



**1791 Tullie Circle, N.E./Atlanta, GA 30329
404-636-8400**

TC/TG/MTG/TRG MINUTES COVER SHEET

(Minutes of all Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/MTG/TRG No. TC 7.5 DATE June 28, 2017

TC/TG/MTG/TRG TITLE Smart Building Systems

DATE OF MEETING June 27, 2017 LOCATION Long Beach, CA

| MEMBERS PRESENT | YEAR APPTD | MEMBERS ABSENT | YEAR APPTD | EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE |
|--|------------|--|------------|--|
| Natascha Milesi Ferretti, Vice Chair, (NV) | 2016 | Nick Gayeski, Enabling Technologies Subc. (NV) | 2014 | Andrew Windham (CM) |
| David Yuill, Secretary (NV) | 2015 | Haorong Li, FDD Subc. (NV) | 2011 | Chandra Golkapudi (V) |
| Jin Wen, Research Subc. (V) | 2015 | Xin (Sherry) Hu (V) | 2015 | Chariti Young (CM) |
| Mike Galler, Webmaster (NV) | 2011 | Rich Hackner, Chair, (V) | 2016 | Chris Laughman (V) |
| Carol Lomonaco (V) | 2015 | Li Song, BOD Subc (V) | 2013 | Cibi Chakravarthy (V) |
| Brian James (V) | 2015 | Joshua Rhodes, Smart Grid Subc. (V) | 2015 | Dan Veronica (CM) |
| Ran Liu, Programs Subc (NV) | 2015 | Yuebin Yu, FDD Subc (NV) | 2016 | David Blum (CM) |
| Edward Tsui (NQ) | 2013 | Glenn Remington (V) | 2013 | David Shipley (CM) |
| | | Peter Armstrong (V) | 2016 | Donhun Kim (CM) |
| | | Vern Smith, Handbook Subc (NV) | 2015 | Eric Yang (CM) |
| | | Tea Zakula (NQ) | 2016 | Grant Wheeler (V) |
| | | | | Helia Zandi (V) |
| | | | | Huojun Yang (CM) |
| | | | | James Sweeney (CM) |
| | | | | Jia Chang Huangy (CM) |
| | | | | Jim Butler (V) |
| | | | | John Gibbemeyer (V) |
| | | | | Kristen Cetin (V) |

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

| | | | | |
|--|--|--|--|--------------------------|
| | | | | Mike Brambley (CM) |
| | | | | Paolo Tabares (V) |
| | | | | Srinivas Katipamula (CM) |
| | | | | Tom Lawrence (CM) |
| | | | | Vance Payne (V) |
| | | | | Xiaohui Zhou (CM) |
| | | | | Xing Lu (V) |
| | | | | Yan Chen (CM) |
| | | | | Yixing Chen (CM) |
| | | | | Zheng O'Neill (CM) |
| | | | | |

DISTRIBUTION: All Members of TC/TG/MTG/TRG plus the following:

| | |
|---|--|
| TAC Section Head: Marija S Todorovic | SH7@ashrae.net |
| All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters (Research, Standards, ALL, etc.) | See ASHRAE email alias list for addresses. |
| Mike Vaughn, Manager Of Research & Technical Services | MORTS@ashrae.net |

**ASHRAE TC 7.5 Smart Building Systems
2017 Annual Meeting
Long Beach, CA
204 Long Beach Convention Center, 1:00-3:30pm, June 27, 2017
Draft Minutes**

Voting and executive membership for this meeting:

| Full Name | Voting | Position |
|----------------------------|----------|----------------------------------|
| Richard J Hackner | Yes | Chair |
| Joshua D Rhodes | Yes | Smart Grid Subcommittee Chair |
| Jin Wen | Yes | Research Subcommittee Chair |
| Li Song, PhD | Yes | BOD Subcommittee Chair |
| Peter R Armstrong, PE | Yes | Member |
| Xin (Sherry) Hu, PhD | Yes | Member |
| Brian A James | Yes | Member |
| Carol Lomonaco | Yes | Member |
| Glenn T Remington | Yes | Member |
| Edward Ka Cheung Tsui | Yes (NQ) | Member Non Quorum |
| Tea Zakula | Yes (NQ) | Member Non Quorum |
| Natascha S Milesi Ferretti | No | Vice Chair |
| David P Yuill, PE | No | Secretary |
| Vernon A Smith | No | Handbook Subcommittee Chair |
| Ran Liu | No | Program Subcommittee Chair |
| Nicholas T Gayeski, PhD | No | Enabling Tech Subcommittee Chair |
| Haorong Li, PhD | No | FDD Subcommittee Chair |
| Yuebin Yu, PhD | No | FDD Subcommittee Chair |
| Michael Galler | No | Webmaster |

Meeting called to order by Vice Chair Natascha Milesi-Ferretti at 3:30 PM

1. Call to Order (Natascha Milesi-Ferretti)
2. Roll Call and Self Introductions of Members, Guests and Liaisons

4 voting members were present, including non-quorum: Carol Lomonaco, Jin Wen, Brian James, and Edward Tsui.

7 members were absent, including non-quorum: Sherry Hu, Li Song, Rich Hackner, Peter Armstrong, Tea Zakula, Glenn Remington, and Joshua Rhodes

Quorum not achieved. (4/10)

3. Vice chair read scope of Technical Committee and ASHRAE Code of Ethics Commitment.

Scope:

Technical Committee 7.5 is concerned with the following topics

- Performance and interactions of smart building systems (SBS).
- The impact of smart building systems on the total building performance.
- Methods for achieving more intelligent control and operation of building processes, including supervisory control strategies and the optimization of dynamic building components and systems.
- Interactions of smart buildings with utilities.
- Documentation of the benefits of smart buildings and smart building systems as they relate to energy consumption, cost of operation, maintenance, occupant comfort, building commissioning, operations, and impact of the SBS on utilities and natural resources.

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.

4. Approval of Las Vegas 2017 Meeting Minutes

The minutes could not be approved because a quorum wasn't present. There were no corrections or amendments to the minutes.

