

ASHRAE TC 6.9 – Thermal Storage
General Meeting Minutes
Monday, February 3rd, 2020
4:30 – 6:00 PM
Hilton Orlando, Room Key West BC, Orlando, FL

Attendees

Each person introduced themselves and an attendance sheet was distributed.
Attendees included:

Dre Helmns	G	
Brent Kouash	CM	
Patrick MacCormac	G	
Min Gyung Yu	G	
Sonje Salo	G	
Shwetha Prabhu	G	
Katherine Davighon	PCM	
Cheng-Min Yang	G	
Cheng Zeng	G	
Greg Pavlak	G	
Martin Timm	G	
Matthew Friedlander	G	
Casey Troxler	G	
Melissa Messenger	G	
Thomas Freeman	G	
Henry Becker	VM	
Farzin M. Rad	VM	Vice Chair/ Handbook Subcommittee Chair
John H. Nix	VM	
Daniel Pyewell	CM	Secretary/ Webmaster
Bruce Lindsay	CM	
Ken Fulk	CM	Standards Subcommittee Chair
Guy Frankenfield	VM	
Emishaw Iqqa	G	
Mitch Ishmael	G	
Nick Roberts	G	
Dragos Parashiv	PCM	
Dave Autrey	CM	
Ivan Thomas	CM	
Doug Reindl	CM	
Mark MacCracken	VM	
Scott Shaffer	CM	
John Dunlap	VM	
Chuck Booten	G	
Jason Woods	CM	
Navin Kumar	G	
Sandra Boetcher	CM	
Rafael Rodriguez	CM	
Michael Deru	CM	
Chris Mincey	VM	Chair
Blake Ellis	CM	
Karl Heine	G	
Richard Brooks	VM	Program Subcommittee Chair
Paulo Tabares	VM	Research Subcommittee Chair
Ayyoub Momen	CM	

Min Gyung Yu	G	
Mike Saunders	G	
Keith Ponitz	G	
Geoff Bares	VM	

Preliminaries

- Meeting called to order at 4:31 PM by Chairperson, Chris Mincey.
- The TC 6.9 Purpose Statement and Code of Ethics Commitment was read by Chris Mincey.
- The agenda and attendance sheet were circulated.
- Voting Member Roll Call – 10 voting members were present: Farzin Rad, John Dunlap, Paulo Tabares, Geoff Bares, Mark MacCracken, Guy Frankenfield, Richard Brooks, John Nix, Chris Mincey, and Henry Becker. The following voting members were not present: John Lau and Trenton Hunt.
- Based on a total of 10 voting members, a quorum was determined.
- All attendees were given the opportunity to introduce themselves. Chris mentioned that if anyone wants to be active in the T.C., please see him after the meeting.
- Modifications to the agenda – cover vote to still be a T.C. in long range planning.

Approval of Minutes

Kansas City – Summer Meeting 2019. No comments were presented in meeting. Motion to approve made by John Dunlap, seconded by John Nix. 11 voting members approved and 1 abstain by Geoff. The minutes were thus approved.

Announcements by Chair – Chris Mincey

Section 6 Breakfast

- T.C. Reorganization was discussed. No changes expected for T.C. 6.9. Expect changes to 6.10 and 6.3, but nothing for this T.C.
- The availability of RPM was mentioned. As long as the T.C. has no problem meeting quorum, we should not need it. So, unless someone has a special request, we will plan on not using.
- Jan. 13th, RAC panel sent all members an email/ survey to share input. Chris advised to look back through inbox and try to complete and submit. Only 700 have been completed so far.

Liaison Reports

- Section 6 head Dawen Lu – did not attend.
- John Nix attended the Professional Development Group meeting this morning. PEC is being reorganized and renamed as Training and Education Committee (TEC), as they will be focusing on training as a revenue source. John asked if the TES

seminar can be done in Austin (with Doug Reindl). John will keep us notified about the status of this. He is also going to try to get some tech hours approved (hour long presentations) as an introduction into the course itself. They plan to offer this 3-4 times a year. Doug has submitted these to PEC. We've combined eLearning with PEC as well, and are finding that eLearning is becoming a bigger part (more and more demand), and they now want active roles and as much revenue as possible.

- For Standard 90.1, John Dunlap reported that 90.1 established a subcommittees for thermal storage. Mark MackCracken and John Dunlap are on the ICE storage subcommittee.

Handbook – Farzin Rad

- With Farzin becoming vice-chair of committee, the committee will need a new handbook chair. Scott Shaffer volunteered to take over.
- This year, not much to update on as we wrapped up the submission version with edits and submitted in April. All work was done in the ASHRAE Authoring Portal. This included updated references, conversions corrected, and new content.
- Reviewers – lead was Ken Fulk, along with Chris Mincey, Brian Silvetti, John Dunlap, Daniel Pyewell, and John Nix.
- Some edits and feedback per submittal. Responses were sent back on Jan 23, 2020. The Chapter will be published this year.
- Guy mentioned that it's a 4 yr. cycle for the handbook. The handbook chair manages the reviewers and ensure comments and edits are done within the time frame allotted. Guy mentioned that it's a great opportunity to understand how the handbook chapters work within ASHRAE.
- For next handbook edition, open suggestions include passive TES work done by John Molnar, and as well as some new info that can be pulled from the updated Design Guide for Cool Thermal Storage.

