

AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-CONDITIONING
ENGINEERS, INC.

1791 Tullie Circle, NE / Atlanta, GA 30329
404-636-8400

TC/TG/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. TC 4.7 DATE: June 25, 2009

TC/TG/TRG TITLE: Energy Calculations

DATE OF MEETING: June 23, 2009 LOCATION: Louisville

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS & ADDIT'L ATTENDANCE
Philip Haves (CHAIR)	2008	Jan Hensen	2008	Suzanne LeViseur (TAC)
Dru Crawley	2007	Peter Ellis	2006	
Joel Neymark (STDS S.C.)	2007			See attendance list for Additional attendees.
Chip Barnaby (APP S.C.)	2005			
Klaus Sommer (INT'L)	2007			
Rich Liesen	2005			
Bass Abushakra	2005			
Larry Degelman	2006			
Moncef Krarti	2007			
Jan Kosny	2006			
Timothy McDowell (SEC)	2008			
Robert Sonderegger	2008			

DISTRIBUTION

ALL MEMBERS OF THE TC/TG/TRG

TAC CHAIR	Bryan Becker
TAC SECTION HEAD	Suzanne LeViseur
SPECIAL PUBLICATIONS LIAISON	Julia A Keen
STANDARDS LIAISON	H Michael Newman
HANDBOOK LIAISON	Douglas C Hittle
RAC RESEARCH LIAISON	Hakim Elmahdy
PROF DEV COMM LIAISON	Tim J McGinn
CHAP TECH TRANSFER LIAISON	Stephen V Abernathy
STAFF LIAISON (RESEARCH)	Michael R Vaughn
STAFF LIAISON (TECH SERVICES)	Michael R Vaughn
STAFF LIAISON (STANDARDS)	Claire Ramspeck

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

ASHRAE TC 4.7 Energy Calculations

LOUISVILLE MEETING

MOTIONS AND ACTION ITEMS

1. MOTION: "Approval of the minutes from the meeting in Chicago" moved Barnaby/Kosny (8-0-0 CNV)
2. MOTION: "Leave the existing publication formats unchanged and create a new publication called 'ASHRAE Conference Proceedings,' which could be in electronic format, that includes the Conference Papers" moved Sonderegger/Neymark (11-0-1 CNV)

AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-CONDITIONING ENGINEERS, INC.
 1791 Tullie Circle, NE / Atlanta, GA 30329
 404-636-8400

TC/TG/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. TC 4.7 DATE: June 23, 2009
 TC/TG/TRG TITLE: Energy Calculations
 DATE OF MEETING: June 23, 2009 LOCATION: Louisville

TC/TG/TRG MEETING SCHEDULE					
LOCATION – past 12 months		DATE	LOCATION - planned next 12 months		DATE
Chicago		January 27, 2009	Orlando, FL		January 23-27, 2010
Salt Lake City		June 24, 2008	Albuquerque, NM		June 26-20, 2010
TC/TG/TRG SUBCOMMITTEES					
Function			Chair		
Program			Michael Wetter		
Research			Joe Huang		
Handbook			Chip Barnaby		
RESEARCH PROJECTS – Current			Monitoring	Report Mode	
Project Title	Contractor		Comm.Chm.	At Meeting	
Appendix 1					
LONG RANGE RESEARCH PLAN					
Rank	Title	W/S Written	Approved	To R & T	
	Appendix 2				
HANDBOOK RESPONSIBILITIES					
Year & Volume	Chapter Title	No.	Deadline	Handbook Subcom. Chair/Liaison	
2005 Fundamentals	Energy Estimating Methods	31	June 2008	Barnaby/Hittle	
STANDARDS ACTIVITIES - List and Describe Subjects					
SPC 140 Standard Method of Test for Building Energy Software – Joel Neymark					
TECHNICAL PAPERS from Sponsored Research - Title, when presented (past 3 yrs. present & planned)					
Appendix 3					
TC/TC/TRG Sponsored Symposia - Title, when presented (past 3 yrs. present & planned)					
Appendix 4					
TC/TG/TRG Sponsored Seminars - Title, when presented (past 3 yrs. present & planned)					
Appendix 5					
TC/TG/TRG Sponsored Forums - Title, when presented (past 3 yrs. present & planned)					
Appendix 6					
JOURNAL PUBLICATIONS - Title, when published (past 3 yrs. present & planned)					
None					

Attendance

Below is a complete listing of attendees at this and the prior three meetings. It includes the voting members of the committee listed on the first page.

Present at Meeting				Last name	First name	Membership
Louisville June 2009	Chicago January 2009	Salt Lake City June 2008	New York Jan 2008			
						V= Visitor VM = Voting CM = corres.
X	X	X	X	Abushakra	Bass	VM
	X	X		Anderson	J.R.	V
			X	Arias	Diego	
	X			Armstrong	Peter	
X	X		X	Balbach	Chris	V
	X	X	X	Baltazar	Juan-Carlos	V
X	X	X	X	Barnaby	Chip	VM
			X	Benitez	Jose	
X				Bobker	Michael	V
	X			Bourassa	Norm	CM
X	X		X	Carpenter	J Patrick	CM
	X			Chaisuparamikul	Pongsak	V
	X			Cho	Soolyeon	V
X	X	X		Claridge	David	CM
	X			Coffey	Brian	V
X	X	X	X	Cornick	Steve	V
X	X	X	X	Crawley	Dru	VM
X	X	X	X	Degelman	Larry	VM
			X	Eldrige	David	
	X	X		Ellis	Peter	VM
X				Field	Kristin	V
X	X		X	Fisher	Dan	CM
	X			Gardner	Carol	
X	X	X	X	Haberl	Jeff	CM
X	X			Haddad	Kamel	CM
X	X	X	X	Haves	Philip	VM
			X	Hensen	Jan	INT'L M
X				Hittle	Doug	CM
X	X	X		Hong	Tianzhen	V
X				Horton	Travis	V
X	X	X	X	Huang	Joe	CM
X	X	X	X	Judkoff	Ron	CM
		X	X	Kinney	Kris	V
X	X		X	Kosny	Jan	VM
X	X		X	Krarti	Moncef	VM
	X			Laughman	Christopher	V
		X	X	Lemort	Vincent	V
X	X	X	X	LeViseur	Susan	TAC Sec Head