5. Announcements

- There are new TC email aliases available; one for each mandatory subcommittee chair in a TC.
- There is a shift from Basecamp 2 to Basecamp 3
- Award nominations for Hightower or service to ASHRAE research are due September 1.
- We can request remote participation meetings for Chicago (RPM).

Carol recommended that we request RPM for Chicago.

Action for Chair: request RPM from ASHRAE

6. Liaison Reports

TAC section seven head Marija Todorovic reported that she has an initiative for a building integrated photovoltaic standard (BIPV). She asked for volunteer effort to help prepare a standard for BIPV.

TC 1.4 Chariti Young: There have been thematic topics discussed: security, useful interfaces, value of growing datasets, need for FDD or analytics in real systems. TC 1.4 sponsored 7 programs in LB (three with TC 7.5).

GPC 13 is working on language on security. Vote in January.

GPC is in public review and interested in receiving feedback.

RP-1746 carries on work from RP-1455, deploying the sequences and developing functional performance tests from the sequences in RP-1746.

RP-1711 is similar to 1455 for water-side sequences.

RP-1587 to develop a method of assessing control loop performance is complete, and the report is available.

TC 1.5 Mike Galler: Their cybersecurity subcommittee is forming a GPC.

TC 7.3 Mike Brambley: He requested that he be removed as liaison. Need to find a new liaison, if possible, that regularly attends the TC 7.3 meetings. The handbook content on FDD appears to Mike to be reduced in the upcoming applications.

SPC 207P Mike Brambley: There seems to be consensus that the committee wants to release a standard based on Economizer FDD only, with work to continue on the other faults. They're planning an option to request a change in TPS of the committee to narrow scope to Economizer FDD.

7. FDD Subcommittee Report (Jin Wen for Yuebin Yu)

Jin reported that they had a short meeting on current RTAR and WS, to be able to have a full report on RP-1615, which just concluded. Alireza Behfar gave a nice report summarizing the project. Jin asked David Yuill to summarize the project for the TC.

Jin Wen, Michael Bobker, and David Yuill are working on WS-1781 on AFDD for AHU. Phase 1 will focus on studying the current state of AFDD for AHU, and phase 2 will focus on developing a test method. They would like a vote before the August RAC deadline.

Kristen Cetin described WS-1812, which is focused on FDD for leakage of circulating fluid in ground source heat pump (GSHP) and hydronic systems. It will require a survey of stakeholders to better understand the extent of leakage in GSHP systems. They got comments from the RAC liaison and they are addressing them. They would like a vote before the August RAC deadline.

There is interest in self-healing for equipment, and they hope to generate an RTAR.

Minutes from the meeting are appended.

8. Enabling Technologies (Zheng O'Neill for Nick Gayeski)

They talked about research on a review of metadata and taxonomy to support FDD. There's a new ASHRAE Standard 223p on taxonomy.

There is a research ideas on building system response to communication infrastructure for building to grid communication.

There's a program idea about cybersecurity, but it wasn't submitted.

9. Smart Grid (Kristen Cetin for Josh Rhodes)

They had a forum on the future of smart buildings and the data collection needed for them. They'll type up a summary on the results of the discussion.

They plan to submit two seminars on Smart Grid topics for Chicago.

They are thinking of ideas related to smart products for residential buildings for future programs.

They have some ideas for research: development of models for better peak load predictions; instantaneous voltage and current load from buildings; linking building modeling to grid modeling; development of a demand response guideline. Kristin will submit a forum on the latter idea.

10. Building Operations Dynamics (Zheng O'Neill for Li Song)

They have a part idea for a program about model accuracy study.

They discussed RP-1661 about development validation of dynamic models for evaluation of chilled water system strategies. We are cosponsors with TC 4.7. Li Song is our representative on the PMS.

WS-1809 updating dynamic models of HVAC equipment; they need to have a complete draft by Chicago meeting.

Five new research ideas were discussed: How IoT impacts operators; linking productivity with occupancy based control; smart management of moisture and energy consumption in residential locations; design guideline to consider measurement disturbance for reasonable MPC; RTAR for MTG.OBB topics.

The minutes are appended.

11. Research (Jin Wen)

There are some updates from RAC: They have selected one IRG (innovative research grant). They received 30 pre-proposals and encouraged five of those. These are high-risk and cutting edge. RAC considered seven RTARs and accepted one. Unsolicited research proposals (URP) will typically be funded at most once per year. URP are assigned to a TC if they are approved. There are also grants-in-aid. There are 10-25 granted per year. GIA fellows now receive \$5k until they attend a meeting, then get the next \$5k.

This TC now doesn't have any active research project. TRP-1661 (co-sponsored) is in the negotiation phase, and has our member, Li Song, on the PMS. We're co-sponsoring with TC 2.4 1756-TRP, which went out for bid.

Jin described the ASHRAE research sponsorship process.

We have four active WS and twelve RTAR ideas, but these have not been submitted. We are co-sponsoring two RTAR submissions, with TC 1.4 and with MTB.OBB.

They went back to their Roadmap discussion last summer, and discussed the summary that they developed at the Winter meeting. The roadmap is posted on Basecamp, but can't be posted on a publicly available site.

The minutes are appended.

12. Program (Ran Liu)

We sponsored two programs:

- 1) A seminar on IoT for control of buildings, with four speakers, with about 80 attendees.
- 2) Forum on what data we need to collect in smart buildings, and what is ASHRAE's role

We co-sponsored three programs.

- 1) Securing building automation systems
- 2) Workshop on future building operation
- 3) Debate on commissioning.

Ran read the tracks for the future ASHRAE meetings in Chicago and Houston.

The deadline for programs for Chicago is August 1. For Houston, Technical Papers and Conference paper abstracts are due August 28. Programs is February 9, 2018.

Ran read a list of program ideas. Seminar on Smart Meters; debate on password for security on building automation system; integration of IoT, smart buildings, and smart grid; how BAS can enhance existing building commissioning; model predictive control case studies; what data the lawyer would like to know.

TC 7.6 is seeking co-sponsoring of a program on occupancy based control.

There are ideas for potential programs on: Case studies on occupancy based control; Cybersecurity.

