



Shaping Tomorrow's
Built Environment Today

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/TRG NO.: T.C. 6.7

DATE: Feb 16, 2014 (Approved unanimously by LB Feb. 24, 2014)

TC/TG/TRG TITLE: Solar Energy Utilization

DATE OF MEETING: June 25, 2013

LOCATION: Denver, Colorado

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Gaylen Atkinson	9	Charles Cromer	9	John Dunlap (partial)
Costas Balaras (HC)	CM	Mark Hertel	11	Brijesh Daeji
Reda Djebbar	CM	Wilfred Laman	9	Wei Feng
Joshua Kading (SEC)	CM	Svein Morner (SC,WM)	12	Andrea Gains-Germain
Janice Means (CH)	11	Christian Vachon	11	Michael Haughey
Timothy Merrigan (VC)	CM	Ali Rashid Al-Alili	CM	Heidi Havenstein
Ram Narayanamurthy (PC)	12	Pamela Anoff	CM	Kelton Friedrich
Vijay Suri	PM	Robert Aresty	CM	Jim Leidel
Marija Todorovic (NQ)	9	William Bahnfleth	CM	Cheng-Xian Lin
		Erv Bales	CM	Bin Mao
		Joseph Brillhart	CM	Matt Mitchell
		John Brown	CM	Leon Shapiro
		Alan Chalifoux	CM	Zigi She
		Andrew Chiasson	CM	
		Bradley Collins	CM	
		J Kevin Cross	CM	
		Robert Davis	CM	
		Brian Dougherty	CM	
		Peter Ellis	CM	
		Jonathan Evans	CM	
		Robert Foster	CM	
		David Gerlach	CM	
		Joshua Gillespie	CM	
		D Y Goswami	CM	
		Cory Hasiak	CM	
		Richard Hayter	CM	
		Henry Healey	CM	
		Hugh Henderson	CM	

	Bion Howard	CM	
	James Huggins	CM	
	Pamela Immekus	CM	
	Christopher Kampf	CM	
	Sanford Klein	CM	
	Anew Lowenstein	CM	
	Alfred Lutz	CM	
	Fariborz Mahjouri	CM	
	Jeff Mahoney	CM	
	Alfi Helmy Malek	CM	
	Anew McNamara	CM	
	Lucio Mesquita	CM	
	M Maggie Moninski	CM	
	Stanley Mumma	CM	
	Khalid Nagidi	CM	
	Joeseoph O'Gallagher	CM	
	H Greg Peebles III	CM	
	Buss Price	CM	
	Ming Qu	CM	
	Talal Rabiah	CM	
	T Agami Reddy	CM	
	Etizaz Shah	CM	
	Harvey Stenger	CM	
	Menelaos Stylianou	CM	
	Athar Syed	CM	
	Gregoris Thoma	CM	
	Dean Tompkins	CM	
	Michael Wassmer	CM	
	Scott Wayland	CM	
	Bede Wellford	CM	
	Dean Wiersma	CM	
	Maurice Wildin	CM	
	Byard Wood	CM	
	Cenk Cy Yavuzturk	CM	
	Paul Zeigler	CM	
	Yanda Zhang	CM	
	Yongfang Zhong	CM	
	William Schulte	PM	

DISTRIBUTION

<i>All Members of TC/TG/MTG/TRG plus the following:</i>	
TAC Section Head: John Dunlap (Mark Hegberg)	
TAC Chair: William McQuade	
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters:	
Research Liaison	Stephen Hancock
Special Pubs Liaison	Francis A. Mills
Standards Liaison	Debra H. Kennoy

Manager Of Standards	Stephanie Reiniche
Manager Of Research & Technical Services	Mike Vaughn

*Starting month as a voting member is July of the year shown. CM = corresponding member.



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MEETING MINUTES
ASHRAE TC 6.7 – SOLAR ENERGY UTILIZATION
Annual Meeting – June 25, 2013
Denver, Colorado

I. Call to order/Quorum/Introductions

The meeting was called to order at 1:17 pm. Roll call was taken and there were not enough members present to make a quorum. The entire meeting ran without a quorum.

II. Agenda Review

No changes were made to the agenda.

III. Minutes

Due to the lack of a quorum an email vote will be initiated to approve the minutes of the January 29th, 2013 Winter Meeting in Dallas.