Present at Meeting				Last name	First name	Membership
Louisville June 2009	Chicago January 2009	Salt Lake City June 2008	New York Jan 2008			V= Visitor VM = Voting CM = corres.
X	X	X	X	Liesen	Richard	VM
			X	Lisenbee	Larry	
	X			Logee	Terry	V
	X	X	X	MacDonald	Iain	V
			X	Malhotra	Mini	V
X	X	X	X	McDowell	Tim	VM
X	X	X	X	Mukhopadhyay	Jaya	V
X	X	X	X	Neymark	Joel	VM
				Norford	Les	
	X		X	O'NEILL	Zheng	
				Parekh	Anil	
X	X	X	X	Pedersen	Curt	CM
		X		Reddy	T. Agami	CM
X			X	Rees	Simon	CM
	X			Schaefer	Larry	V
	X	X	X	Selkowitz	Steve	V
X				Shrestha	Som	V
	X			Smith	Vern	V
	X			Sloat	Cara	V
X	X		X	Sonderegger	Robert	VM
X	X	X	X	Sommer	Klaus	INT'L M
	X		X	Spitler	Jeffrey	
X	X			Stovall	Therese	V
			X	Subbarao	Kris	
			X	Szymurski	Steven	
			X	Tabanes	Paulo Cesar	
X		X	X	Taylor	Russell	CM
X				Thevenard	Didier	V
			X	Vukovic	Vladimir	
			X	Wang	Xudong	
X	X	X	X	Wetter	Michael	CM
X	X	X	X	Wray	Craig	CM
X				Wright	John	V
		X		Xiaobing	Liu	V
	X			Zhou	Liang	V
	X			Zmeureanu	Radu	V

Appendix 1**TC 4.7 RESEARCH PROJECTS STATUS****ASHRAE****Technical Committee 4.7 Energy Calculations
(June 23, 2009)****Active projects**

#	Title	Joint TC	Cog SC/ Contractor	PMSC	Dates / status
1416-RP	Development of Internal Surface Convection Correlations for Energy and Load Calculations	4.1	Sim/Comp, Univ of Texas	Dan Fisher (Chair), Steve Bruning, Jan Kosny	Contractor selected 6-2008, Start 8/2008
1456-RP	Assess and Implement Natural and Hybrid Ventilation Models in Whole-building Energy Simulations	4.10	Sim/Comp, Univ of Colo	Joe Huang (Chair) Philip Haves, Jan Hensen, R.Banks, N.Bourassa, S.Szymurski	Contractor selected 6-2008, Start 8/2008.

Appendix 2
RESEARCH PLAN

ASHRAE
Technical Committee 4.7 Energy Calculations
2009 Research Plan (June 23, 2009)

Title	Society status	TC 4.7 Status	Authors or TC 4.7 Prime Contact	Subcommittee*
Active projects				
1456-RP Assess and Implement Natural and Hybrid Ventilation Models in Whole-Building Energy Simulations	project started May 08	Second PMS meeting held Chicago Jan 09, 6-mos. NCX to Dec 09	PES YJHuang (chair), PHaves, JHensen, RBanks, CScrutton (CEC), XDWang (ARTI), HDavies (CIBSE)	SCM
1416-RP Development of Internal Surface Convection Correlations for Energy and Load Calculations	project started Aug 08	First PMS meeting held Chicago Jan 09	PES: DFisher (chair), SBruning, JKosny	SCM
Active co-sponsored projects				
1311-RP Improving load calculations for fenestration with shading devices (TC 4.5 lead, 4.1 other co-sponsor)	Project completed	Project completed (to be removed from Jun 09 Res Plan)	DCrawley	SCM
Approved co-sponsored WSs				
WS-1413 Developing standard procedures for filing missing weather data (TC 4.2 lead)	WS approved by ASHRAE, out to bid Mar 09	Co-sponsorship approved by full committee in Salt Lake City Jun 08	YJHuang	DDM
WSs recommended by SC for approval				
WS-1404 Modeling, analysis, and reporting protocols for predicting annual energy performance from short-term building energy monitoring	WS approved by ASHRAE, out to bid Mar 09	Contractor recommendation made Louisville Jun 09	PES Sonderegger, Smith, Haberl	DDM

ASHRAE
Technical Committee 4.7 Energy Calculations
2009 Research Plan (Jun 23, 2009, continued)

Title	Society status	TC 4.7 Status	Authors or TC 4.7 Prime Contact	Subcom- mittee*
WS under development				
Procedure to create hypothetical layer-by-layer fenestration descriptions when only the bulk properties such as U-factor and SHGC have been defined	RTAR approved	WS underdevelopment, planned for vote in Jan 2010	YJHuang	
RTARs under development				
Equipment performance input data	None	RTAR development	CBarnaby	
Simulations better matching real buildings	None	Clarification requested	MWetter	
Occupancy/Internal gains values and schedules	None	Work with TC 7.6 on development	LDeGelman	
Inactive RTARs or research ideas omitted (see Research Plan in previous TC 4.7 minutes for listing)				

Appendix 3
TECHNICAL PAPERS FROM SPONSORED RESEARCH

RP	Title	Contractor	Approved	Paper
1051	Procedures for Reconciling Computer-calculated Results with Measured Energy Data	Drexel	Chicago January 2006	Reddy, T.A., 2006. "Literature Review on Calibration of Building Energy Simulation Programs: Uses, Problems, Procedures, Uncertainty and Tools", ASHRAE Transactions, vol 112(1).
1051	Procedures for Reconciling Computer-calculated Results with Measured Energy Data	Drexel	Chicago January 2006	Sun J. and Reddy T.A., 2006, "Calibration of Building Energy Simulation Programs Using the Analytic Optimization Approach (RP-1051)", Int. J HVAC&R Research 12(1) 177-196.
1051	Procedures for Reconciling Computer-calculated Results with Measured Energy Data	Drexel	Chicago January 2006	Reddy, T.A., I. Maor and C. Pongjapornpon, 2006, "Calibrating Detailed Building Energy Simulation Programs with Measured Data- Part I: General Methodology", accepted for publication in Int. J HVAC&R Research.
1051	Procedures for Reconciling Computer-calculated Results with Measured Energy Data	Drexel	Chicago January 2006	Reddy, T.A., I. Maor and C. Pongjapornpon, 2006, "Calibrating Detailed Building Energy Simulation Programs with Measured Data- Part II: Application to Three Case Study Office Buildings", accepted for publication in Int. J HVAC&R Research.
865	Accuracy Tests for Simulations of VAV Dual Duct, Single Zone, Four Pipe Fan Coil and Four Pipe Induction Air Handling Systems (4796)	Univ Nebraska, Texas A&M	July 2002	Yuill, G., Haberl, J. 2006. "Accuracy Tests for Simulations of VAV Dual Duct, Single Zone, Four Pipe Fan Coil and Four Pipe Induction Air Handling Systems (4796)," ASHRAE Transactions-Research, Vol. 112, Pt. 1 (January).
865	Accuracy Tests for Simulations of Constant Volume, Dual Duct and Variable Volume Air Handling Systems (4796).	Univ. Nebraska, Texas A&M	July 2002	Yuill, G., Haberl, J., Caldwell, J. S. 2005. "Accuracy Tests for Simulations of Constant Volume, Dual Duct and Variable Volume Air Handling Systems (4796, RP-865)," ASHRAE Transactions-Research, Vol. 111, Pt. 2, No. 4796, pp. 137 – 153 (June).