Ran will step down as Program Subcommittee Chair, because he can't always travel to ASHRAE from China. Ran thanked the TC for their outstanding activity on programs.

Minutes from Program are appended.

13. Handbook (David Yuill for Vern Smith)

David read a summary of the minutes sent by Vern. Our deadlines for submitting the revised chapters and Chapter Checklist are March 18, 2018 for Chapter 42 and July 31, 2018 for the chapter on Smart Building Systems.

14. Standards (Natascha Milesi-Ferretti for Rich Hackner)

No discussion of standards, because SPC 207p had been discussed earlier by the liaisons.

15. Web Page (Mike Galler)

We're moving to Basecamp 3. In Basecamp 3 there will be folders.

16. Actions Taken Prior to Long Beach Meeting

A vote was taken to approve a webinar presentation by David Yuill and Alireza Behfar to GreenChill, to disseminate findings from RP-1615.

Motion: Accept to accept the "Fault Detection and Diagnostic Methods for Supermarkets" PowerPoint presentation as one of the RP-1615 deliverables with the understanding that ASHRAE Research needs to weigh-in whether to keep the GreenChill references on the cover page.

PMS for RP-1615 made the motion. Voting results: **10-0-0-1 CNV**

ASHRAE Manager of Research, Mike Vaughn gave the following response regarding the GreenChill logo:

"Hi David,

I think we are ok on this situation now that we have a TC vote endorsing the presentation and release of RP-1615 information to an outside audience. Since ASHRAE is mentioned on the cover page of the presentation, I'm also not concerned about the use of the GreenChill logo on the same page.

Thanks to Yuebin and members of the TC for getting results from RP-1615 out to a wider audience and for raising ASHRAE's visibility with this group.

Sincerely, Mike"

17. Old Business

No discussion.

18. New Business

No discussion.

19. Adjournment

Meeting adjourned at 5:27 PM.

DRAFT



Meeting Minutes

TC 7.5 Handbook Subcommittee

4:45 - 5:30 pm, Sunday, 25 June 2017
Long Beach Convention Center
Room 204
Long Beach, CA

Objective for this Meeting: Review edits to date and assign sections for review and editing.

The meeting started at 4:45 pm. No liaisons were present.

Vern Smith attended the Applications Handbook Liaison meeting earlier today. The ASHRAE Authoring Portal will be the official vehicle for submitting final edited chapters for publication. There was some discussion of problems with using Microsoft Edge to access the Portal. The recommended browser is Internet Explorer. Chapter 42, Supervisory Control Strategies and Optimization, has a deadline for submission on March 18, 2018. Chapter 61, Smart Building Systems, is due July 31, 2018. TC Voting Members should read the final drafts of each chapter before voting, and each chapter is required to have a separate vote.

Little progress was made over the past five months. Vern posted the ASHRAE Authoring Portal access presentation and a list of current chapter subsections to Basecamp in February. In May, Srinivas Katipamula provided a link to a PNNL report reviewing AFDD papers since 2004, which will be used to update the AFDD section of Chapter 61.

Vern requested volunteers to review sections of the chapters and read off the current subsection titles and number of pages for each. There was a short discussion on coordinating the contents of the Terminology section in Chapter 42 with the publicly available on-line terminology database. It was agreed that we should reconcile any differences with input to/from TC 1.6, Terminology, but keep our terminology section in place for the convenience of readers. Chapter 42 has a total of 67 pages, with the longest subsection totaling 9 pages. Vern will touch base with Peter Armstrong and Nick Gayeski for their input on sections that could use additional content. Donghun Kim volunteered to participate in reviewing the chapter and suggest edits.

Mike Brambley suggested a new subsection on building/grid integration for Chapter 61 since this is a relatively new topic for the general ASHRAE membership. David Blum, Srinivas Katipamula, and Mike Brambley agreed to draft the new subsection.

Our goal will be to update Chapter 42 by December 2017 to allow the voting members time to read the chapter before the main TC meeting in January 2018. Our goal for Chapter 61 will be to complete the editing by the end of May 2018, to allow time for voting members to read the chapter before the main TC meeting in June.

The meeting was adjourned 15 minutes early at 5:15 pm.

**TC 7.5 Smart Building Systems
Program Subcommittee Meeting**

Long Beach

Sunday (6/25) 5:30 pm - 6:00 pm LBCC 204

Announcements

Ran Liu will step down from Program Sub-Committee Chair after Long Beach meeting.

Sherry Xin Hu will be the new Program Sub-Committee Chair, and Eric Yang will be the Co-Chair.

Programs presented at Long Beach

| Sponsoring Committee | Program Time | Session Chair | Session Title | Co-Sponsoring Committee |
|------------------------------------|---|---------------------|--|--|
| 7.5 Smart Building Systems | Seminar 15 Sunday, 1:30 PM - 3:00 PM | Michael Brambley | The IoT for Better Building Operation and Control | 1.4 Control Theory and Application |
| 7.5 Smart Building Systems | Forum 5 Tuesday, 9:45 AM - 10:45 AM | Kristen Cetin | Future smart buildings: What data do we need to collect and how? | |
| 1.4 Control Theory and Application | Seminar 20 Monday, 8:00 AM - 9:30 AM | Michael Pouchak | Preventing Headlines - Securing Building Automation Systems | 7.5 Smart Building Systems 1.5 Computer Applications |
| 1.4 Control Theory and Application | Debate 2 Monday, 9:45 AM - 10:45 AM | Frank Shadpour | Commissioning Agents For Smart Buildings - Whose Side Am I On? | 7.5 Smart Building Systems HVAC Security TG2 |
| 1.4 Control Theory and Application | Workshop 2 Sunday, 8:00 AM - 9:00 AM | Marcelo Acosta | Are You Ready For 21st Century Building Automation? | 7.5 Smart Building Systems |

Program tracks and timelines for Chicago

- *Track 1: Systems and Equipment*

Track Chair: [Carrie Anne Crawford](#)

Email: carriecrawford@eeace.com

Selection of equipment and systems is paramount to HVAC&R design. Papers and programs in this track will assist designers, engineers, and operators in the design, selection, and operation of HVAC&R systems and equipment.