IV. Chair's Report – J. K. Means

A. Roster Comments

- 1) Reminder: The 2013-2014 Roster goes into effect on July 1, 2013.
- 2) Janice Means will remain as TC6.7 Chair for another year. Tim Merrigan is stepping down from the Vice Chair position. Marija Todorovic will be the new TC6.7 Vice Chair beginning July 1, 2013. Updated 2013-2014 Roster was circulated. Attendees were requested to indicate changes in company, addresses and/or email address on roster AND to ASHRAE. Those wishing to be added as CM were asked to supply all appropriate information and to complete/update their ASHRAE bio online (see next item for directions).
- 3) All were requested to update their ASHRAE Bio, especially with the new employment discipline information. The procedure is to login at the ASHRAE home page, enter your password and then go to the Members Only section.

B. TC 6.7 Sponsored Sessions & Sessions of Interest were announced.

- 1) **Special Session 1:** Panel Discussion: Shifting Landscape of Renewable Energy systems in an Era of Low PV and Natural Gas Prices [**co-sponsored with TC 1.09 Electrical Systems**]
- 2) **Special Session 4: Workshop: BIM, Commissioning, and COBie: Does Automated Building Energy Modeling Replace measurement and Verification?** [**co-sponsored with TC 1.04 control Theory and Application**]
- 3) **Seminar 45:** Integrating Innovative, Large-scale Solar Thermal Systems into the Built Environment.
- 4) **Seminar 3*:** Moving Buildings and the Grid to a Renewable Future, Seminar 11: Performance Based Procurement Process Case Studies [*** sponsored by TC 2.8 Building environmental Impacts and Sustainability**]

C. ASHRAE Awards

- 1) There is a new ASHRAE Award Summary Sheet available.
- 2) Hightower Technical Achievement Award nominations are due to Section Head by September 1, 2013 (for recognition of outstanding technical

leadership and contributions on a TC/TG/TRG –except research and standards activities--during past Society year).

D. New MTGs:

- 1) MTG.CCDG, Cold Climate Design Guide (Chair Frank Mills, Vice Chair Bjarne Olesen)
- 2) For more information on the 7 existing MTGS, go to <http://www.ashrae.org/standards-research—technology/technical-committees>

E. Thank You Letters to Employers:

- 1) Watch your email for how to request a thank you letter to your employer for your service to ASHRAE from ASHRAE President Tom Watson

F. Upcoming Conferences – <http://www.ashrae.org/CITY/>

- 1) 2014 Winter Meeting, New York, NY – January 18-22, 2014
 - a. Technical papers submittals due July 3, 2013
 - b. Seminar/Forum Session Proposals due August 12, 2013
- 2) 2014 Annual Meeting, Seattle, WA – June 28/July 2, 2014
 - a. Conference Paper abstracts due September 23, 2013
 - b. Technical Papers due for review August 12, 2013
 - c. Final Conference Papers due for review January 9, 2014
 - d. Seminar and Forum Session proposals due February 13, 2014
 - e. Technical papers final review due February 25, 2014
- 3) 5th International Conference – Solar Air Conditioning September 25-27, 2013, Black Forest, Bad Krozingen, Germany <http://solaricon.com>
- 4) See Chair for a complete list of additional worldwide conferences.

V. Subcommittee Chair Reports

A. Handbook – C. Balaras

- 1) 2015 HVAC Applications, Chapter 35 – Solar Energy Use, changes: second draft with track changes, along with comments received from TC 4.2 were circulated earlier this month. See the attached Research Subcommittee Report for details. Plans included under follow-up items from the report include:

- a. Pre-Final draft in fall 2013 for TC review
- b. Finalize and have the final draft for a vote in NY (Jan 2014)
- c. Submit to ASHRAE by March 22, 2014

- 2) 2016 HVAC Systems & Equipment, Chapter 37 – Solar Energy Equipment, See the attached Research Subcommittee Report for details. Plans from the report include to submit final draft for TC vote in Chicago (January 2015)

B. Research – J. Leidel (See follow-up attachment.)

C. Standards –S. Morner (Presented by T. Merrigan)

- 1) See attached S. Morner Standards Report.
- 2) Review proposed IAPMO Standard, “**BSR S1001-1-201x, Design and Installation of Solar Water Heating Systems Solar DHW Residential Design Standard**”

D. Program – Ram Narayanamurthy

- a. Proposed programs New York City (Aug 12 deadline)
 1. International trends in sustainable design: Chair: Maria Todorovic
Track: International Design
Description: Maria briefly touched on integration of solar thermal in ZNE buildings from around the world as well as the European Solar Decathlon during her talk Sunday. This session will expand on each of those cases and also illustrate a passive solar retrofit in LA.