1050	Development of an Inverse Model Toolkit	Univ. of Dayton, Texas A&M	December 2001	Kissock, K., Haberl, J., Claridge, D. 2003. "Inverse Model Toolkit (1050-RP): Numerical Algorithms for Best-Fit Variable-Base Degree-Day and Change-Point Models," ASHRAE Transactions-Research, Vol. 109, Pt. 2, pp. 425 – 434.
1050	Development of an Inverse Model Toolkit	Univ. of Dayton, Texas A&M	December 2001	Haberl, J., Claridge, D., Kissock, K. 2003. "Inverse Model Toolkit (1050-RP): Application and Testing," ASHRAE Transactions-Research, Vol. 109, Pt. 2, pp. 435 – 448.
1093	Diversity Factors and Schedules for Energy and Cooling Load Calculations	Texas A&M	June 2000	Abushakra, B., Haberl, J., Claridge, D. 2004. "Overview of Literature on Diversity Factors and Schedules for Energy and Cooling Load Calculations (1093-RP)," ASHRAE Transactions-Research, Vol. 110, Pt. 1 (February), pp. 164 – 176.
1093	Diversity Factors and Schedules for Energy and Cooling Load Calculations	Texas A&M	June 2000	Claridge, D., Abushakra, B., Haberl, J. 2003. "Electricity Diversity Profiles for Energy Simulation of Office Buildings (1093-RP)," ASHRAE Transactions-Research, Vol. 110, Pt. 1, pp. 365 – 377 (February).

Appendix 4
TC/TG/TRG SPONSORED TRANSACTIONS SESSIONS

Current as of June 2009

PRESENT:

Louisville, June 20-24, 2009

Transaction “Improving Load Calculations for Fenestrations with Shading Devices”

Organized by: TC 4.1 (lead)/4.5/4.7

Chair: Glenn Friedman

Status: Moved from NYC.

PLANNED:

PAST:

Chicago, January 24-28, 2009

HVAC&R Research Seminar “Synthesis of Optimum HVAC System Configurations”

New York City/January 2008

How Low Can You Go?

Recent Advances in Energy Simulation (Chair: Dan Fisher)

How Low Can You Go? Low-Energy Buildings Through Integrated Design (Chair: Dru Crawley)

Application of Inverse Models (Chair: Jeff Haberl)

Appendix 5
TC/TG/TRG SPONSORED SEMINARS

Current as of June 2009

PRESENT:

Louisville, June 20-24, 2009

- 1) Seminar "Energy modeling of large buildings systems"
Track: Applications
Organized by: TC 4.7, joint Track with 9.1&9.8 (Simulation and Component Models)
Chair: Timothy McDowell
Status: New (01/09). Confident to get speakers.

PLANNED:

Orlando, January 23-27, 2010

Seminar "Supporting Performance Feedback Via Community Energy Benchmarking - Lessons learned"
Track: Operational Topics
Organized by: TC 4.7 (Data Driven Models)
Chair: Chris Balbach
Status: New (01/09). (Candace Damon, Kim Lenihan, Chris Balbach)

Seminar "Web-based Programs for Calculating Energy Code-Compliance"
Track: Applications
Organized by: TC 4.7 (Applications)
Chair: Larry Degelmann
Status: Moved from Dallas. (Jeff Haberl, Eric Richmond plus one more).

Seminar "How to Assess the Performance of Sustainable Buildings through Measured Data"
Track: Sustainability/LEED
Organized by: TC 4.7 (Data Driven Models)
Chair: Moncef Krarti
Status: New. 4 speakers (B. Koran, Bass Abushakra, David Claridge)

Seminar "Computer Simulation of Supermarkets"
Track: Applications
Co-sponsored by: TC 4.7 (Applications)
Chair: Van Baxter
Status: 4 speakers lined up.

Albuquerque, June 26-30, 2010

----- APPLICATIONS

Seminar "Shoot-out of Code Compliance Simulation for Residential Buildings"
Organized by TC 4.7 (Applications)
Chair: Jeff Haberl
Status: New (6/08)

Seminar "Experience with Simulation of Standard 90.1 Code-compliant Buildings"
Organized by TC 4.7 (Applications)

Chair: Carol Gardner
Status: Moved from Dallas

Seminar “Applying Performance Assessment Tools to mitigate Climate Change”
Organized by TC 4.7 (Applications)
Chair: Carol Gardner
Status: Moved from NYC. May get 4 speakers, but none confirmed.

Seminar “Fenestration Data Needs for Energy and Loads Calculations”
Organized by: TC 4.7 (Applications)
Chair: -
Status: Moved from Dallas. Keep as maybe.

----- DATA DRIVEN MODELS

Seminar “Advanced Inverse Modeling Techniques using Interval Data”
Organized by: TC 4.7 (Data Driven Models)
Chair: Jeff Haberl
Status: Moved from NYC.

Seminar “Methods of Carbon Credit Certification from Energy Efficiency and Renewable Energy”
Organized by: TC 4.7 (Data Driven Models)
Chair: Kris Subbarao
Status: Moved from Long Beach. Confident to get 3 speakers.

----- SIMULATION AND COMPONENT MODELS

Seminar “Modeling of High Performance Buildings”
Track: Energy Conservation and Alternative Energy Sources
Organized by: TC 4.7 (Simulation and Component Models)
Chair: Tim McDowell
Status: New (6/08).

Seminar “You don't know what you've got 'till it's checked! The importance of QA in benchmarking energy analysis results”
Organized by: TC 4.7 (Simulation and Component Models)
Chair: Russ Taylor
Status: Moved from NYC. Had two speakers (summer 09).

PAST:

Salt Lake City June 21-25, 2008

Use of Equation Solvers for Simulation (Chair: Michael Wetter)

New York City/January 2008

How to model nothing – Energy Modeling for Zero Net Energy Buildings: Parts 1 & 2 (Chair: Jan Kosny)

Long Beach/June 2007

Simulation Support for the 2007 Solar Decathlon (Chair: Kamel Haddad)

Dallas/January 2007

Use of ‘equation solvers’ for Simulation (Chairs: Jean Lebrun/Mike Wetter)

Applications of Computer Simulation in High Performance Buildings (Chair: Martha Brook)

Québec City/June 2006

None

Chicago/January 2006

How and Why to Calibrate a Simulation to Measured Data (Chair: Robert Sonderegger)

Application and Experiences with the New Simulation Software (Chair: Dan Fisher)

Denver/June 2005

Neglected Topics in Building Simulation (Chair: Ian Beausoleil-Morrison).

Orlando/January 2005

What to do When Data Misbehave (Chair: Agami Reddy)

Appendix 6
TC/TG/TRG SPONSORED FORUMS

Current as of June 2009

PRESENT:

Louisville, June 20-24, 2009

None

PLANNED (w/priorities):

Orlando, January 23-27, 2010

None.

PAST:

Chicago, January 24-28, 2009

“Limitation of Energy Simulations for NZEB”

Chicago/January 2006

What Controls Modeling Capabilities are Needed for Energy Simulations? (Chair: Philip Haves)

ASHRAE TC 4.7 Energy Calculations
Tuesday, June 23, 2009, 6:00 PM to 9:00 PM
Louisville, KY

1. Roll call and introductions (McDowell)

- The meeting convened at 6:05 PM.
- 12 voting members were present, excluding the chair, out of 14 non-international members, constituting a quorum.
- Those present introduced themselves.