- *Track 2: Fundamentals and Applications*

Track Chair: [Kevin Marple](#)

Email: kmarple@benzco.com

Fundamentals are the foundation for understanding applications in engineering. Key components of ASHRAE fundamentals include thermodynamics, psychrometrics, fluid and mass flow, IAQ, and building envelope. This track provides opportunities for papers and presentations of varying levels across a large topic base. Concepts, design elements and shared experiences for theoretical and applied concepts of HVAC&R design are included.

- *Track 3: Standards, Guidelines and Codes*

Track Chair: [Corey Metzger](#)

Email: corey.metzger@resourcece.com

ASHRAE is known for its standards and design guidelines – and they are constantly evolving with the intent on improving the built environment and its systems. Designers, Contractors, Architects and Owners must be able to keep up with the continuing changes in the current cycle but to also be prepared for the future changes. In addition, there is a large interaction of ASHRAE with the code authorities and government to incorporate these standards and guidelines. The series of sessions in this track highlight the changes to the standards and guidelines, their projected path and optimum design techniques to meet or exceed the standards.

- *Track 4: Earth, Wind & Fire*

Track Chair: [Ashish Rakheja](#)

Email: ashish.rakheja@aeonconsultants.in

Designing for natural elements and other possible disasters often requires specific elements of building design and construction. From materials to stabilizing elements and simulations to specifications, these options must be incorporated. This track will deliver on modern strategies to address all of these conditions. Be prepared to be blown away by industry practices to prevent disastrous results.

- *Track 5: Transportation IAQ and Air Conditioning*

Track Chair: [Dimitris Charalambopoulos](#)

Email: dimitris@ashrae.gr

Often considered boutique engineering, both enclosed vehicular facilities and transportation design, construction, operation, and maintenance needs to be elevated to equal status with other HVAC applications. These systems require the same design approach as other system designed but usually have special technical requirements that mandate close velocity capture/control, air quality control, etc. that can be overlooked but the more traditional building system design engineer. This

track will seek case studies and trouble-shooting projects highlighting the opportunities and pitfalls associated with these unique applications.

- *Track 6: Tall Buildings*

Track Chair: [Leticia Neves](#)

Email: leneves@gmail.com

Chicago is home to one of the tallest buildings in the world. One that stood the tallest in the world for nearly 25 years. However, today, more and more tall buildings are being designed and constructed. This track will draw upon “larger than life” case studies, as well as large building HVAC systems that can be classified as “innovative and/or 21st century” that highlight the opportunities presented and achieved by the designer, builder, and operator for facility HVAC systems throughout the world.

- *Track 7: Modeling Throughout the Building Life Cycle*

Track Chair: [Joseph Furrantello](#)

Email: j.furrantello@gmail.com

Modeling was originally concerned primarily with building and system design specifications. The demands of energy efficient operation brought about the need for modeling of part-load operation for a variety of off-design conditions. The explosion of computational capacity and data collection capability is rapidly expanding the scope, complexity and practical applications of modeling both during design, but even more so for fault detection, diagnostics and operational optimization. Thirty years ago, people were dreaming of doing some of the things that Building Information Modeling is now bringing to reality. Presentations and papers are solicited related to all aspects of building modeling, with a particular interest in successful applications that have extended modeling into operational phases of the building life cycle.

- *Track 8: Heat Exchange Equipment*

Track Chair: [Vikrant Aute](#)

Email: vikrant@umd.edu

Given the critical importance of energy efficiencies and reliability of HVAC systems, new heat and mass transfer HVAC & R equipment and advanced systems have been developed. Bringing non-traditional technologies to the actual field is not trivial task and how to design the equipment and characterize the performance of new HVAC &R technologies under real field type conditions are still open questions. The papers and programs in this track will inform designers, engineers, building energy simulation modelers, and energy consultants and practitioners in the use of non-traditional heat exchange equipment and advanced HVAC &R systems under real field type conditions. The track will focus on fundamentals and applied aspects, on current challenges and recent advancements for managing frost growth, water condensate, fouling, corrosion, and mitigation of mold growth and bacteria that are often encountered in heat exchange equipment when working under real field type conditions.

- *Track 9: Refrigerant Mini Track @ Expo**

Track Chair: [Gary C. Debes](#)

Email: gcdebes@verizon.net

*Section will determine topics, speakers, session types, etc.

- *Track 10: Residential Mini Track @ Expo**

Track Chair: [Gary C. Debes](#)

Email: gcdebes@verizon.net

*Topics, speakers, session types, etc. will be determined by the cognizant committee.

Conference Program Chair: Michael Collarin

Email: Michael.Collarin@parsons.com

Staff Support

For information on the technical program, special events, special sessions and general conference inquiries

Tiffany D. Cox

Assistant Manager of Conference Programs

Email: tcx@ashrae.org

Technical Support

For technical problems or for help in submitting an abstract online, [email Tech Support](#)

| | |
|---------------------------------|---|
| Wednesday, March 01, 2017 | Conference Paper Abstracts, Technical Papers and Paper Session Requests Due |
| Monday, March 27, 2017 | Conference Paper Abstract Accept/Reject Notifications |
| Friday, June 02, 2017 | Website Opens for Seminar, Forum, Debate, Panel and Workshop Proposals |
| Friday, July 07, 2017 | Final Conference Papers Submitted for Review (Includes Bio, Learning Objectives and Methods of Assessment); Request for Conference Paper Sessions Due |
| Monday, July 24, 2017 | Conference Paper accept/reject notifications |
| Tuesday, August 01, 2017 | Seminar, Forum, Workshop and Paper Proposals Due |
| Monday, August 07, 2017 | Revised Conference Papers/Final Technical Papers Due |
| Monday, August 21, 2017 | Conference and Technical Paper Final Accept/Reject Notifications |
| Wednesday, September 06, 2017 | Seminar, Forum, Workshop Accept/Reject Notifications |
| Friday, December 01, 2017 | Upload of PPTs Begin |
| Monday, January 08, 2018 | All PPTs Due Online |
| Wednesday, January 17, 2018 | Final Day for Commercialism Revision Upload prior to on-site |

Program tracks and timelines for Houston

- *Track 1: HVAC&R Systems and Equipment*

Track Chair: Frank Schambach

Email: franschambach@mindspring.com

Selection of equipment and systems is paramount to HVAC&R design. Papers and programs in this track will assist designers, engineers, and operators in the design, selection, and operation of HVAC&R systems and equipment.

