

**ASHRAE TC 6.9 – Thermal Storage
General Meeting Minutes
Monday, January 25th, 2021
3:30 – 5:00 PM EDT
Virtual Zoom Meeting**

Attendees

Attendees included:

Craig Wray	CM	
Charles Dorgan	CM	
John Andrepont	CM	
John Lau	VM	
Trent Hunt	VM	
Chuck Booten	CM	
Mike Kazmierczak	CM	
Steve Bourne	CM	
Sandra Boetcher	CM	
Spencer Dutton	CM	
Richard Brooks	VM	Program Subcommittee Chair
Henry Becker	VM	
Farzin M. Rad	VM	Vice Chair
John H. Nix	VM	
Daniel Pyewell	VM	Secretary/ Webmaster
Bruce Lindsay	CM	
Ken Fulk	VM	
Guy Frankenfield	CM	
Scott Shaffer	VM	Handbook Subcommittee Chair
Richard Mullen	CM	
Chris Mincey	VM	Chair
Blake Ellis	CM	Standards Subcommittee Chair
Paulo Tabares	CM	Research Subcommittee Chair
Amy Van Asselt	CM	
Navin Kumar	CM	
Ahmed Elatar	CM	
Brent Kovash	CM	
Dre Helmns	G	
Joe Vadder	CM	
Katherine D' Avignon	CM	
Larry Markel	CM	
Phil Trafton	CM	
Rami Saeed	CM	
Karl William Heine	CM	
Ryan Lime	CM	

Preliminaries

- Meeting called to order at 3:33 PM by Chairperson, Chris Mincey.

- Housekeeping – keep mic on mute if not speaking. No need to provide email to Daniel on attendance.
- The TC 6.9 Purpose Statement and Code of Ethics Commitment was read by Chris Mincey.
- Voting Member Roll Call – 10/12 voting members were present: Farzin Rad, Richard Brooks, Chris Mincey, John Lau, John Nix, Daniel Pyewell, Trent Hunt, Henry Becker, Ken Fulk, and Scott Shaffer. The following voting members were not present: Geoff Bares and Mark MacCracken.
- Based on a total of 10/12 voting members present, a quorum was determined.
- All guests were given the opportunity to introduce themselves. Dre Helms introduced himself and requested to be added to the roster as a corresponding member.

Approval of Minutes

- Summer Virtual Meeting 2020. No comments were presented in the meeting. John Nix made a motion to approve the minutes, seconded by Trent Hunt. 10 voting members approved, thus the minutes were approved unanimously.

Announcements by Chair – Chris Mincey

Section 6 Breakfast

- Reorg still ongoing – still some mergers happening.
- ASHRAE pushing pursuit of new institute professional development classes.
- Scott Shaffer mentioned that he heard in a committee discussion about the possibility of renaming T.C.s to F.G.s (functional groups). Chris will follow up on this.

Liaison Reports

- Section 6 head Dawen Lu – did not attend.
- Professional Development Group - John Nix – no update. He indicated that the committee is always looking for new ideas. The T.C.'s class provided (instructed by Doug Reindl) has not been proposed for the near future. The classes are usually proposed at least one year in advance.
- Work Group 90.1 - John Dunlap did not attend. John Lau mentioned, and Dan Pyewell confirmed, about the implementation of round-trip efficiency for thermal storage into the proposed addendum of 90.1 (indicated as 98%). John Lau requested that Mark MacCracken give an update at a future meeting, as he has been intimately involved in the Work Group.
- T.C. 2.5 Climate Change – John Nix says they were looking for some common topics to tie together with thermal storage. John will continue to work with them on this.
- 4.1 Load Calculations Data and Procedures - Guy Frankenfield will continue to follow up with T.C. chair. Guy has reached out a few times, but no response back. Guy will make another attempt.