2. Renewables Integration in Tall Buildings: Chair: Ram

Narayanamurthy

Track: Tall Buildings

- (i) PV Integrated Electrochromic Retrofit windows – Brian Berland, ITN
- (ii) Application of transpired solar collectors in tall buildings – Shanti Pless, NREL
- (iii) Application of Trombe walls – Paul Torcellini, NREL
- (iv) Architectural PV integrated building facades - TBD

3. Integrated energy management for low energy homes” Chair:

Kelton Fredrick

Track: Energy Management and Controls

- (i) Positive energy home impossible without integrated controls and energy management – Gaylen Atkinson
- (ii) Increasing renewable system utilization with DC microgrids – Brian Fortenberry
- (iii) Integrated energy management system for residential cost reduction and load management – Ram Narayanamurthy

b. Proposed programs Seattle

1. Conference Papers from Maria Todorovic

2. Drake Landing Update: Reda Djebbar

3. Conference paper on using solar thermal systems for balancing wind generation

c. New York Deadlines were stated. Seattle deadlines for Conference paper abstracts and Technical paper submittals is September 23, 2014.

E. Website – S. Morner – no report

VI. Liaison Reports from Society & Other Organizations

A. ALI – H. Healy – T. McGinn

B. TAC Section 6 – J. Dunlap

C. Research Liaison – S. Hancock

D. Programs – M. Moninski

E. Handbook Liaisons – *Appl.* – Sheldon Jeter / *Sys. & Equip.* – Nicolas Lemire

F. Standards Technical Committee Liaison Subcommittee – Debra Kennoy

G. Special Publications – Francis Mills

H. Other TC's

I. LEED Energy and Atmosphere TAG – B. Howard

J. ASES – TBD

VII. Old Business

VIII. New Business

- A. The possibility of changing TC 6.7's name to include all renewables was discussed, e.g. Renewable Energy Systems.

Meeting adjured at approximately 3:30 pm

Subcommittee Reports are attached.

Respectfully Reconstructed and Submitted by TC6.7 Chair, Janice K. Means (original minutes lost)

Standards Subcommittee Report (from previous meeting)
ASHRAE TC 6.7 Solar Energy Utilization
2013 Winter Conference – Dallas
Standards Committee Liaison to TC 6.7:
January 29, 2013, 3:15 pm to 4:15 pm

ASHRAE standard 93-2010 Methods of Testing to Determine the Thermal Performance of Solar Collectors (ANSI approved)

Most recent SPC Chair: Charlie Cromer

ASHRAE standard 93-2010 was reaffirmed last meeting as is with the expectation that it will be withdrawn when ISO standard 9806 is revised.

ISO standard 9806-1 (which is based on std 93) has been developed to replace std 93, but is missing details on solar air heating collectors which is worldwide only covered by std 93 today. ISO 9806 is in the process of being revised (combining 9806-1, 2 and 3 and ANSI EN 12975-2) and including air systems, but has not yet been approved. ISO 9806 is expected to be approved at the end of 2013.

ASHRAE Standard 95-1987 -- Methods of Testing to Determine the Thermal Performance of Solar Domestic Water Heating Systems

Most recent SPC Chair: Tim Merrigan

Was ISO standard 9459-1 adopted?

ASHRAE Standard 96-1980 (RA 1989) Methods Of Testing To Determine The Thermal Performance Of Unglazed Flat-Plate Liquid-Type Solar Collectors

Most recent SPC Chair: James Huggins

Uncertain if ASHRAE standard 96 needs to be revised or reaffirmed. It is being replaced by ISO 9806-3 and should likely follow the same track as standard 93 when it needs to be reaffirmed, revised or withdrawn.

ASHRAE Standard 125-1992 (RA 06) MOT Thermal Energy Meters for Liquid Streams in HVAC Systems

Cognizant (Lead) TC: 6.1, Hydronic and Steam Heating Equipment and Systems

This standard was reaffirmed in 2011.

Solar standard updates:

IAPMO is in process of writing three solar standards based on FSEC documents (FSEC 103-10 "Operation of the Solar Thermal Systems Certification Program", FSEC104-10 "Florida Standards for Design and Installation of Solar Thermal Systems" and FSEC 105-10 "Solar Thermal System and Components Test Protocols"):

1. S1001.1 Design and Installation of Solar Water Heating Systems (SWHS)
2. S1001.2 Performance Rating of SWHS
3. S1001.3 Performance Rating of Components in SWHS (Title not officially determined)

S1001.1 is in drafted and out for public review. Janice has this draft document that will be discussed to see if TC6.7 has any comments.

The drafting of S1001.2 has started and draft is expected to be completed this summer. S1001.3 is expected to start directly after the draft of S1001.2 is completed.

ISO

Janice Means was on the US technical Advisory Group (TAG) to ISO/TC 180 up until 2012 (Jim Huggins before Janice). Jim Huggins reported that ISO 9806 is under revision and expected to be published late 2013.