- *Track 2: Fundamentals and Applications*

Track Chair: Dennis Alejandro

Email: denzjac@yahoo.com

Fundamentals are the foundation for understanding applications in engineering. Key components of ASHRAE fundamentals include thermodynamics, psychrometrics, fluid and mass flow. This track provides opportunities for papers and presentations of varying levels across a large topic base. Concepts, design elements and shared experiences for theoretical and applied concepts of HVAC&R design are included.

- *Track 3: District Energy and Cogeneration Plants*

Track Chair: Kimberly Pierson

Email: kdpwildcat@gmail.com

As our world resources become more and more sparse there is an industry-wide movement toward efficiency and sustainability. One of the ways in which we can look to minimize our carbon footprint is to combine our resources. District energy systems and cogeneration plants do just that and are quite popular in some locales but have yet to gain traction in other developed cities. We will look at the advantages and limitations, do's and don'ts and best practices of utilizing this type of shared system.

- *Track 4: Safeguarding your HVAC&R System*

Track Chair: Rich Rose

Email: richr@mticontrols.com

From seismic events to power outages and human error, how secure is your HVAC&R System? Mechanical, plumbing, electrical, and control systems all work together to create our living buildings, so it is imperative that designers and operators take into account the reactivity and interaction of these systems in response to natural disasters, human interference and other catastrophic events. Topics in this track include considering your design layout and accessibility, backup systems, supports and bracing, and more.

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

Track Chair: Dimitris Charalambopoulos

Email: dimitris@ashrae.gr

Residential dwellings require designers to consider a different scope of building functions, occupant use, and comfort. With increasing utility rates and a movement toward net zero housing, the traditional residential design models are continuously diversifying and evolving. This track will discuss how we can integrate modern residential design and building practices into hot and/or humid climates with specific challenges ranging from indoor comfort to ventilation and mold.

- *Track 6: Professional Skills*

Track Chair: Kevin Marple

Email: kmarple@benzco.com

This track is designed to provide professionals an opportunity to develop in the areas of presentation skills, leadership, teambuilding, understanding various business operations, interpersonal skills, etc. In short, the Professional Skills Track can cover all aspects of business outside of engineering/technical applications and lends itself to interactive session types such as workshops and forums.

- *Track 7: Research Summit*

Track Chair: Melanie Derby

Email: derbym@ksu.edu

Active research, and the exchange of those research findings are critical to the development of our HVAC&R industry and environment. The sixth annual research summit invites researchers to share those results; and this year we announce an exciting collaboration with ASHRAE's archival research publication, *Science and Technology for the Built Environment* (STBE). Researchers are invited to present papers, seminars, forums or participate in panel discussions. Authors may also pursue an opportunity to further develop their submissions for later publication in STBE

- *Track 8: HVAC&R Control Freaks*

Track Chair: Gary C. Debes

Email: gcdebes@verizon.net

This track will focus on all things controls (note: please see track 9 "MiniTrack" as well). We invite you to join this exchange addressing one of the most dynamic areas in HVAC&R. Topics may range from design innovations spreading through our industry to the latest in building integration and observation, or even troubleshooting the most common issues occurring in building management systems.

- *Track 9: HVAC&R Analytics*

Track Chair: Vikrant Aute

Email: vikrant@umd.edu

This track will focus on the application of analytics algorithms/tools to automate systems. The tools and data are readily available, but the challenge is in using them in a timely and effective manner to add value to our HVAC&R Systems. By discussing the basics of analytics, methods, case studies and lessons learned we can consider if machine learning is ready to replace conventional controls.

For information on the technical program, special events, special sessions and general conference inquiries.

Conference Program Chair:

Cindy Moreno

Email: cindym@tmmechanical.com

Staff Support

Tiffany D. Cox, Assistant Manager of Conference Programs

Email: tcox@ashrae.org

Timelines

Monday, August 28, 2017: Conference Paper Abstracts, Technical Papers and Paper Session Requests Due

Thursday, September 28, 2017: Conference Paper Abstract Accept/Reject Notifications

Friday, December 8, 2017: Final Conference Papers Due – Submitted for Review (Includes Bio, Learning Objectives and Methods of Assessment); Request for Conference Paper Sessions Due

Friday, January 2, 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 – 27, 2018)

Program ideas for Chicago and the future

| Type | Session Chair / Speakers | Proposed Title | Status | Updates |
|---------|----------------------------|--|-------------|--|
| Seminar | Carol Lomonaco / Sherry Hu | The role of cloud-based communication on smart meter technology. | For Chicago | What the procedure to get the data and what people can do with the data. Sherry Hu can be a speaker. |

| | | | | |
|-----------------------------|----------------------------------|---|--------------|--|
| | | | | To find more speakers. |
| Debate | Carol Lomonaco | Strong password for BAS | For Chicago | Three speakers identified |
| Seminar | David Blum/Sherry Hu / Xiwang Li | Foundation of building integration / Smart grid with energy storage and IoT | For Chicago? | Try again for Chicago |
| Seminar | Andreas Athienitis | Model Predictive Control (MPC) Case Studies in Commercial and Institutional Buildings | For Chicago | Not selected for Las Vegas. May re-submit for Chicago. David can be a speaker. |
| Forum | Rich Hackner | What data the lawyer would like to know | For Chicago | |
| Seminar Sponsored by TC 7.6 | Eric Yang | Existing building performance with occupant behavior based control | For Chicago | TC 7.6 seeing for co-sponsoring with 3 speakers confirmed. Dane Christensen from NREL will be the 4 th one. |
| Seminar | Kristen Cetin | Smart products for residential and commercial | For Houston | Talk with residential TC; net zero building talk and a link from Zeng. |
| Seminar Sponsored by TC 1.5 | Carol Lomonaco | Cyber security consultants what they do | For Houston | TC 1.5 seeking for co-sponsoring |
| Seminar | David Blum/Da Yan/ Bing Dong | Case studies of occupant integrated control | For Houston | CO-sponsoring committee: MTG.OBB |
| Seminar | Carlos Haiad & Glenn Remington | Cyber Security on Building Systems | For Chicago | |
| Seminar | Peter Armstrong & Li Song | Building optimal / predictive control | For Future | |
| Seminar,co-sponsor TC 7.9 | Li Song & Carol Lomonaco | How BAS can Enhance Existing Building Commissioning | For Future | |