2. Accept agenda & approve minutes of Chicago meeting (Haves) (Agenda: Attachment A)

MOTION: "Approval of the minutes from the meeting in Chicago" moved Barnaby/Kosny (8-0-0 CNV)

3. Announcements/Liaisons (Haves)

- Section Liaison, Suzanne LeViseur,
 - Activity report due by midnight
 - New AEDGs are available from ASHRAE
 - Nominations are sought for the Highsmith award
 - The TC website needs to be updated
 - Google groups are acceptable for the TC, but the official website must be maintained
 - Thank you letters for employers are available on-line
- Handbook Liaison, Doug Hittle
 - Handbook will be coming on the web replacing the CD+
 - Chapters are being reviewed by the College of Fellows
 - Peter Simmonds is the in-coming Handbook Liaison
 - TCs have been challenged to provide additional material for the CD+
- Professional Development, John Nix
 - Offer to TC to develop a 3 hour short-course on energy modeling
 - The course would be an introductory course on what energy modeling is and how to select the appropriate software or company
 - The course author would not be paid to develop the course, but receive some of the fees from teaching the course
 - TC would have oversight of course development.
 - One person in the room expressed possible interest in developing the course, so the interest will be forwarded to ASHRAE
 - The TC will receive more information from ASHRAE to disseminate to the membership
- The TC now has the opportunity to propose themes for future meetings 2 years in advance and tracks for the meeting 18 months in advance.
- You can decline to have your seminar recorded, but you lose your free registration
- The Hightower award is for outstanding technical contributions over the past year, excluding research and standards).
- ASHRAE has proposed to eliminate the International Member position on committees and replace it with a non-quorum voting position. These two positions would not count against the quorum when not in attendance, but can vote when present. The idea is to remove the geographic distinction with these positions. ASHRAE asked for feedback on the proposed change.
 - The first idea circulated was to recommend that no change be made to the current International Member position, but this did not have the support of the members in the room.
 - The TC held an advisory vote in support of the concept of the generalization of the International Member category to Non-Quorum Voting Member category (7-3-0 CNV). The negative votes asked to have their opposition marked as wanting to eliminate the International Member category completely and not replace it with the new category.

- CLIMA 2010 in Turkey. The abstract deadline has been extended to the end of September.
- Proposed changed to the Program
 - The society needs to do a better job of disseminating the information from the conference to the general society membership
 - Seminar presentations are being given more weight than they should because of the recordings
 - Conference Papers are being introduced. These are single blind reviewed papers of ~3000 words that would be presumably be written by consultants and practicing engineers.
 - The Transaction papers are not disappearing, but the new Conference Papers would be in addition
 - The HVAC&R Journal will be expanding the range of topics that it accepts
 - Concern was raised about the mixing of double blind and single blind publications in a single publication and that any publication coming out after these changes should be title something other than Transactions to denote the change.
 - The TC suggests that the current paper structure remain and the new papers be added in a new publication

MOTION: "Leave the existing publication formats unchanged and create a new publication called 'ASHRAE Conference Proceedings,' which could be in electronic format, that includes the Conference Papers" moved Sonderegger/Neymark (11-0-1 CNV)

- Concern that the motion does not convey that the Transaction should not continue in the same name if there is any change of content.

4. Membership (Haves)

- Rolling off Barnaby, Leisen, Abushakra and Degelman
- Rolling on Haberl, Huang, Taylor and MacDonald
- Barnaby has taken over as chair of Handbook

5. Subcommittee reports

5.1 Research Joe Huang (chair) reporting:

- RTARs may now be submitted 3 times per year and the next deadline is Sept 15.
- Projects are to be controlled tighter by the PMS and a new form needs to be filled out by the PMS chair after every meeting.
- RAC has developed a strategic plan with 10 research themes. TC4.7 is involved in the #7 theme "Load calculation and energy calculations for net-zero buildings" Conference calls have identified strategic areas of need: better interfaces, better design of low-energy buildings, tools to model non-energy systems, and methods to model new systems and allow rapid prototyping on new systems. The overall goal is to identify better tools for low-energy houses. RAC will coordinate this new plan with the existing research plan.
- 1311-RP – the last papers were presented at this meeting and the project is now complete
- 1416-RP – the PMS met on Monday morning with the contractor (Novoselic at UT-Austin). The project is ahead of schedule and the contractor is working on the first paper. The PowerPoint presentation from the contractor is available from Dan Fisher.
- 1456-RP – the project is on schedule, with the literature review, coupled models versus lab reports and comparison to measured data from naturally ventilated buildings completed. The comparison was good for the single story building, but not for the multi-story buildings. The buildings may not have been instrumented well enough to provide adequate data. This may lead to future experimental work to provide the answers.
- RTARs and Workstatements – trying the new strategy with focus groups at the meetings rather than the old subcommittee structure. Work progressed at the meeting, but nothing is currently ready for full TC action.
- The topics discussed concerning developing detailed window descriptions from bulk properties, determining equipment input data from manufacturer's data, determine better

equipment/lighting/occupancy levels and schedules for typical buildings, and how to better match between simulations and real building performance. (See subcommittee minutes for discussion notes.)

5.2 Handbook, Chip Barnaby (chair) reporting:

- Barnaby just taking over. Will submit a new version for the CD+ version. A draft of the new chapter will be available in Orlando. Any comments or suggested changes should be submitted to Barnaby.

5.3 Program, Michael Wetter (chair) reporting:

- TC prioritization is no longer needed.
- The TC needs to work with the track chairs to get program inserted in to the conference.
- There are 4 program ideas reading and Wetter will contact Giometti to determine the appropriate track chairs.
- Conference Paper abstracts are due Sept 25.

5.4 Standards, Ron Judkoff (chair) reporting

- Addendum b to SMOT 140 which includes the HERS BESTEST was voted out of committee and submitted to ASHRAE. It will go out for public review this Fall.
- The next test suites to be incorporated for SMOT 140 are the ground coupling and multi-zone suites from the IEA 34/43 work and the air side suite from RP-865.
- The Data Format Subcommittee has developed standardized spreadsheets for the output. Thanks to Witte and Pegues for all of their work on this.
- A strong recommendation was made to ASHRAE and DOE that the example results be updated using a rigorous methodology.
- Related activities – IA 34/43 was completed and the final reports are available on the IEA Solar Cooling and Heating website. BESTEST-EX for modeling retrofits of existing residential buildings including calibration to utility data is under development.

5.5 Website, chair not in attendance,

- Contact the chair (Kris Kinney) with any changes or updates to the website.