Svein is considering taking over after Janice as a member of the US TAG.

Report submitted by Svein Morner

Research Subcommittee Report
ASHRAE TC 6.7 Solar Energy Utilization
2013 Annual Meeting
June 24, 2013, 1:45 p.m. – 2:45 p.m

Present:

Jim Leidel, TC 6.7 Research Subcom Chair
Steve Hancock, Research Liaison
Janice Means, TC 6.7 Chair
Reda Djebbar

Kelton Friedrich
Andrea Gains-Germain
Valeriy Maisotsenks
Tim Merrigan
Ram Narayanamurthy

The following was developed during the meeting.

DRAFT Research Plan and Needs

A. ASHRAE R&D PLAN

Reference Goal 8: Facilitate the use of natural and low global warming potential (GWP) synthetic refrigerants and seek methods to reduce their charge. (Or eliminate refrigeration based cooling altogether).

Reference Goal 2: Progress toward Advanced Energy Design Guides (AEDG) and cost-effective net-zero-energy (NZE) buildings. (CREATE SOLAR COOLING TECHNOLOGIES TO COMPETE WITH REFRIGERANT BASED COOLING)

Should also cross reference with or coordinate with DOE solar R&D plans.

B. ENERGY & TECHNOLOGY MARKET TRENDS

- Solar PV capital cost: down
- Solar thermal capital cost: steady, but high
- Natural gas: unit cost down, long term expectation is to stay down
- Electric: increasing, long term expectation is slow & steady increase

C. R&D NEEDS

1. Seasonal energy storage design and demonstrations
2. Solar thermal driven cooling:
 - a. Cost reduction, improvements in technology, demonstrations
3. Building integration: mounting, cost reduction, aesthetics
 - a. Cost reductions: HW storage, collectors, other BOS
 - b. Integrate systems to remove need for energy storage
4. Monitor and Investigate: Solar PV electric driven technologies vs Solar Thermal
5. PV-Thermal systems & collectors:
 - a. Test methods, case studies, and handbook design guidance
6. Solar PV driven heat pumps
7. Solar driven sea water desalination
8. Demonstrate and review case studies of viable biomass combustion and biogas generation systems for the built environment

D. SPECIFIC RTAR's

1. Being Developed: "OG standard?" Svein Morner
2. Under TC Review: "Solar Thermal Cooling: Desiccant Indirect Evaporative Dew Point Cooling System Validation for the Built Environment with Exhaust Humidity Recovery" Jim Leidel
3. Look at developing an RTAR for "Integrated Renewable Energy Systems for the Source Exergy Increase" Prof. Marija Todorovic

Research Plan & Needs

submitted by

Jim Leidel, TC 6.7 Research Subcommittee Chair

June 26, 2013

Handbook Subcommittee Report
ASHRAE TC 6.7 Solar Energy Utilization
2013 Annual Meeting
June 24, 2013, 6:30 pm to 8:20 pm

Present:

Costas Balaras, TC 6.7 HB Subcom Chair
Janice Means, TC 6.7 Chair
Sheldon Jeter, 2015 HB Com Liaison
Nicolas Lemire, 2016 HB Com Liaison
Marija Todorovic, TC 6.7 VM

Jim Leidel, TC 6.7 CM
Kelton Friedrich, TC 6.7 CM
Neal Lott, TC 4.2, HB Subcom Chair
Didier Thevenard, TC 4.2, Chair
Reda Djebbar, TC 6.7 VM

A. Ch. A35 "Solar Energy Use" for 2015 HVAC Applications

April 2013: First draft of revised Ch. A35 "Solar Energy Use" for the 2015 HVAC Applications with track changes (including new material, edits and responses to comments received from Dr. Maurice W. Wildin - College of Fellows), was circulated to TC 6.7 for review and comments. Feedback received from Sandy Klein, Mark Hertel (TC 6.7). Comments were also received from Didier Thevenard, Chair TC 4.2 Weather Information on the first 8 pages that have some overlaps with Ch. F14 of the Fundamentals.

June 2013: Second draft with track changes, along with comments received from TC 4.2 were circulated to the TC for discussion in Denver.