| | | | | |
|----------|--|--|------------|---------------------------------------|
| Seminar | Srinivas Katipamula | Improving Energy Efficiency of Commercial Buildings thru Data Analytics | For future | |
| Seminar | Nick Gayeski | Edge computing, Cloud Analytics, and On-Premise Systems – Architectures for Smart Building Systems | For future | Need one more speaker |
| Seminar | Nick Gayeski / Speakers from Armstrong | Smart Transducers with Embedded Diagnostics | For future | |
| Seminar | Kristin Heinemeier / Kristin & Jon Douglas, someone from TC 7.9? | Fault Detection and Retro-commissioning: Where is the Line and Does it Matter? | For future | |
| Workshop | Kristin Heinemeier | Lab Methods for verifying that FDD tools for RTUs really work: Will Standard 207 really work? | For future | |
| Seminar | Glenn Remington | Case Studies: Using FDD for smarter facility operations / Lessons Learned from FDD implementation | For future | The project has been done for a while |
| Seminar | Chris Kinney/Michael Munroe/Glenn Remington | FDD and Clouds? | For future | |
| Seminar | Jin Wen / Zheng O'Neil | Occupancy-based control sensor | For Future | To invite speakers |
| Seminar | Xiaohui Zhou/ Srinivas Katipamula/Jin Wen | Open source platforms for HVAC, VOLTRON | For future | |

| | | | | |
|-----------------------------------|----------------|----------------------------|-----------------|-------------------------------------|
| Seminar Sponsored by TC 1.5 | Carol Lomonaco | Cyber security red team | For Kansas City | TC 1.5 seeking for co-sponsoring |
|-----------------------------------|----------------|----------------------------|-----------------|-------------------------------------|

ASHRAE TC 7.5 Smart Building Systems
2017 Annual Conference, Long Beach LA

Meeting Minutes of Building Operations Dynamics Subcommittee Meeting

Date: Monday, June 26th, 2017
Time: 4:300-5:15 p.m.
Location: LBCC 202AB

1. Roll Call and Introductions
2. Program Proposals

| Program | Title | Lead | Newest update |
|------------|---|--------------------|---|
| 1 | What to do with optimal control? | Peter Armstrong | Peter was lack of one of the speakers. Updates after St. Louis meeting: Abstract was submitted – Updates after LV: It will be submitted for Winter 2018 Updates at Long Beach: Peter is not here. |
| 2 | Model accuracy impact study on model predictive control | Andreas Athienitis | Orlando---It is already a well-funded project. Andreas will provide a seminar for the work he has done in the area. For Las Vegas. Updates after St. Louis meeting: It was not accepted for LV. Update after LV: Control tracks for long beach and joe suggested to communicate with track chair in order to improve the chance. Update at Long Beach: Andreas is not here. David Blum is willing to contribute. |
| 3 | Smart products for residential and commercial | Josh and Kristen | Update after LV: Suggested to talk with residential TC and net zero building committee and a link from Zeng was shared. Update at Long Beach: Christen wanted to push this to Houston. |
| 4 | Training plan for facilities | | Update after LV: TC7.3 and commissioning - provide somehow continuous information; Jin recommends forming a MTG. Update at Long Beach: Park |
| New ideas? | | | |

3. Research

| Research | Title | Lead | Newest updates |
|----------|---|------|--|
| RP-1661 | RP- 1661: Development and Validation of Dynamic Models for the Evaluation of Chilled- | | University of Miami is selected as the contractor. |

| | | | |
|-------|---|-------------------------------------|---|
| | Water System Control Strategies in the ASHRAE Handbook | | |
| WS | WS- 1809: Updating reference guide for dynamic models of HVAC equipment | Heejin Cho | Updates after St. Louis meeting: RTAT is recommended by RAC. Now Heejin is working on the WS. He plans to have it ready for review in Long Beach. Updates after LV: Heejin is working on the WS; need a status update. Update at Long Beach: Heejin will send the WS by Chicago Meeting. Note: This WS has to be submitted by August, 2018 |
| RTAR? | If you had “perfect information” on occupant’s comfort preferences and their location within a conditioned space then how would you optimize control and how much value would you be able to realized | Rich Hackner? Li Song? | St. Louise update: An RTAR is prepared by Li and will be discussed in the committee meeting for comments. Rich will lead on WS if the RTAR is accepted. Need inputs to improve the RTAR. Two volunteers: James Sweeney and Gary Shamshoian. Updates after St. Louis meeting: James provided many inputs in details and the RTAT is revised accordingly. It is ready for committee discussion in LV. Update after LV: March 1 st is the deadline. Withdraw? Update at Long Beach: Park |
| RTAR | Explore and Quantify Behavior-Driven Building Energy | Zheng O’Neill Bing Dong | This is a new RTAR from MTG:OBB. Look for the co-sponsorship from TC7.5 |
| RTAR? | How IoT impacts operators | Carlo Liping Wang | New at Long Beach |
| RTAR? | Link the productivity with occupancy based control | Ivo Martinac | New at Long Beach |
| RTAR? | Smart management of moisture and energy consumption in residential houses, smart ventilation, optimal location for dryer, heat pump water heater, etc. | Andrew Windham; Kristen Cetin | New at Long Beach |
| RTAR? | Design guideline to consider unmeasured disturbance for an implementable MPC | Donghun Kim, David Blum | New at Long Beach |

4. Handbook: Jin Wen and Zheng O’Neill volunteered to review the new chapter material
5. Other topics: None
6. Adjournment: 4:56pm



Meeting Minutes

TC 7.5 Enabling Technologies Subcommittee

3:15-4:00 pm, Sunday, June 2017

Prepared by Zheng O'Neill

Objective for this Meeting: Generate ideas for research and program related to Enabling Technologies and assign owners.