Programs – Richard Brooks

Past programs:

- No Seminars were presented in Kansas City.

Current programs:

- Two programs were proposed by TC-6.9 for the conference:
 - Using Thermal Energy Storage to Increase the Resiliency and Flexibility of Florida HVAC & Power Generation Facilities
 - Advances in Energy Storage for Smart Buildings: New Modeling Capabilities and Technologies
- Both submitted but neither accepted for the conference. Chris Mincey noted that of 125 submitted, 75 were accepted.

Future programs:

- Deadline for Austin rapidly approaching.
- Potential Future Seminar Topics as follows:
 - Thermal vs. battery Storage
 - Long term versus Short Term Storage
 - TES 101 – may be too general
 - John Andrepont’s Conference Paper Seminar regarding his previously published paper on TES & Turbine Inlet Cooling
 - AHSRAE 150: What is it and how to apply it
 - Economics of Thermal Energy Storage
 - Predictive Controls to Utilize TES to address Renewables – from Amy’s work
- Potential Future Seminar Titles as follows:
 - Voted Seminar #1: Embry Riddle (for Austin, TX) – TES in Small Scale Storage Applications. Chair is not firm yet.
 - Other suggestions include:
 - Simple, Elegant, and “Virtually” the Best Battery Ever – Thermal Storage
 - How many Times Can a TES System Pay for Itself
 - The Nitty ”Griddy” about TES Systems – Why Electric Grids and Microgrids need TES
 - David Blum indicated that Track 5 for Austin sounds favorable for us. 2 seminars proposed as follows:
 - Voted Seminar# 2: Integrating PCM (hot and cold HX) storage in different configurations of HVAC systems (residential and commercial with LiO battery). Possible co-sponsor with T.C. 7.5. Smart Building systems. Chair not firm yet.
 - Voted Seminar #3: Techno-economic comparisons. Look for co-sponsorship.
 - On-going project
 - 2-3 speakers
 - Guy Frankenfield would like to present on energy storage comparisons/ technologies for over 10 yrs life-span.
 - DOE – there is a currently funded project for PCM and techno-economics (mentioned by Navin with Oakridge Natl Lab). He would like to join and support as well.
 - Need a chair and 3 different ideas of seminars/ titles
- Advances in Energy Storage for Smart Buildings – chaired by Paulo.

- Chris made motion to approve 1st (Embry Riddle) seminar. John Nix seconded. All approved.
- Richard made motion to approve 2nd seminar. Geoff seconded. All approved.
- Chris made motion to approve 3rd seminar. Geoff seconded. All approved.
- For Chicago, it was suggested to look into doing a seminar on TES for refrigeration (case study with specific vendors), and TES with solar and renewables (look to co-sponsor with T.C. 6.7).
- Paulo Tabares suggested that we look at doing a seminar on TES lessons learned.
- Scott Hackel with Slipstream indicated that for Chicago, we should look to do seminar on use of TES for air-conditioning. He indicated that there is some good data and case study info available in order to do a session on TES application (vendors and neutral non-vendors). Applications include traditional ice storage, passive PCM, and controls technologies.
- John Nix mentioned that a current hot topic is on using TES with solar and other renewables. T.C. 6.7 wanted something in their handbook about using TES. Mark MacCracken has done a presentation on TES versus batteries. John is wondering if anyone has done any work with Solar and TES together. Research topic of TES with renewables and discussion with T.C. 6.7
- For Chicago, Geoff mentioned that Enwave will conduct a tour of their ICE TES facility.

Standards – Ken Fulk

SPC-150 update:

- Proposed new guideline 150. As a surprise to us, Standards killed the idea of a guideline. They did not believe justification of a guideline was sufficient. Suggested that we seek to initiate revisions to standard.
- Request to make revision to SPC 150. Chris should have SPC150 revision form handy. Minimum of 5 people needed for committee. John Nix said he would work with the group. John Nix says that alternatives need to be in specific Chapters/ sections, and not in Appendix. Ken suggests having an adhoc meeting to define the areas that you would want to change, and then approach the committee. Ken is looking for a replacement for subcommittee chair for standards.

Standards update:

- SPC-150 subcommittee was to be dissolved, but ASHRAE continues to schedule a SPC-150 subcommittee meeting. Chris indicated that he will request ASHRAE remove this from future programs.
- Std. 94-2. This standard was withdrawn at least six (6) or more T.C. meetings ago but ASHRAE continues to maintain that they have no official record of this action so it remains active. Mike Filler is aware of this and is committed to completing the related documentation to make this happen. Mike was to fill out a specific form that ASHRAE requires to be filled out to complete this task. A copy of this form was sent to Mike two (2) years ago. This form also requires documentation that each SPC member received a ballot and voted. It is possible this could be done by e-mail but needs to include a ballot, not just a simple e-mail response. Ken suggested a SPC

94.2 member send him a copy of the e-mail distributed to the SPC members requesting for this vote so that he might be able to work this to a successful conclusion. This may warrant a call to Mike Weber of ASHRAE to resolve this matter.