The focus during the meeting was placed on the material related to the clear sky model and solar geometry. The HB subcom approved the following recommendations:

1. Issues raised by TC 4.2: Remove material that references the old clear sky model and reference the new isotropic clear sky model in F14. Didier Thevenard will provide some brief text on the improved accuracy of the new model and appropriate references. Edit relevant text and replace eqn (11) with some background information that briefly refers to the old simple clear sky model that was used in A35 - 2011 and superseded by the new model available in F14.
2. Replace Tables 1-2 that provide declination and equation of time values, with a figure of typical annual variation of declination and equation of time. Figures to be provided by Janice Means.
3. Include the Equation of Time
4. Request original figures to make corrections of solar angle definitions etc. Sheldon Jeter will make the request to HB editors

Follow up actions:

- a. Pre-Final draft in fall 2013 for TC review
- b. Finalize and have the final draft for a vote in NY (Jan 2014)
- c. Submit to ASHRAE by March 22, 2014

B. Ch. 37 Solar Energy Equipment for 2016 HVAC Systems & Equipment

Some work on PVs that was not completed for the 2012 edition and it should be considered for this revision.

Short term planning: Circulate existing Ch.37 document file and other relevant material by mid-July 2013.

Long term planning: Final draft for TC vote in Chicago (Jan 2015); Submit

to ASHRAE by May 16, 2015

C. Request access to ASHRAE HB Online. TC Chair should submit a request to HB Committee liaison and provide name & email address of TC HB lead revisers.

Submitted by
Costas Balaras
TC 6.7 HB Subcom Chair

TC/TG/TRG Activity Feedback Form

Please provide feedback on your TC/TG/TRG activities and return this form to your Section Head by email or drop off a printed copy in the Section Head's mailbox folder outside the ASHRAE Headquarters Room by Tuesday night 9:00 pm.

PLEASE DO NOT LEAVE NUMERIC CELLS EMPTY. ENTER 0 IN CELLS IF THERE IS NO COUNT

TC#	6.7	Committee Name:	Solar Energy Utilization									
		Chair:	Janice K. Means									
Meeting was Held (City)	Denver, CO		(Day)	Tuesday		(Date)	6/24/2013					
Membership			Quorum Established (Yes/No)									
			Number Present	Remote Participants	Total on Committee							
Voting Members (excluding Non-Quorum Members)			3	0	8							
Non-Quorum Members			1	0	1							
Corresponding Members			4	0	58							
Provisional Members			1	0	2							
Visitors/Guests			12	0	0							
# members/guests who are also YEA members			2	0	UNKOWN (3 shown on Atten. Sh.)							
Handbook Responsibilities			Standards Responsibilities									
Volume and Chapter (i.e. A17 Printing Plants)			Standards Number (i.e. SPC 178, Std 90.1, Gdl 2)									
Total Number of Chapters			2		Total Number of Standards		0					
# Chapters voted out this meeting			0		# Standards recommended		0					
Special Publications (last six months)			0	Title:								
Program Activities (For This Meeting)												
Total # of Forums		Total # of Technical Paper Sessions			Total # of Conference Paper Sessions			Total # of Seminars				
Submitted*	Sponsor	Co-sponsor	Submitted*	Sponsor	Co-Sponsor	Submitted*	Sponsor	Co-Sponsor	Submitted*	Sponsor	Co-Sponsor	
0		0	0		0	0		0	3		2	
Current Research Activities (active)						FAQ Responsibilities						
# of active RTARs						Total # of FAQ's						0
# of active Workstatements						# FAQs updated this meeting						0
# of active TRPs						FAQ IDs						
# of active RPs												
Total # of Active Projects						TC Website						
Problems getting RTAR/WS approved?						TC has a website (yes/no)						yes
						Website Up-to-date? (Yes/No)						yes
TC Management						Website is on the ASHRAE Server (Yes or No)						yes
						Link to website from www.ashrae.org/standards-research-technology/technical-committees is functional? (yes/No)						yes
Minutes completed on Time?												
Agenda distributed on time?												
Members asked to Reconfirm participation (winter)?						Award Nominations (last six months)						
Roster Workbooks Completed (Winter)						Distinguished Service Award						0
Did Chair and Vchair attend Training?						Exceptional Service Award						0
Did Handbook Chair attend Training?						Other: Hightower, Research, etc (specify below)						0
Did Program Chair attend Training?						Award :						
Any Concerns or requests for the Technical Activities Committee? (Please type in Space Below)												
We did not make quorum and continue to have issues with attendance of voting members. Our members include international and some work for the U.S. Government. A couple of members reported that they could not get approval to attend since they were going to CLIMA 2013, scheduled immediately prior to this ASHRAE meeting. Many [would use] access to on-line meeting capability.												
Although we have no current RTARs, two are underway for submittal.												
This TC6.7 meeting went especially well with interesting and pertinent discussions. We have a lot of new interest, especially from university researchers including a few from China.												
Thank you for your support.												

* For submitted sessions, include only sessions which your TC initiated and submitted FOR this meeting.