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: January 27, 2009

TC/TG/TRG TITLE: Energy Calculations

DATE OF MEETING: January 27, 2009 LOCATION: Chicago

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			Craig Wray (CEC)
Joel Neymark (STDS S.C.)	2007			
Chip Barnaby (APP S.C.)	2005			
Klaus Sommer (INT'L)	2007			
Rich Liesen	2005			See attendance list for
Bass Abushakra	2005			Additional attendees.
Larry Degelman	2006			
Peter Ellis	2006			
Jan Kosny	2006			
Timothy McDowell (SEC)	2008			
Robert Sonderegger	2008			
Moncef Krarti	2007			

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

CHICAGO MEETING

MOTIONS AND ACTION ITEMS

1. MOTION: "ASHRAE should continue to make available Simplified Energy Analysis Modified BIN Method as an electronic document" moved Barnaby/Sonderegger (11-0-0 CNV)

2. MOTION: "ASHRAE should continue to make available the Annotated Guide to Load Calculations as an electronic document" moved Barnaby/Kosny (12-0-0 CNV)

3. MOTION: No cost extension for 6 months for 1456-RP (Barnaby/Degelman 10-0-0 CNV, contractor not voting)

4. ACTION ITEM: Haves will follow up with Handbook committee on state of galley and galley reviews

5. MOTION: Approval of TC4.7's program plan (Degelman/Barnaby 10-0-0 CNV)

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TC/TG/TRG No. TC 4.7 DATE: January 27, 2009

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DATE OF MEETING: January 27, 2009 LOCATION: Chicago

TC/TG/TRG MEETING SCHEDULE

LOCATION – past 12 months	**DATE**	**LOCATION - planned next 12 months**	**DATE**
Salt Lake City	June 24, 2008	Louisville, KY	June 20-24, 2009
New York City	January 22, 2008	Orlando, FL	January 23-27, 2010

TC/TG/TRG SUBCOMMITTEES

Function	**Chair**
Simulation and Component Models	Iain MacDonald
Applications	Chip Barnaby
Data-Driven Modeling	

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	Taylor/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
Chicago January 2009	**Salt Lake City June 2008**	**New York Jan 2008**	**Long Beach June 2007**			V= Visitor VM = Voting CM = corres.
X	X	X		Abushakra	Bass	VM
X	X		X	Anderson	J.R.	V
		X		Arias	Diego	
X				Armstrong	Peter	
X		X		Balbach	Chris	
X	X	X		Baltazar	Juan-Carlos	V
X	X	X		Barnaby	Chip	VM
		X		Benitez	Jose	
X				Bourassa	Norm	CM
X		X	X	Carpenter	J Patrick	
X				Chaisuparasmikul	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	Culp	Charles	
X	X	X	X	Degelman	Larry	VM
		X		Eldrige	David	
X	X		X	Ellis	Peter	VM
X		X	X	Fisher	Dan	
X			X	Gardner	Carol	
			X	Graves		
			X	Gray		
X	X	X	X	Haberl	Jeff	CM
X				Haddad	Kamel	
X	X	X	X	Haves	Philip	VM
		X		Hensen	Jan	INT'L M
			X	Hittle	Doug	
X	X			Hong	Tianzhen	
X	X	X	X	Huang	Joe	CM
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	X	Lemort	Vincent	V
X	X	X	X	LeViseur	Susan	TAC Sec Head

Present at Meeting				Last name	First name	Membership
Chicago January 2009	**Salt Lake City June 2008**	**New York Jan 2008**	**Long Beach June 2007**			V= Visitor VM = Voting CM = corres.
X	X	X	X	Liesen	Richard	VM
		X	X	Lisenbee	Larry	
X				Logee	Terry	V
X	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
			X	Norford	Les	
X		X		O'NEILL	Zheng	
			X	Parekh	Anil	
X	X	X	X	Pedersen	Curt	CM
	X		X	Reddy	T. Agami	CM
		X		Rees	Simon	
X				Schaefer	Larry	V
X	X	X		Selkowitz	Steve	V
X				Smith	Vern	V
X				Sloat	Cara	V
X		X		Sonderegger	Robert	VM
X	X	X		Sommer	Klaus	INT'L M
X		X	X	Spitler	Jeffrey	
X				Stovall	Therese	V
		X	X	Subbarao	Kris	
		X		Szymurski	Steven	
		X		Tabanes	Paulo Cesar	
	X	X	X	Taylor	Russell	V
		X		Vukovic	Vladimir	
		X		Wang	Xudong	
X	X	X	X	Wetter	Michael	CM
X	X	X	X	Wray	Craig	
	X		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 24, 2008)