Subcommittee Scope: The Enabling Technologies Subcommittee of TC 7.5: Smart Building Systems aims at exploring and developing technologies which will enable the development, implementation and commercialization of smart building applications such as fault detection and diagnostics, model-predictive control and optimization, and smart grid applications such as automated demand response. Three focal points of this subcommittee are i) smart transducers, such as sensors and actuators which provide diagnostic information, ii) communications, such as wireless devices and protocols enabling greater data exchange, and iii) embedded metadata, such as embedded equipment and system information to enable smart building applications. On these topics, the scope of this subcommittee includes identifying and sponsoring research projects, evaluating existing technologies, providing recommendations to building operators and practicing engineers, developing supporting tools for researchers in these areas, and organizing programs to disseminate research findings and advancements among ASHRAE members.

Related Committee activities: BACnet committee AP data modeling working group, Facility Smart Grid Information Model, Computer Applications, Emerging Technologies, SGPC20 HVAC process data exchange requirements and SPC 205 Standard Representation of packaged unit models.

3:15 Introductions / Agenda Revisions / Announcements

3:20 Existing RTARs and research ideas

i. A Review of Metadata and Taxonomies to support FDD.

1. Work in other TCs is advancing on this topic. Review ASHRAE Standard 223P, and this presentation by Dave Robin. https://www.haystackconnect.org/images/presentations/04-DaveRobin_HaystackConnect2017_UseofMetadataandSemanticTagginginBACnetandASHRAEsEffortsonSemantics.pdf. Has anyone from TC7.5 participated in this effort?

<< Nobody is familiar with standard 223P, will check at Main meeting again >>

3:30 New research ideas or enabling technologies worthy of committee's attention?

- 1) If we have perfect data on where people are. Can we control the building better? – Song Li has an existing RTAR “Saving energy national wide...” on this topic. The goals are to 1) develop control strategies based on occupancy information; and 2) evaluate energy impact national-wide. Song will resubmit this RTAR. << No updates since Rich and Li are not at Long Beach >>
- 2) BEMOSS type low cost control and sensor and their impacts on building control and performances. – there are some interests but no RTAR ideas etc. << No updates. >>
- 3) New Idea at Long Beach: how can building/building system respond to the utility ancillary service/frequency regulations in terms of actuator reactions. A new RTAR focusing on communication infrastructure will be proposed by David Blum and Bing Dong

3:40 Existing Program ideas

- i. Update about Cybersecurity program at Long Beach – Glenn Remington or others who attended? << not such program submitted >>

- ii. Parked ideas waiting for the right conference track. Are any upcoming conference tracks right for these?
 - a. Carlos: Potential program was discussed on the role of cloud-based communication on smart meter technology. – Glenn Remington. Carlos and Glenn are both interested. The focus will be 1) the security of the data, and 2) how to get the data and what do you do on this. << Carlos and Xin/Sherry Hu will put an ASHRAE debate forum for this>>
 - b. Joe Zhou: Open source platforms for HVAC. Srinivas Katipamula, Jin Wen. Not accepted for St. Louis. VOLTRON On Hold. <<Joe is not interested to lead, drop>>
 - c. Michael Munroe: Securing ad-hoc sensor networks. Autonomous swarms for robots, sensors, control, motion. **On Hold.**
 - d. Nick Gayeski: “Smart Transducers with Embedded Diagnostics”. Speakers from Armstrong, Schneider Electric interested. **On Hold**
 - e. Nick Gayeski: Edge computing, Cloud Analytics, and On-Premise Systems – Architectures for Smart Building Systems. Examples of embedding analytics/smart building applications in devices/transducers, on-premise controllers and servers, or cloud platforms. **On Hold**

TC 7.5 Fault Detection and Diagnosis Subcommittee Meeting Agenda

2017 Annual Meeting, Long Beach, CA

Date: Sunday, Jun. 25, 2017

Time: 2:30 pm-3:15 pm

Location: 204, LBCC

| | | |
|--------|--|---|
| 0:00 | Call to Order | Yuebin Yu |
| | Circulate Sign In Sheet, self-introduction, announce the subcommittee scope. | |
| 10 min | Update/Discussion of Active project/RTARs/Work Statement | |
| | Methods to evaluate AFDD strategies for air handling unit systems, a | Jin Wen, Dave |
| | RTAR, Development of AFDD for leakage of ground-source heat pumps, a | Zheng O'Neill and Christin Cetin |
| 5 min | Idea pool revisit, New Research Ideas, Open discussion: RTAR idea: collect, clean, and label existing data for FDD research. | Xiwang Li, Liping Wang, Kristen. Shawn Shi (Carleton) |
| 30 min | Summary Presentation: Fault Detection and Diagnostic Methods for Supermarkets-Phase 1: a) Many questions and good interests; b) It is recommended to have a seminar on this RP; c) We should have follow-up RTAR on this topic. | Alireza Behfar |
| | Adjourn | |

- a: Active, p: Parking lot, n: New

The FDD Subcommittee of TC 7.5: Smart Building Systems aims at exploring and developing technologies to help detecting and diagnosing common faults existing in building HVAC systems. The scope of this subcommittee includes (a) identifying and sponsoring research projects to develop new FDD technologies, evaluate existing FDD technologies; provide recommendations to building operators and practical engineers; and develop supporting tools for researchers in FDD areas; and b) organizing programs to disseminate research findings and advancements in FDD areas among ASHRAE members.



