra

9. New business

Abushakra

- Results of Discussion on Urban-scale Building Energy Modeling, a proposed move from TC1.5 to TC4.7

We discussed this and have decided to merge this with applications. Bass will continue to ponder the name.

Looking at conferences, most conferences have lots of papers. This is not abating. TC 1.5 wants to see this move to another subcommittee and see 4.7 as the natural spot. Joshua likes the name Urban Scale Building Energy Modeling. He is hoping for something solid to present to 1.5 in Houston. Bass will work on a name. Erik: wasn't the consensus "BUMS"?

- Assigning a Liaison to Std 90.1 (Interpreting Chapter 11 and Appendix G for energy modelers)

Jeff suggest we contact Jason Glaser to discuss this.

10. Adjourn

Abushakra

Neal moves, Jeff seconded. 10-0-0 in favor, Chair voting.

RESOURCES

Deadlines

2018 ASHRAE Annual Conference in Houston, TX:

- August 28, 2017: Conference Paper Abstracts due Monday
- December 8, 2017: Conference Papers due Friday
- Thursday, January 11, 2018: Website Opens for Seminar, Workshop, Forum, Debate and Panel Proposals
- Monday, January 15, 2018: Conference Paper Accept/Revise/Reject Notifications
- Friday, February 9, 2018: Program (Seminar, Forum, Workshop, Debate and Panel) Proposals Due
- Friday, February 9, 2018: Revised Conference Papers/Final Technical Papers Due
- Monday, February 19, 2018: Conference and Technical Paper Final Accept/Reject Notifications
- Tuesday, March 1, 2018: Registration Opens
- Monday, March 19, 2018: Seminar, Forum, Workshop Accept/Reject Notifications
- Monday, April 30, 2018: Upload of PPTs Begin
- Friday, June 1, 2018: All PPTs Due Online
- Wednesday, June 20, 2018: Final Day for Commercialism Revision Upload prior to on-site
- Saturday, June 23, 2018: Speaker's Lounge Opens
- **Conference begins (June 23, 2018)**

Houston, June 2018 Tracks

Track 1: HVAC&R Systems and Equipment

Track Chair: Frank Schambach

Email: frankschambach@mindspring.com

Track 2: Fundamentals and Applications

Track Chair: Dennis Alejandro

Email: denzjac@yahoo.com

Track 3: District Energy and Cogeneration Plants

Track Chair: Kimberly Piersonj

Email: kdpwildcat@gmail.com

Track 4: Safeguarding your HVAC&R System

Track Chair: Rich Rose

Email: richr@mticontrols.com

Track 5: Residential - Modern Buildings in Hot and Humid Climates

Track Chair: Dimitris Charalambopoulos

Email: dimitris@ashrae.gr

Track 6: Professional Skills

Track Chair: Kevin Marple

Email: kmarple@benzco.com

Track 7: Research Summit

Track Chair: Melanie Derby
Email: derbym@ksu.edu

Track 8: HVAC&R Control Freaks
Track Chair: Gary C. Debes
Email: gcdebes@verizon.net

Track 9: HVAC&R Analytics
Track Chair: Vikrant Aute
Email: vikrant@umd.edu

ASHRAE Research Strategic Plan 2010-2018

Goal 1: Maximize the Actual Operational Energy Performance of Buildings and Facilities

Goal 2: Progress toward Advanced Energy Design Guides (AEDG) and Cost-Effective Net-Zero-Energy (NZE) Buildings

Goal 3: Reduce Significantly the Energy Consumption of HVAC&R, Water Heating and Lighting in Existing Homes

Goal 4: Significantly Advance our Understanding of the Impact of Indoor Environmental Quality (IEQ) on Work Performance, Health Symptoms and Perceived Environmental Quality in Offices, Providing a Basis for Improvements in ASHRAE Standards, Guidelines, HVAC&R Designs and Operation Practices

Goal 5: Support the Development of ASHRAE Energy Standards and Reduce Effort Required to Demonstrate Compliance

Goal 6: Building Information Modeling of Energy Efficient, High Performing Buildings. BIM is a Rapidly Developing Field of Knowledge which Stretches Beyond the Traditional Boundaries of the HVAC&R Industry to the Wider Construction Sector

Goal 7: Support Development of Tools, Procedures and Methods Suitable for Designing Low-Energy Buildings

Goal 8: Facilitate the Use of Natural and Low Global Warming Potential (GWP) Synthetic Refrigerants and Seek Methods to Reduce their Charge

Goal 9: Support the Development of Improved HVAC&R Components Ranging from Residential through Commercial to Provide Improved System Efficiency, Affordability, Reliability and Safety

Goal 10: Significantly Increase the Understanding of Energy Efficiency, Environmental Quality and the Design of Buildings in Engineering and Architectural Education

Goal 11: Understand Influences of HVAC&R on Airborne Pathogen Transmission in Public Spaces and Develop Effective Control Strategies.