Active projects

#	Title	Joint TC	Cog SC/ Contractor	PMSC	Dates / status
1311-RP	Improving Load Calculations for Fenestration with Shading Devices	4.1 (cogni-zant TC), 4.5	Sim/Comp, University of Waterloo	Robert Hopper (chair/4.1); Ross McCluney (4.5); Chris Wilkins (4.1); Dru Crawley (4.7)	Contractor selected 6-2004 Start: 02-2005. Report to be submitted soon after Chicago.
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 (Jan 26, 2009)

Title	Society status	TC 4.7 Status	Authors or TC 4.7 Prime Contact	Subcom-mittee*
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				
RTAR-1404 Modeling, analysis, and reporting protocols for predicting annual energy performance from short-term building energy monitoring	RTAR approved Mar 2008	SC to complete WS and send to full committee for letter ballot. Feb 09	AReddy, LNorford, VSmith, BAbushakra	DDM

ASHRAE
Technical Committee 4.7 Energy Calculations
2009 Research Plan (Jan 26, 2009, continued)

Title	Society status	TC 4.7 Status	Authors or TC 4.7 Prime Contact	Subcom-mittee*
Draft co-sponsored WSs to be taken off of Research Plan				
WS-1468 Development of reference Building Information Model (BIM) for thermal model compliance testing (TC 1.5)	WS approved, out to bid Nov 08, contractor selection Chi-cago Jan 09	TC 4.7 not official co-sponsor (to be removed from Jun 09 Res Plan)	CBarnaby	A
RTARs under development in subcommittee				
Procedure to create hypothetical layer-by-layer fenestration descriptions when only the bulk properties such as U-factor and SHGC have been defined	None	YJHuang to modify RTAR and send to full committee for latter ballot Feb 09	YJHuang	A
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. Ponjapornpon, 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. Ponjapornpon, 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 January 2009

PRESENT:

Chicago, January 24-28, 2009

HVAC&R Research Seminar "Synthesis of Optimum HVAC System Configurations"
Organized by: HVAC&R Research (co-sponsor)
Chaired by: TBD
Status: Jonathan Wright to present 2 papers from RP1049, confirmed by R. Radermacher.

PLANNED:

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.

Orlando, January 23-27, 2010

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.

PAST:

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 January 2009

PRESENT:

Chicago, January 24-28, 2009

None

PLANNED (w/priorities):

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.

2) 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.

3) 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)

4) 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).

5) 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)

6) 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.

Orlando, January 23-27, 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 January 2009

PRESENT:

Chicago, January 24-28, 2009

"Limitation of Energy Simulations for NZEB"
Organized by: TC 4.7 (Simulation and Component Models)
Chaired by: Tim McDowell

PLANNED (w/priorities):

Louisville, June 20-24, 2009
None.

PAST:

Chicago/January 2006

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

ASHRAE TC 4.7 Energy Calculations
Tuesday, January 27, 2008, 6:00 PM to 9:00 PM
Chicago, Illinois

1. Roll call and introductions (Haves)

- The meeting convened at 6:15 PM.
- 10 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 Salt Lake City meeting (Haves) (Agenda: Attachment A)

3. Announcements/Liaisons (Haves)

- Section Liaison, Suzanne LeViseur, reminded the TC of CLIMA 2010 Healthy Buildings and the Website needs to be updated sooner
- Nominations are being accepted for the Highsmith Award
- There is a new provisional corresponding member category for TCs
- Peer reviews of the AEDGs are on-going
- Public comments on the Performance Management Protocol are due by Feb 6
- ASHRAE was asked to TC to review three Special Publications that TC4.7 is listed as the cognizant TC: Simplified Energy Analysis Method, Annotated Guide to Load Analysis, Energy Measurement

MOTION: "ASHRAE should continue to make available Simplified Energy Analysis Modified BIN Method as an electronic document" moved Barnaby/Sonderegger (11-0-0 CNV)

MOTION: "ASHRAE should continue to make available the Annotated Guide to Load Calculations as an electronic document" moved Barnaby/Kosny (12-0-0 CNV)

- Research Liaison, Hakim Elmahdy, noted that RTAR 1404 has been removed will need to be resubmitted by October 2009 and for RP-1197 copies of final report are needed.