Standards – Blake Ellis

- ASHRAE Std. 150-2000 (RA 2019) – Method of Testing the Performance of Cool Storage Systems
 - a. Published in Orlando (Winter 2020).
 - b. Some discussion and consideration to develop an SPC team to update the standard (trying to revise to be a little more inclusive of testing methodology, and as well to be used as a guide). Members that have volunteered for the team include the following: Charles Dorgan, Blake Ellis, Guy Frankenfield, John Nix, and someone from Oakridge National Lab (Kyle Gluesenkamp is not sure of the person yet. Blake will follow up with him).
 - c. Daniel Pyewell mentioned in the subcommittee meeting that Working Group 90.1 has referenced Std. 150 in the proposed addendum, and that there may be some coordinating and future revisions to the standard based on potential integration into Std 90.1.
- AHRI 900-2014 (RA 2020) – Performance Rating of Thermal Storage Equipment Used for Cooling. Reaffirmed in 2020 with no changes.
- Proposed ASME TES-2-200X, Safety Standard for Thermal Energy Storage (TES) System Requirements for Solid State and other TES Systems. This is a safety-focused standard for thermal storage, particularly for high temperature TES systems. Blake attended the last meeting, and reported that they are still recruiting and trying to figure out scope of the standard. The next meeting is on Feb. 18th. Nicole Gomez is the main contact for the standard (see subcommittee notes for contact information). Blake indicated that it seems like the standard is solely about high temperature. Blake will keep in touch with Nicole, going forward.
- Possible new standard proposed on Test Standard for Phase Change Materials – being proposed by Navin Kumar. The effort would be to standardize PCM for use in buildings. Navin is currently gathering interest to form a standard subcommittee. If there is any interest, please reach out to either Navin or Blake. Dre Helms volunteered to be involved in the standard. Katherine Avignon also volunteered to work with Navin on potential matches from her work on other standards. Chuck Booten also volunteered to help with the standard.

Programs – Richard Brooks

- **PAST PROGRAMS – Virtual/ Austin TX – Summer 2020 (Seminar Virtual due to Covid-19)**
 - a. None of our proposed seminar topics were approved/ chosen by the selection committee (CEC).
- **CURRENT PROGRAMS – Virtual/ Chicago, IL Winter 2021 (Seminar Virtual due to Covid-19)**
 - a. T.C. submitted 4 seminars, with all four accepted. 2 of 4 seminars are live, 2 are pre-recorded.
 - i. Seminar-30899 (pre-recorded)
 1. Smart Controls and Optimization for Thermal Storage Systems and Connected Communities
 2. Chair- Paulo Tabares Velasco

- ii. Seminar-30929 (Live)
 - 1. Thermal Storage for Grid-Friendly Refrigeration
 - 2. Chair- Scott Hackel
- iii. Seminar-30939 (Live)
 - 1. Techno-Economic Comparison of Energy Storage Technologies
 - 2. Co-Sponsored by TC-7.5 Smart Building Systems
 - 3. Chair- Kyle Gluesenkamp
- iv. Seminar-30975 (pre-recorded)
 - 1. Integrating Renewable Energy into Residential and Commercial Air Conditioning with Thermal Energy Storage to Resolve Grid and Off-Grid Issues.
 - 2. Chair- Bruce Lindsay

- **FUTURE PROGRAMS – Phoenix, AZ, June 26-30, 2021**

Venue = Sheraton Phoenix Downtown and the Phoenix Convention Center

One Program was approved by the Voting Members for the 2021 Annual Meeting in Phoenix AZ:

- 1. Coupling TES with Electrical Chemical Storage
 - a. Chair: Spencer Dutton
 - b. Speakers; Kyle Gluesenkamp, Dre Helms, Spencer Dutton
 - c. The deadline for submission is Feb 22.
- 2. No TC co-sponsors of seminars were approved.

Handbook – Scott Shaffer

- Thermal Storage Ch. 50 was just published in 2020 with the new edition. The handbook revision is now starting a new 4 year cycle.
- Scott attended the Handbook chair meeting on Wednesday, Jan. 13th. There were a lot of technical issues with audio and video on the virtual call. The handbook committee chair meeting is aware of the numbering error in the chapter table of contents, and noted that it will be corrected on next issue.
- Using ASHRAE authoring portal for collaborative work on current cycle (Authoring.ashrae.org). This utilizes the microsoft sign-in feature, which is conflicting with work sign-in. Scott is working through issues on this with Heather Kennedy for ensuring an editable edition of the chapter.
- Scott attended the Handbook Training for T.C.s on Thursday, Jan. 14th. Handbooks are going electronically/ digital. Will be a fee for hard copy revisions in the future. Schedule for revisions of the books/ chapters was furnished.

- New 2024 editions proposed:
 - a. Passive thermal storage (John Molnar)
 - b. Heat storage (seasonal) (Farzin Rad)
 - c. Refrigeration (applications, ice tanks)
 - d. PCM expansion – add chapter/ section
 - e. Thermal Mass
- Scott will develop a work schedule by next meeting.
- Farzin asked whether there are any volunteers to be lead on the Chapter Revision for PCM expansion. He suggested maybe reaching out to presenters.
- John Andrepont – suggested to not forget bibliography and reference updates in the new handbook revision. I.e. District Cooling Guide was recently updated.
- Katherine D’ Avignon – T.C. 6.5 Radiant Heating and Cooling – mentioned to consider use of thermal mass for energy storage – to consider coordination with T.C. 6.5 on this. She also asked whether PCM will be a second section to latent phase change already in the Chapter. Katherine suggests to review PCM implementation (she focuses in heating versus cooling), as the new radiant heating and cooling chapter will have more reference to building thermal mass.
- Navin Kumar volunteered to help as a reviewer. Dre Helmns volunteered to help with the new PCM section.
- Guy mentioned to use Internet Explorer for the Portal (due to technical issues), and not Firefox or Chrome.