6. Reports on related activities (Various persons)

- GPC 20 (Barnaby), XML definitions – more use cases and data groups and not XML definitions. Results will be posted on-line
- TC 2.8 no report.
- TC 4.1 (Pedersen) Research project approved as publication in ASHRAE Journal, some discussion of developing a SMOT for load calculations.
- TC 4.2 (Degelman) Seminar on climate change update, several research projects completed, Huang starting to finish up new international weather files.
- TC 4.5 (Wright) The committee was dwindling, but attendance was better at this meeting.
- TC 6.5 (Sommer) Contractor meeting for radiant project, research is looking for proposals, seminar on reducing energy 30% with radiant systems.
- TC 7.5 (Krarti) performance assessment of packaged equipment.
- TC 7.6 (Abushakra) energy measurement classes through ASHRAE, discussing name and scope change.
- Building Smart (Barnaby) – recent testbed project interoperability between 3-D CAD, Energy+ and Code checking software.
- IBPSA (Haberl) had a successful meeting on Saturday with a great talk by Curt Pedersen and the slide will be up on the website soon. Cooperating with ASHREA on developing a certification for energy modelers. SimBuild 2010 will be in New York City.
- IBPSA Canada (Haddad) eSim 2010 coming.
- IBPSA World (Haberl) Building Simulation 2009 in Glasgow in July/August

7. Old Business

(none)

8. Committee Structure

- May not yet be able to determine if the new structure is helping to get more accomplished. The multiple tracks have allowed for more discussion on single topics. The working huddles were successful, but we need to be more proactive in getting the themes before the meeting. Logistics need some work and a router at the meeting would be helpful. Haberl will investigate this for Orlando.

9. New Business

Standard 100 kicks off on Wednesday morning.

10. Executive Session

The TC took action on the TRP.

Attachments

- A. Agenda
- B. Subcommittee Minutes
- C. Research Subcommittee Minutes
- D. Program
- E. SSPC 140 Minutes

Agenda

ASHRAE TC 4.7 Energy Calculations

Tuesday, June 23, 2009, 6:00-8:30 p.m.
Archibald Room, Galt House Hotel
Louisville

1. Roll call and introductions	McDowell
2. Accept agenda & approve minutes of Chicago meeting	Haves
3. Announcements/Liaisons	Haves
4. Membership	Haves
5. Subcommittee reports	
5.1 Research	Huang
• <u>Status:</u> 1311-RP Improving Load Calculations for Fenestration with Shading Devices (TC 4.1/4.5/4.7; Univ. of Waterloo)	
• <u>Status:</u> 1416-RP Development of Internal Surface Convection Correlations for Energy and Load Calculations (TC 4.1/4.7 Univ. of Texas at Austin)	
• <u>Status:</u> 1456-RP Assess and Implement Natural and Hybrid Ventilation Models in Whole-Building Energy Simulations (TC 4.10/4.7 Univ. of Colorado)	
• RTARs and Work statements for consideration	
5.2 Handbook	Taylor
5.3 Program	Wetter
5.4 Standards	Neymark
• SSPC 140 SMOT for Eval Bldg Energy Analysis Computer Programs	
• IEA Annex 34/43 Test and Validation of Bldg Energy Sim Tools	
5.5 Web Site	Kinney
6. Related activities reports	
GPC 20 XML Definitions for HVAC&R	Barnaby
TC 2.8 Building Environmental Impacts and Sustainability	?
TC 4.1 Load Calculation Data and Procedures	Petersen
TC 4.2 Climate Information	Degelman
TC 4.5 Fenestration	Barnaby
TC 6.5 Radiant Heating and Cooling	Sommer
TC 7.5 Smart Building Systems (now includes TC 7.4)	Wetter
TC 7.6 Systems Energy Utilization	Abushakra
BuildingSMART (formerly IAI International Alliance for Interoperability)	?
IBPSA: USA, SimBuild 2008; Canada, eSim 2006; IBPSA, BS 2009	Haberl, Hensen
7. Old Business	(Haves)
8. Committee Structure	Haves
9. New business	(Haves)
10. Adjourn	
11. Executive session: 1404-TRP Modeling, analysis, and reporting protocols for predicting annual energy performance from short-term building energy monitoring.	Haves Sonderegger (PES Chair)

Attachment B

ASHRAE TC 4.7 Energy Calculations

Subcommittee

Monday, June 22, 2009, 6-9 pm

Louisville, Kentucky

Attendance: Tim McDowell, Michael Wtter, Klaus Sommer, Soolyeon Cho, Juan-Carlos Baltazar, Bass Abushakra, Larry Degelman, Piljae Im, Van Baxter, Chris Balbach, Moncef Krarti, David Kaufman, Reid Hart, Jan Kosny, Robert Sonderegger, Peter Armstrong, Therese Stovall, Dennis Jones, Jeff Haberl, Phil Haves, Atila Novoselac, Vern Smith, Jim Pegues, Joe Huang, Chip Barnaby, Li Zhang, Jaya Mukhopadhyay, Richard Liesen, Curt Pedersen, Russell Taylor

Phil called the meeting in order and explained the new process. No longer having the topical subcommittees, but will instead try a process where we will brain storm ideas and identify break-out topics

Van Baxter – seminar from TC 10.7 “Computer Simulation of Supermarkets; Benefits and Risks” – has 4 speakers. Not sure what the new formal process is for TC involvement in the program at meetings. Will vote at the main committee meeting just in case.

Phil discussed the email received from Pat Graef from TRG4 Sustainable Building Guidance and Metrics concerning simulation results better matching real building performance.

Topics from Chicago: additions to SPC 140 – validation; energy behavior of groups of buildings (Need to specify how to use large data sets, Specify needed output, What data are available?)

New topics:

- How to get real plug loads for commercial
 - 1093 RP – how can this help
 - Expand to cover other buildings types
 - CBECS – expand their survey?
- Tables of typical use in 90.1?
 - User’s Guide had tables in 90.1-1989
 - Real schedules vs idealized schedules
- Short time step data?
 - How can simulation use this?
 - Where is this available?
- How to develop algorithms that will take readily available equipment data and prepare it for input for simulation?
 - There is a mismatch between manf’s data and inputs for simulation models
 - Modeler has to transform manf’s data for use by simulation
 - Need to standardize transformation
 - 1197-RP (Brandemuehl)
 - residential equip,
 - used ratings defined by others
 - purpose: what’s needed
 - conclusion: use what’s avail, ARI tests, degradation coeff,
 - data are being collected but not published
 - 1197 showed that one could reproduce the impact of entering the data into the simulation
 - Quality of the data from ARI is not QC’d, need to checking data
- Joe Huang – RTAR to develop layered window model from SHGC, Uvalue data

- Went through letter ballot, approved by ASHRAE TAC
- JH has rough WS
- JH contacted TC 4.5 who wants to co-sponsor
- Modeling for net-zero buildings
 - Residential
 - Commercial
 - How to integrate solar thermal, solar PV
- Modeling of net-zero communities
 - Residential, Commercial, etc.
 - Sharing electricity from renewable to another?
 - Transportation?
 - University of Cardiff?
 - Ecole Polytechnic, metering at community level
- TC 4.1 voted to move forward with getting a standard so that manf's would self-rate equipment in all modes of operation
- Google Power meter?
 - About to be released
 - Need RP to see how to take data and develop tools
 - If 3rd parties give permission will use meters from customers, relying on metered data warehouses.
 - Does Google need guidance on what to do with this?
 - What sort of format for the data model?
- Need for internet-based software
 - To be used by the masses, playing with R-values
 - Something your mother-in-law can use
 - Similar to LBNL's Homeenergysaver