4. Membership (Haves)

- Rolling off Barnaby, Leisen, Abushakra and Degelman
- Rolling on Haberl, Huang, Taylor and MacDonald

5. Subcommittee reports

Subcommittee meetings were done differently to assess how the TC should organize itself (**Attachment B**). Chairs will comment on the status of the subcommittees:

5.1 Applications Chip Barnaby (chair) reporting:

- A workstatement on BIM went out from TC1.5 without addressing the comments from TC4.7
- In Salt Lake City a project for a generic window property generator was discussed, but no progress since.

5.2 Data-Driven Modeling reported by Huang:

- No current projects, but an accepted RTAR about long term performance form short term measurements that has been turned into a workstatement.

5.3 Simulation & Component Models Ian MacDonald (chair) reporting:

- 15 topics for RTARs but no progress. One has migrated to TC4.4 and will likely co-sponsor.

5.4 Research, Joe Huang (chair) reporting (Attachment C)

- Status: 1311-RP - improving load calculations for fenestration with shading devices – final report is in and approved by TC4.1. Papers are submitted. Final delivered is the source code. A layer by layer window model implanted in the loads toolkit that can model windows, blinds, screens, etc. Shades are converted to an idealize layer – for optical and thermal exchange. Project is finished
- Status: 1416-RP – Development of Internal Surface Convection Correlations for Energy and Load Calculations (TC4.7/4.1) - experimental work to determine convection coefficients for different diffusers for walls and windows – contractor has facility set-up and balanced, good data is being collected, ahead of schedule, seminar should be possible soon, due to be completed summer 2010
- Status: 1456-RP - Assess and implement natural and hybrid ventilation models in whole-building energy simulation (TC4.10/4.7) – working for 9 months, literature search complete and models identify, models are running, 13 experimental data sets, models run against data, much work done in improving models, but not as much in the coupling of the airflow with the whole building models.

  MOTION: No cost extension for 6 months for 1456-RP (Barnaby/Degelman 10-0-0 CNV, contractor not voting)

- Workstatement 1404: "Measurement, Modeling, Analysis and reporting Protocols for Short-term M&V of Whole Building Energy Performance" Goal of project is determine with short-term data, what level of uncertainty in the predictions of the energy savings. Minor editorial changes were suggested in the subcommittee meeting. Need qualified bidders for cover sheet.

  MOTION: Approval of Workstatment 1404 with minor editorial changes and increase in cost to $200,000 (Sonderegger, Kosny 11 – 0 – 0 CNV)

- Research strategic plan: New strategic plan with fewer and more specific goals. The current TC structure is good for specific research but not strategic research. RAC has developed a new strategic plan with 11 goals with a specific champion and list of cognizant TCs. The goal champions with contact the list of TCs and work with them to flush out the projects to meet the strategic goals. Large projects from strategic goals and smaller projects from TC projects. Should be on the web shortly..
- Jeff Spitler – goal champion – comments were general – section 4 was already working well together. Execution, next four months – an ad hoc committee will meet to determine the activities to meet these goals and discuss the barriers to these goals. The goals will be formed into the strategic plan in June.

5.5 Handbook, chair not in attendance,

- Has TC 4.7's chapter has been sent/received by ASHRAE? Chair should have delivered it, but that one would need to contact the Liaison (Hittle) to see where this was? Chapter was approved in SLC.

  ACTION ITEM: Haves will follow up with Handbook committee on state of galley and galley reviews

5.6 Program, Michael Wetter (chair) reporting (Attachment D)

- Changes in the way that ASHRAE organizes the meetings in themes and tracks. The themes are set by the president 2-years out. Tracks in Louisville in energy and large building systems (HVAC and sustainability). Orlando tracks based on market surveys – already on the web. Looking for a coherent meeting experience.