Research –Paulo Cesar Tabares Velasco

- No current projects or work statements. Last project was the Design Guide for CTIC Systems.
- RTARs:
 - a. Optimal Design and Control of Distributed Cool Thermal Energy Storage for the Interactive Grid
 - i. Combined both “Model Predictive Control for Chilled Water Storage” and “Optimal Design and Control of Distributed Ice Thermal Energy Storage for the Interactive Grid” into one RTAR (from feedback received).
 - ii. Still working on finalizing this RTAR
 - b. Phase-change Material Thermal Energy Storage for Light Commercial and Residential HVAC:
 - i. Suggested by Sandra Boetcher
 - ii. To focus on increasing conductivity of raw materials
 - iii. Write RTAR – call for study of practical implementation of thermal storage to maximize volumetric use of exchange

- iv. Amy Van Asselt thinks she may be able to contribute
 - v. Kasheeb (Northridge) also indicated that he may have some things to contribute
 - vi. Spencer Dutton would like to contribute as well, by providing models in Modelica
 - vii. Kyle Gluesenkamp suggests to establish state-of-the-art for PCM conductivity, etc. for the RTAR statement.
- c. Hot water heaters for thermal storage
 - i. Suggested from Joseph Rendall – Oakridge National Lab
 - ii. Spencer Dutton is very interested in the topic and would like to contribute. Spencer to follow up with Joseph to brainstorm in order to establish a work statement.
 - d. Dharam Punwani provided an update on the Design Guide for CTIC Systems. The approved manuscript was submitted in Feb. 2020. The committee has 21 manuscripts waiting to be published. CTIC design guide is the 9th in line, so hopefully it will be published early next year (2022). Ken Fulk recommended that Dharam email him to ask what's going on with the delay.
 - e. For any other topics or ideas on RTARs, please reach out to Paulo.

Long Range Planning/Website – Chris Mincey/Daniel Pyewell

- Guy is sitting in on meetings for ESIC (modeling software), and reports they are finishing up their first licensed storage/ calculator, which does not include thermal storage, just battery storage. But, intentions are made to extend the software to include thermal storage in the future.
- Chris mentioned a former discussion from the last meeting on whether we need to revise the purpose statement? Does group think we need to update it? Should it adopt any language on smart grid adaptation? Or even add a sentence for grid flexibility? Chris will try something out in the next few weeks and send it out for members to review.
- The Publications Committee reached out on feedback for the Cold Air Distributions Design Guide, published back in 1996, on whether to revise, withdrawal, or reaffirm. This Design guide was developed 25 years ago by Chuck Dorgan, with support by the HVAC/R center in University of Wisconsin, as well as with many Ice Storage professionals. It is seen as an important compliment to ice storage technologies. The cold air guide is based on using water coming off of ice storage in the mid 30°Fs, for producing air around ~44°F air (ballpark temperature mentioned). With the low temp. air, it was noted that there needs to be special equipment considerations, such as the need to use nozzles to prevent condensation, and that location of diffusers is very important and needed to control humidity.
 - a. Henry Becker and John Nix think it may need some minor tweaking. John Nix can research and see where we are, and what standards we currently have that are associated with it.

- i. It was agreed to leave as-is for now, and revisit in summer meeting once John Nix has more info/ feedback. Chris will request a copy of it to distribute to the committee and review further.
- Chris appointed Daniel Pyewell as Vice Chair, once Farzin rolls on as T.C. chair. If there is any interest in becoming secretary or webmaster, please reach out to either Chris or Daniel.
 - Chris also made a motion to keep the T.C. together as-is, which was seconded by John Nix, and unanimously approved.
 - Chris mentioned that if anyone is interested in becoming a corresponding member, to please either reach out to Chris or Daniel.
 - Membership changes – 4 voting members will be rolling off this summer. Paulo recommends at least having one person from a National Lab as a voting member. Amy Van Asselt was suggested, and she confirmed that she is interested. Guy Frankenfield, John Dunlap, Larry Markel, and Chuck Booten also volunteered to be voting members.