Agenda

TC 7.5 Smart Grid Subcommittee

4:00-4:45 pm, Sunday, June 25, 2017

Prepared by **Kristen S. Cetin**

Subcommittee Scope: This subcommittee will explore and develop ideas and research work statements to improve the building and utility interactions (and more specifically the electric grid). The research will focus on developing enabling technologies for seamless interaction of smart building components and utilities and other building services. An important aspect of this work is to identify the information that is necessary to support smart building technologies, and to identify the requirements of communication protocols to support the exchange of this information between different building services buildings and utilities, between multiple buildings, with outside service providers.

The importance of a stable and reliable electric power grid to life and the economy in the 21st century has been underscored by two major events over the last decade: a major black out on the east coast of North America and wildly varying electricity prices in California during an attempt at restructuring the electricity marketplace. In response to these events many organization (DOE, EPRI, and CEC) have started research activities to find ways to modernize the grid. However, there a significant gaps in the research activities, especially as they relate to buildings. Since buildings consume over 70% of the electric in the U.S., they have to part of the solution to modernize the grid. ASHRAE has traditionally developed technologies, standards, and guidelines for buildings. Therefore, this subcommittee can play a major role in continuing this effort.

| | | |
|----------|--|--|
| 0:00 | Call to Order | |
| | Circulate Sign In sheet, self-introduction, announce the subcommittee scope. | |
| 5-10 min | Relevant sessions at current ASHRAE conference | |
| | <i>Seminar 9 - 11:00 am – 12:30 pm - Sunday Operation Optimization of Buildings As Virtual Batteries for the Grid with High Penetrations of Renewables</i> | Zheng O’Neill |
| | <i>Seminar 8 – 11:00 am – 12:30 pm – Sunday Occupant Behavior Based Modeling Predictive Control</i> | David Blum, Bing Dong, Pengfei Li, Da Yan |
| | <i>Forum 5 - 9:45 AM - 10:45 AM – Tuesday Future Smart Buildings: What Data Do We Need to Collect and How?</i> | Kristen Cetin Joe Zhou |
| 5 min | Winter ASHRAE conference seminar ideas | |
| 15 min | Update/Discussion of RTARs/Work Statement ideas | |
| | 1) Development of models for better peak load predictions | |
| | 2) Instantaneous voltage and current load from buildings | Ralph Muehleisen, |
| | 3) Energy demand prediction of multiple building scale | |
| | 4) Connecting grid modeling and building modeling | |
| | Other ideas? | |
| 10 min | Interest in continuation of Demand Response Guideline/Standard development (from 2016 discussions) | |
| | Other ideas and discussions | |
| Adjourn | | |

Meeting Minutes

Call to Order

- New members – name – affiliation, new member
- Read scope

Sessions at current ASHARE conference

- Seminar 8 – 11:00 am -12:30 PM – Sunday Occupant Behavior in Buildings
 - o several presentation on projects connecting buildings to the grid
- Seminar 9 - 11:00 am – 12:30 pm - Sunday Zheng O’Neil, Operation Optimization of Buildings As Virtual Batteries for the Grid with High Penetrations of Renewables
- Forum 5 - 9:45 AM - 10:45 AM Future Smart Buildings: What Data Do We Need to Collect and How?

ASHRAE conference ideas

Winter 2018 (Aug 1, 2018)

- Track 3 – Standards, Guidelines and Codes (updates on changes to codes)
 - o Smart building systems in code – Demand Response - Kristen to pursue
- Track 7 – Modeling Through the Building Life Cycle
 - o Fundamental of smart building integration – for presentation (David Blum)
 - o **Challenges associated with communication of different smart homes systems – Carlos – challenges with getting systems to responds**
 - What could go wrong – lessons learned from DR
 - What could go wrong, have we identified all thought things – what adaptive technologies to make sure it will work
 - **Ruban (LG)– Carlos (LG) – Ask Rich Hackner, Glenn Remmington – glennremington@live.com**

Summer 2018 (March 19, 2018) – will discuss next time

- Track – residential modern buildings in hot and humid climates
- Track - HVAC&R Analytics –

From Previous discussions – will table for next time (no appropriate track)

- Smart products for residential and commercial buildings - Josh, Kristen, Zheng – talk with residential TC – net zero building committee -

Update/Discussion of RTARs/Work Statement ideas (Michael Bobker, mbobker@ccny.cuny.edu)

- Development of models for better peak load predictions (**Kristen to discuss with Mike**)
 - o City-scale model *validation* for predicting demand response - some models exist to do this
 - o Need an evaluation of the state of the art, perhaps useful for new city planning
 - o Need some more research on demand response capacity prediction
 - o Existing software – GridLabD – developed to designing rate cases - Snirvas
 - o Peaks at annual, monthly, daily, hourly, 15 min, 1 min?
- Instantaneous voltage and current load from buildings

- no volunteers but will keep for next time
- Linking building modeling to grid modeling (**interest from Don Hong Kim – follow up with him?**)
 - Some existing efforts
 - Cider – DOE Sunshot program – linking transmission and building modeling, heavy use of smi
 - CEC – put out public request for comment on possibly funding
 - IEA Annex 60 – electrical and building linking efforts with Modellica
 - End user of this work would be policy recommendations for ISOs
 - How to validate models?
- Guidance on smart building equipment / IoT – (interest but no volunteers – will keep for next time)
 - what are you getting , functionality, products
 - what program functions are necessary to work in different environments

Interest in continuation of Demand Response guideline – Previous efforts from Randall, Carlos

- Efforts last year – 2016 (about a year ago)
- Suggested to form at multidisciplinary task group (MTG)
- Suggestion by Larry Markel –
 - Addendum to 189.1
 - See how 189.1 is merging with IGCC & integrating demand response
 - Volunteer effort to join Working Group for DR – Andy Persily
- *Interest among TC for continuing this effort – **Kristen will submit a forum proposal then if not accepted we can set up time during the subcommittee to discuss instead and still can be included in the program***
 - *Interest in more focus – focusing on ASHRAE related interests – e.g. HVAC capabilities needed to participate in demand response*
 - *If there is a demand response program, how would a building/equipment manufacture be able to contribute*
 - *What kind of equipment to install to make a building DR ready?*
 - *Recommend to engage TC 1.4*
 - *Currently there are rules of thumb....*