The meeting then broke into 4 groups to work on the various topics:

1. Misc Loads Schedules
 - a. Reintroduce ELCAP over again to 5 new regions
 - b. What needs to be acquired?
 - c. How to format data collected?
 - d. Idea needs expansion, RTAR written, ready to discuss
2. Equipment performance data
 - a. Simulator wants to simulate a building with XYZ chiller. How to prepare input?
 - i. Use default model. Most models use curve fit
 - b. How to do this?
 - i. Get performance map data
 - ii. Develop canonical procedure to develop common curve fit from performance data
 - iii. Or, Use few characteristics
 1. Use 1197 or primary toolkit
 2. Identify parameter identification
 3. Develop curve fit
 - c. Idea needs expansion, RTAR written, ready to discuss
3. RTAR: U-values/SHGC transform to multi-layer windows
 - a. Topic is well defined
 - i. Assumes all that is available is Uvalue, SHGC, frame assumptions
 - ii. Develop procedure to run fenestration software backwards to generate Window 5 file
 - iii. Possible approach:
 1. Use search procedure to look through library to find closest match?
 2. Develop true robo-Window generator

-
- b. Concern: has this already been done by NREL or LBNL
 - c. Needs input by TC 4.5
 - d. Goal: group needs to finish WS for discussion at 3:30 and vote at main TC, needs more than 1-1/2 hr work, letter ballot for vote before August.
4. Prediction of actual performance of buildings
- a. TC needs rebuttal to request
 - b. Modeling unreal buildings
 - c. Real-time calibration of simulation
 - d. Automated calibration of buildings
 - e. Prediction of energy use of LEED vs actual performance
 - f. Take case studies and categorize what went wrong
 - g. Follow-up on NBI study, field work, monitoring, focus on outliers, LEED buildings

ASHRAE TC 4.7 Energy Calculations
Subcommittee
 Tuesday, June 23, 2009, 3:30-5 pm
 Louisville, Kentucky

Attendance: Tim McDowell, Jeff Haberl, Larry Degelman, Klaus Sommer, Gerritt Hoefker, Stefano Schiavon, Michel Tandif, Jaya Mukhopadhyay, Therese Stovall, Mark Hudoba, Michael Wetter, Tianzhen Hong, Joel Neymark, David Kaufman, Jan Kosny, Ron Judkoff, Chip Barnaby, Joe Huang, Dan Fisher, John Wright, Phil Haves

Topic 1: Generation of curve-fit coefficients for Equipment Simulation: dealing with the need for data from equipment ratings that allow for simulation program inputs. The idea is to do a project where the performance map and curve-fit coefficients needed by simulation programs are derived from the manufacturer's performance. The first step would be to determine the format needed for the performance map and then determine how to convert the available data into the needed performance data. Different standard performance maps would be determined for different pieces of equipment.

RJ – this is sorely needed, but are the manufacturer's performance data even available to create the initial map. Can map be derived from tool kits and rating conditions?

MW – the data needs to be verified – is it real data or modeled data

JK – an advanced database with the manufacturer's data

CB – not data, but tools to determine the program inputs from the available data

PH – this would allow anyone to construct the database

RJ – this standard format would have a broad range of applicability to programs and range of operation

We will pursue the RTAR on this topic and volunteers to work with Chip: Dan F, Ron J, Tianzhen H, Joel N

Topic 2: Better match of simulation to existing buildings. A very broad topic, but there are some fundamental issues like thermal bridges, equipment degradation, etc. But is it really possible to measure building energy use and simulate this. Maybe the better approach is a stochastic approach that tried to determine the error and uncertainties

in the outputs. Need more information from the ASHRAE TRG4 Sustainable Building Guidance and Metrics to determine how to proceed.

Topic 3: Equip/Misc loads schedules:

Larry presented the RTAR, but has not worked too extensively on the topic. The start was a paper with measurements from buildings that showed the nighttime electric loads which were at a minimum of 20% of the daytime peak. This is much different from previous work which showed closer to 5%. 91 different buildings were studied of various type which showed similar (if not worse) performance in other building types. An RTAR has been circulated that was started by Deru & Hart and TC 7.6 will continue the lead on this effort. Volunteers to help: Joe, Tim

Topic 4: Window properties from bulk properties workstatement. The RTAR has been approved by RAC and needs to be turned into a workstatement.. A focus group has worked on improvements. If you do not have the detailed properties of the window, but only the bulk properties such as U and SHGC how do you determine the detailed properties for use in simulation programs. No unique solutions, but there needs to be some way of weeding out the outlier of the windows that may not be practical choices. Also this really useful for the existing windows where some properties are known.

An abstract has been added about a method that has been put into Energy+ developed by LBNL. This project generated monolithic window properties that gave the same U and SHGC. The concerns are that a single layer may not represent the multiple layer reflections and shading.

Do these need to be real properties or are fictitious properties good enough? Can this simplified single layer model work when shading devices are added?

Do these bulk properties include the frame or are they center-of-glass? Most of the time the bulk values and the NFRC values include the frame, so the results would need to include the frame.

The inputs need to be explicit in the workstatement, since we cannot predict what different code standards (i.e CofG vs overall, different size windows, etc) will give.

The outputs should be more detailed. Is a window5 output format adequate?

The approach should be requested as part of the proposal.

Possibly include a specific table in the workstatement.

This workstatement needs more work before a vote including different use cases.

TC4.5 may be interested in co-sponsorship. Circulate the workstatement to them when completed.

Comments from a code official would also be helpful.

Volunteers: Jeff, Chip, Joel, Tianzhen, Jan, John Wright

Handbook: the various reasons, the updated chapter did not get in the HoF. Chip is the new chair for handbook. The next step is getting changes into the CD version of the HoF. New text from Jeff and Joel. Chip will figure out the schedule for submittal for the CD+. If you have comments or additions contact Chip. We will vote on this at the January meeting. A final draft will be needed in Orlando. The first cut will probably be just a clean-up of things that should have been in this time, but not a big rewrite.