- SPC-150 revision published last year and is available in the ASHRAE Book Store.
- SPS Liaison, Rich Sweirczyna, did not attend
- Other standards of interest. AHRI 900. Approved by ANSI in 2015. AHRI discussing to making some updates, but should be minor. Ken will report on anything else that develops with this.
- TES-2-200X (ASME). Ken traded emails with ASME and they plan on keeping each other informed. The document will have some overlap with ASHRAE, but seems to be mostly focused on controls. Ken will keep us posted on this.
- Ken indicated no changes to name of standard subcommittee will be made as the guideline will not be pursued.
- Post meeting note: Blake Ellis has agreed to take over the Standards Subcommittee Chair Position for Ken.

Research –Paulo Cesar Tabares Velasco

Status Update:

- ASHRAE provided survey – take 5 mins to fill out.
- No current projects and work statements (except concluding CTIC design guide). We brainstormed ideas during the last meeting in Kansas City.
- We currently have two main RTAR ideas:
 - Optimal Design and Control – main author is Karl Heine. Main concept – employ programming with possible grid future scenarios (California or Arizona). Use it to inform pricing schemes? Different customers/ profiles? Different prices?
 - Include various input signals.
 - Real-time pricing – Utilities (PG&E) did previous work (RTP w/ Thermal Storage).
 - Comments on adjusting ice storage – a lot of existing ice storage capacity for basketball games/ etc.
 - Broad design of perfect system.
 - Model Predictive Control – Amy Van Asselt. Develop control strategies for CHW systems for highly variable inputs such as renewables. More on how you are going to control.
 - Ken Fulk suggests that the two authors at least chat to see if there is common ground between the two ideas. Suggestion on separating to phases: the first being design, and the second as actively controlling in real time to achieve results.
- Paulo is looking for more feedback on RTARs, with a deadline of Feb. 17th, and will start working on 2nd version of RTARs. Then after that, Paulo will send back to TC for vote. Paulo would like to vote by email on these 2 main RTARs, and hope to get new RTARs by next meeting.

- CTIC design guide – Geoff Bares indicated that vote will be made tomorrow to approve final draft and get ready for publication.

Long Range Planning/Website – John Lau/Daniel Pyewell

- Chair Breakfast – put a lot more color on TC reorganization. TC 6.9 is well structured and should not need to be affected. Some changes are happening with other TCs, but not as drastic of a reduction as was first estimated.
- History of TES is now available. Chris Mincey has a link that he will pass along to Daniel Pyewell, in order to post and have available from the website.
- Guy is sitting in on meetings for ESIC (modelling software), but they are currently focusing on batteries for now. Guy is sitting in to see how it's progressing, and to ensure TES is included in this software.
- 3 voting members rolling off after summer meeting. Guy Frankefield, John Dunlap, and Paulo Tabares. Daniel Pyewell and Scott Shaffer will roll on as Voting Members in July. Bruce Lindsey is another potential future voting member (Mark MacCracken suggested).
- Mark MacCracken mention that heat storage will be an up and coming thing with net zero goals for buildings, particularly as chillers are essentially large heat pumps.
- John Nix indicated that we received an email from T.C. 2.5 Climate Change, about thinking TES may be a technology related to climate change. They are thinking a combination of TES with renewables will lead to reduction of emissions to atmosphere (carbon footprint). John will try to make it to their general meeting tomorrow to chat further with them. John will report Amy's research project that may lend itself useful for Climate Change.
- 4.1 Load Calculations is looking for someone to represent and attend. Guy will attend.
- Daniel has been keeping our website up-to-date.
- Chris mentioned those nominated for major contributors of thermal storage technology. Geoff and Bruce conducted an appreciation lunch for them.
- Chris made motion to remain a TC, seconded by Guy. All approved unanimously.

Honors and Awards – Blake Ellis

- Bill Banfleth received the F Paul Anderson award. This is ASHRAE's highest honor for technical achievement. He is a professor at Penn State, at University Park.
- Gordon Holness was also recognized and gave mention of T.C. 6.9.
- May 1st – deadline coming up for Louise and Bill Holladay Distinguished Fellow Award, as well as Andrew T. Boggs Service Award.

Old Business

- none

New Business

- Chris mentioned that if any guests wish to become involved in the committee, to please get him their information in order to become a corresponding member. Current provisional members roll off automatically after 2 years if they do not request to be added as corresponding members.
- Any volunteers for SPC 150 alternative test procedures and members for subcommittees – 1 chair and 4 members. Guy Frankenfield, John Nix, and Keith Ponitz said that they will be on the adhoc committee.
- Geoff indicated 90.1 has subcommittee on 3 TES storage technologies. We have liaisons for ice storage, and need liaisons for CHW. Daniel Pyewell volunteered. John Dunlap will follow up with information in order for Daniel to pursue.

Adjourn

- Motion by Chris Mincey to adjourn, which was unanimously approved. Meeting adjourned at 5:28 p.m.