Chris nominated Guy Frankenfield, Amy Van Asselt, John Dunlap, and Chuck Booten to roll on as voting members.

Honors and Awards – Blake Ellis

- **TC 6.9 Members Receiving Awards at this Meeting:**
 - a. None at the time of this TC 6.9 Meeting.
- **Update ASHRAE Bio**
 - a. Blake indicated that an updated ASHRAE bio is important as it is reviewed with any award submission and Blake encouraged people to keep their bios updated.
- **Hightower Award**
 - a. Given to people about service the last four years on technical activities.
 - b. TC chair and members of TAC & Tech Council are not eligible.
 - c. TC chair submits the form to the TC section head by September 1.
- **Other Awards Application Dates**
 - a. May 1 Due Dates:
 - i. Louise and Bill Holladay Distinguished Fellow Award: This award honors Fellows of the Society for continuing preeminence in engineering or research work.
 - ii. Andrew T. Boggs Service Award: This award, named after Andrew T. Boggs, former ASHRAE Executive Vice President, recognizes past recipients of the Exceptional Service Award for continuing, unselfish, dedicated and distinguished service to the Society.

- iii. *Distinguished Fifty-Year Member Award:* This award recognizes individuals who have been ASHRAE members for a minimum of fifty years, and were a past Society President, a Fellow, recipient of the Distinguished Service Award, or otherwise performed outstanding service for the Society.
 - iv. *Exceptional Service Award:* This award recognizes members who have served the Society faithfully and with exemplary effort, far in excess (45 service points) of that required for the Distinguished Service Award (15 service points). The individual must have been a full grade Member for a minimum of ten years and be a past recipient of the Distinguished Service Award.
 - v. *Distinguished Service Award:* This award recognizes members of ASHRAE who have served the Society faithfully and with distinction on committees or otherwise given freely of their time and talent on behalf of the Society (15 service points are required).
- b. December 1 Due Dates
- i. *ASHRAE Hall of Fame:* This award honors deceased members who have made milestone contributions to the growth of ASHRAE-related technology. Individuals inducted into the Hall of Fame must have been an ASHRAE member (any grade) or a member of a predecessor Society and must have shown evidence of distinction in the Society, either technically or academically.
 - ii. *ASHRAE Pioneers of the Industry Award:* This award honors deceased individuals who have made milestone contributions to the growth of air conditioning, heating, refrigeration and ventilation. Individuals inducted into the Pioneers of the Industry must have shown evidence of distinction, either technically or academically.
 - iii. *F. Paul Anderson Award:* This award, named in honor of F. Paul Anderson, 1927-28 President of the American Society of Heating and Ventilating Engineers, is the Society's highest award. This award honors members for notable achievement, outstanding work or service in any field of the Society. Accomplishments should include exceptional leadership in the HVAC&R industry, ASHRAE, and society. Broad-based activities of outstanding value in consulting, contracting, engineering, design, and related activity within ASHRAE are desired. Previous recipients of this award include Willis Carrier, Sam Lewis, Carl Ashley and Donald Kroecker.
 - iv. *Fellow Nominations:* ASHRAE members who have attained distinction in the fields of heating, refrigeration, air conditioning, ventilation or the allied arts and sciences through invention, research, teaching, design, original work, or as an engineering executive on projects of unusual or important scope. The individual must have made substantial contributions and have been a full grade member in good standing for at least ten years prior to the date of their election.
 - v. *ASHRAE Award for Distinguished Public Service:* This award recognizes ASHRAE members who have performed outstanding public service in their community, and in doing so, have helped to improve the public image of the engineer.

vi. Honorary Member: Honorary Member status is granted to individuals in recognition of preeminent professional distinction without regard to whether the individual is or has been a member of the Society. Previous recipients include Milton Eisenhower and President Herbert Hoover.

- The List of members getting awards has not been provided yet by ASHRAE, although Blake believes some committee members will be getting awards. The upcoming virtual awards will recognize ones from last summer as well as this winter. Blake will include all of these awards at the next meeting.
- Blake mentioned that John Andrepont will be obtaining the Distinguished Service Award.

Old Business

- None

New Business

- John Andrepont mentioned that IDEA is having a virtual conference, from Feb. 16th – 19th. The conference will have 2 entire sessions devoted to Thermal Storage, and a half dozen presentations, which include Guy and John as presenters. Please visit www.districtenergy.org for more information on the upcoming conference.

Adjourn

- Motion made to adjourn meeting made by Chris Mincey, seconded by John Nix. All voting members approved the motion.
- Chris adjourned the meeting at 4:40 p.m.