Attachment C (repeated from Chicago)

**ASHRAE
Technical Committee 4.7 Energy Calculations
2007-2008 Research Plan
(January 22, 2008)**

Title	Society status	TC 4.7 Status	Authors or TC 4.7 Prime Contact	Sub committee*
Active Projects				
TRP-1456 Assess and Implement Natural and Hybrid Ventilation Models in Whole-Building Energy Simulations	Opened for Bid Nov 07	PES met and forwarded recommended bidder to full committee NY meeting.	PES JHuang (chair), PHaves, JHensen, RBanks, NBourassa, SSzymurski	SCM
TRP-1416 Development of Internal Surface Convection Correlations for Energy and Load Calculations	Opened for Bid Nov 07	PES met and forwarded recommended bidder to full committee NY meeting.	PES: DFisher (chair), SBruning, JKosny	SCM
Approved RTARs				
None				
RTARs recommended by SC for approval				
Modeling, analysis, and reporting protocols for predicting annual energy performance from short-term building energy monitoring	None	RTAR accepted by SC and forwarded to full committee; approved by full committee NY meeting	AREddy, LNorford, VSmith, BABushakra	DDM
CFD boundary conditions for natural ventilation	TC 4.10 lead, None	Discussed in full committee NY, co-sponsorship rejected but liaison with TC 4.10 to continue	YJHuang	SCM
RTARs to be reviewed				
RTAR-1468 Development of reference Building Information Model (BIM) for thermal model compliance testing	TC 1.5 lead, RTAR approved Jun 07	YJH to obtain copy of RTAR from TC 1.5 and circulate in SC	YJHuang	A
RTARs under development in subcommittee (prioritized)				
Assessment of the potential for application of moisture absorption/desorption models in whole bldg energy simulations to evaluate possible energy savings caused by moisture buffering effects in bldg enclosure and furnishings	None	Highest priority in SC; draft RTAR still under discussion in SC, no progress since June 06	JKosny	SCM

ASHRAE
Technical Committee 4.7 Energy Calculations
2007-2008 Research Plan (continued, page 2)
(January 22, 2008)

Title	Society status	TC 4.7 Status	Authors or TC 4.7 Prime Contact	Sub committee*
RTARs under development in subcommittee (prioitized. continued)				
Development of Enhanced Window Simulation Capability for Standard 90.1 Prescriptive Simulation	None	RTAR under development, no progress since Jan 07	JHaberl, JDeringer,	A
Performance metrics for HVAC secondary systems	None	No progress since Jun 07	JWright, JHaberl, and CBarnaby	SCM
Research topics under discussion in subcommittee (unprioritized)				
Develop a radiant system module for the simulation and analysis of spaces and systems	None	Original RTAR fom TC 6.5 rejected in Long Beach, to be replaced by a new RTAR. No progress since Jun 07.	Kosny, Haves	SCM
Use of evolutionary compu-tation for inverse problems	None	Under discussion in SC	RNelson	DDM
Toolkit of Energy Conser-vation Measures, Prototypical Buildings, Sensitivity Analysis, and ECMs for use in ASHRAE Standard 90.1 Energy Cost Budget Method	None	Under discussion in SC	JGlazer, LNorford	A
Development of integrated models for liquid desiccant dehumidification driven by heat recovery or renewable energy	None	No progress since Jun 07	Haberl	SCM
Thermal mass toolkit: optimization of the calculation of the thermal mass energy benefits for residential and commercial buildings	None	No progress since Jun 07	Kosny	SCM
Modeling of humidity controlled equipment	None	No progress since Jun 07	Haberl	SCM
Modeling of the ground heat exchanger in foundation systems	None	No progress since Jun 07	Kosny	SCM

* SCM = Simulations and Component Models

DDM = Data Driven Modeling (formerly Inverse Methods)

A = Applications

Attachment D

TC 4.7 Program Plan
ASHRAE Meeting
06/23/09

Louisville, June 20-24, 2009**Theme: Optimal Air Quality Management**

Transaction "Improving Load Calculations for Fenestrations with Shading Devices"
Organized by: TC 4.1 (lead)/4.5/4.7
Chair: Glenn Friedman

Seminar "Energy modeling of large buildings systems"
Track: Applications
Organized by: TC 4.7, joint Track with 9.1&9.8 (Simulation and Component Models)
Chair: Timothy McDowell

January 23-27, 2010, Orlando, FL**Theme: Humidity and Sustainable Indoor Environment**

2/15/2009 Transactions Session proposals due; 3/2/2009 Notification of acceptance of Transactions Sessions; 5/1/2009 Papers Due ***
7/10/2009 Session proposals due; 7/15/2009 Notification of selection; 8/14/2009 Final Program Submissions with speakers due

Theme: Humidity and Sustainable Indoor Environment
Tracks: Energy Conservation and Alternative Energy Sources *** Sustainability *** IAQ/Comfort *** Load Calculations ***
Commissioning *** Refrigeration *** Building Information Modeling.
Within Track *Energy Conservation and Alternative Energy*: Global Energy Use Trends - Geothermal Applications- High Performance Office Buildings - *Energy Modeling Experiences* - Net Zero Energy Residential Buildings - Alternative Energy: Solar Applications - Combined Heat and Power Systems - *Energy Calculation Models*

Seminar "Web-based Programs for Calculating Energy Code-Compliance"
Organized by: TC 4.7 (Applications)
Chair: Larry Degelmann
Status: Moved from Dallas. (Jeff Haberl, Eric Richmond, Paul Mathew).

Seminar "Supporting Performance Feedback Via Community Energy Benchmarking - Lessons learned"
Organized by: TC 4.7 (Data Driven Models)
Chair: Chris Balbach
Status: New (01/09). (Candace Damon, Kim Lenihan, Chris Balbach)

Seminar "How to Assess the Performance of Sustainable Buildings through Measured Data"
Organized by: TC 4.7 (Data Driven Models)
Chair: Moncef Krarti
Status: 4 speakers (B. Koran, Bass Abushakra, David Claridge)

Seminar "Computer Simulation of Supermarkets"
Organized by: TC 10.7 (co-sponsored by 4.7)
Chair: Van D. Baxter, ORNL
Status: New (07/09), 4 speakers

Jun 26-30, 2010 - Albuquerque, NM**Theme: Energy Efficient System Design for High Elevations and Dry Climates**

9/25/2009 Transactions Papers and abstract of Conference Papers due;

12/15/2006 to 2/12/2010 Seminars/Forums submission period;
1/9/2010 Conference Papers Due

Transaction "Use of 'equation solvers' for Simulation"
Organized by: TC 4.7 (Data Driven Models)
Co-Chair: Jean Lebrun/Michael Wetter
Status: Have 1 paper (Lebrun), need one more paper.

Forum "Should ASHRAE Develop a Standard for Simulation Aided Design of High Performance Buildings"
Track: Sustainability/LEED
Organized by: TC 4.7 (Applications)
Chair: Jason Glazer
Status: Moved from Salt Lake City.

Conference Paper "Use of Building Energy Simulation in Energy Code and Policy Analysis"

Organized by: TC 4.7
Chair: Russ Taylor
Status: 3 speakers (R. Taylor, R. Brahme, K. Otto)

Seminar "Simulation Support for the Solar Decathlon"

Track: Applications
Organized by: TC 4.7 (Applications)
Chair: Kamel Haddad
Status: Continuing series from Long Beach. Has speakers.

Seminar "Shoot-out of Code Compliance Simulation for Residential Buildings"

Organized by TC 4.7 (Applications)
Chair: Jeff Haberl
Status: New (6/08)

Seminar "Experience with Simulation of Standard 90.1 Code-compliant Buildings"

Organized by TC 4.7 (Applications)
Chair: Carol Gardner
Status: Moved from Dallas

Seminar "Applying Performance Assessment Tools to mitigate Climate Change"

Organized by TC 4.7 (Applications)
Chair: Carol Gardner
Status: Moved from NYC. May get 4 speakers, but none confirmed.

Seminar "Fenestration Data Needs for Energy and Loads Calculations"

Organized by: TC 4.7 (Applications)
Chair: -
Status: Moved from Dallas. Keep as maybe.

Seminar "Advanced Inverse Modeling Techniques using Interval Data"

Organized by: TC 4.7 (Data Driven Models)
Chair: Jeff Haberl
Status: Moved from NYC.

Seminar "Methods of Carbon Credit Certification from Energy Efficiency and Renewable Energy"

Organized by: TC 4.7 (Data Driven Models)
Chair: Kris Subbarao
Status: Moved from Long Beach. Confident to get 3 speakers.

Seminar "Modeling of High Performance Buildings"

Track: Energy Conservation and Alternative Energy Sources
Organized by: TC 4.7 (Simulation and Component Models)
Chair: Tim McDowell
Status: New (6/08).

Seminar "Simulation of HVAC/R equipment and systems using the limited data published by manufacturer"

Track: Systems and Equipment
Organized by: TC 4.7 (Simulation and Component Models)
Chair: Michael Wetter
Status: Moved from Salt Lake City. Joel Neymark, Vincent Lemort, Stephane Bertagnolio & Jean Lebrun, Craig Wray.

Seminar "You don't know what you've got 'till it's checked! The importance of QA in benchmarking energy analysis results"

Organized by: TC 4.7 (Simulation and Component Models)
Chair: Russ Taylor
Status: Moved from NYC. Had two speakers (summer 09).

Jan 29-Feb 2, 2011 - Las Vegas, NV

Theme: Zero Energy Design

Jun 25-29, 2011 - Montreal, Quebec

Theme: Net-Zero Buildings

Attachment E

SSPC 140 Louisville Meeting Summary – 6/22/09 (submitted 6/23/09)

Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs.

From Chair Announcements

- **ANSI/ASHRAE Standard 140-2007 Addendum B (HERS BESTEST adaptation by FSEC/JNA) publication/public review recommendation was approved by SSPC 140 letter ballot on May 7, 2009; publication/public review draft submittal report submitted to ASHRAE Staff on May 19. The addendum will be posted by ASHRAE for **publication/public review during Autumn 2009.** The addendum proposes a separate new section in Standard 140 (to facilitate reference by others) for test cases for more simplified building energy analysis tools commonly used for residential modeling. **The addendum also includes an *informative (non-mandatory) annex containing example procedures for developing acceptance range criteria adapted from HERS BESTEST.* If there are no comments Standards Committee publication approval is expected in January 2010.****
- Current **IRS rules** (IRS notice 2008-40, published Apr 2008) relating to the deduction for energy efficient commercial buildings require software used for assessing tax credits be tested to Standard 140-2007. **Currently 4 programs have satisfied the new requirements (up from 1 program last January).** 10 programs had satisfied the previous requirement (issued June 2006) to submit test results for Standard 140-2004.

Test suites planned for adaptation for Standard 140 in the near future. SSPC 140 unanimously agreed with NREL's plans to adapt for incorporation into Standard 140 NREL's recently completed **IEA 34/43 Ground Coupling and IEA 34/43 Multi-Zone** test suites. Content of the test suites is:

- o Ground coupled heat transfer related to floor slabs (developed by NREL in collaboration with IEA 34/43)
 - This includes analytical verification tests, and the methodological advancement of developing a secondary mathematical truth standard using an analytical solution benchmark and verified numerical-model results for other test cases included within the test suite.
- o Multi-zone envelope test cases (developed by NREL in collaboration with IEA 34/43) including:
 - Analytical verification conduction test
 - Comparative tests of
 - The effect of shading on a window, where a shading device is affixed to the window of a neighboring zone
 - The effect of shading on a window by a neighboring zone of the building
 - Internal windows.

NREL also plans to lead simulation trials for adapting ASHRAE RP-865 (Yuill and Haberl) for Standard 140. This work will begin in early 2010. Adaptation may include revisions to the test specification, which may be needed depending on the outcome of simulation trials. SSPC 140 indicated support for this effort at the meeting.

Development of a format for 140 results data to be posted on the DOE Tools web site.

The Data Format SubC continues to develop data format, submittal, and posting recommendations; much of this can also be applied for tax-deductions related software approvals.

Progress:

- Mike **Witte** is developing automation and format improvements to the four results **spreadsheets** currently in 140-2007 for automating inclusion of new results into formatted charts and tables, for comparing submitted results with the current Std-140 example results set.
- Jim **Pegues** has developed Web **Cover Page** content and layout, and **rules for submitting results**. This work involves improvements to the standard output reports of Std 140, also included in recently approved Standard 140-2007, Addendum A.

How to establish newly submitted results (e.g., via DOE tools site) as updated example results (i.e., how do we vet new results submittals)

Unanimous Resolution (from Chicago, Jan 2009): “The PC has identified a critical need for updated example results to support Standard 140 and directs the Chair to communicate that need to ASHRAE and DOE.”

At the Louisville meeting the PC agreed that **for updating example results there must be a fully funded task to generate updated Section 5.2 and 7.2 results using the process and methodology similar to that used by NREL for the IEA work in Tasks 34/43, 22, 12.**

REFERENCES TO STANDARD 140 IN STANDARD 90.1. JIM PEGUES PLANS TO PROPOSE TO SSPC 90.1 TO CHANGE THE REFERENCES TO STANDARD 140 AS STANDARD 140-2007 INCLUDING ADDENDUM A. SSPC 140 SUPPORTS THIS.

UPDATE FOR IEA TASK/ANNEX 34/43

[this TC4.7 agenda item is closing out as the task is complete; to be replaced with “BESTEST-EX Update” below]

SEVERAL PAPERS FOR AN INVITED SESSION ON THE TASK’S WORK WILL BE PRESENTED AT IBPSA GLASGOW NEXT MONTH.

BESTEST-EX UPDATE

This is a **new comparative test suite being developed for testing the ability of software used for modeling residential retrofits to predict energy savings**. Part of the test process also tests the ability to initially calibrate the model of the existing building (pre-retrofit).

The current test cases include a set of **building physics tests with calibrated energy savings test versions of the physics tests**. The test cases are **based on HERS BESTEST, but with improvements** including to equivalent constant surface coefficients (lower values based on recent advancements in the modeling state of the art) and Sherman-Grimsrud infiltration modeling. Test case **parametric variations** include the following retrofits: **air sealing, attic insulation (blown cellulose), wall insulation (blown cellulose), thermostat setback, and all retrofits combined**. There are also a number of **targeted calibration scenarios** including targeted high and low space heating energy consumption base case scenarios, and fully random selection base case scenarios. There is a deadline to produce an Interim Test Procedure this summer. NREL plans to also add a window retrofit and cooling effect cases for the given retrofits using Las Vegas climate, either to the Interim Test Procedure as time allows or to future generations of the test procedure that are planned by DOE. Additionally, other building physics test cases for BESTEST-EX could be cross-referenced from HERS BESTEST. Future test cases would be developed for BESTEST-EX to address furnace and space cooling system retrofits, duct leakage, and domestic hot water modeling.