  MOTION: Approval of TC4.7's program plan (Degelman/Barnaby 10-0-0 CNV)

5.7 Standards, Ron Judkoff reporting (Attachment E)

- SSPC 140 SMOT for Eval Building Energy Analysis Computer Programs
  - Standard 140 is being sighted and referenced more and more. IRS Notice 2008-40 for the commercial building tax credit now references 140-2007, one currently qualified and more have submitted. Addendum A was published 10/21/08 – on documenting modeler's notes and exceptions. First errata

discovered and corrected. HERS BESTEST is being added to the standard hopefully voted by the SSPC in the Feb/March timeframe. Adding an informative annex discussing setting a possible acceptance criteria. Getting example results. SSPC has identified a critical need to update example results to ASHRAE and DOE.

- IEA 34/43 – is officially over and there are a number of test suites that now are awaiting inclusion into the standard – ground coupling, multi-zone, window, hydronic systems, multi-zone air movement.
- New BESTEST for residential and calibration methods.

5.8 Web Site, chair not present

- New webmaster is Kris Kenney, NAESCO.
- The site has been updated in the last couple of days. Email comments to the chair with comments/improvements.

6. Reports on related activities (Various persons)

- GPC 20 (Barnaby), XML definitions – the document is organized and a draft should be out soon. Most of this work will be done on-line.
- TC 2.8 no report.
- TC 4.1 (Barnaby) some joint program ideas, Registered title and scope for a standard for measuring the power consumption of equipment in all modes.
- TC 4.2 (Degelman) new handbook will have 5563 cities. An abridged copy of ~40 in print, rest on CD, voted to eliminate the old bin data. The new WDviewer will bin the new data. New clear sky model. Issued workstatement on filling in missing gaps in data.
- TC 4.5 RTAR on more complex shading systems coefficients, new radiant spectrum which may change window properties.
- TC 6.5 (Sommer) workstatement on radiant model with 5 bidders.
- TC 7.5 (Reddy) first meeting combined with 7.4, 3 ongoing projects – short term curtailment of HVAC in buildings.
- TC 7.6 (Abushakra) considering name change.
- TC 10.10 energy calculation with refrigeration is going to be more required in the future. No current group.
- IAI (Haves) now Building Smart – Chris Wilkins official ASHRAE liaison, move into implementation rather than just structure
- IBPSA USA (Haves) had a successful conference in 2008, papers are posted on the IBPSA-USA website, plans are starting for a conference in NYC in 2010, approached ASHRAE concerning certifying energy modelers
- IBPSA Canada (McDonald) eSim 2008 papers are available on website.
- IBPSA World (Barnaby) Building Simulation 2009 in Glasgow in July/August, Journal of Building Performance Simulation.

7. Old Business

(none)

8. Committee Structure

- Haves reported on trying things on an experimental basis to see if the current structure could be made to better support the things TC 4.7 needs to do like RTARs, and program. There was an extensive discussion on Monday. Four areas were developed, which did map to the previous subcommittees. Several of these topics were fleshed out into longer pages. This structure is pointing towards research/program structure.
- Gardner expressed concern about how can TC 4.7 better get applications of energy models into the hands of designers.
- Wright, TC 7.5 has been doing this same thing, the results of the subcommittees goes to the research committee, who then summarizes this. Seems like both need a research committee. The positive side is that using subcommittees allows for focus, but can be too narrow. He supports the idea of a research committee.

- Wray, this discussion came up at the CEC. The number of subcommittees has exploded. What has been tried is by TC 7.12 is to try to get a discussion going on one topic…getting the work done between meetings…leaving the discussions for the meetings…
- Gardner expressed concern that there was still a need for application that should not get swept away in a research committee.
- Haves suggested that one possible structure would be a "planning" meeting…perhaps on Sunday morning…then the Mon 6 to 9 would be the 3 subcommittees in parallel to advance RTARs from the planning session or brought forward by TC 4.7 members…this would allow the TC to cancel the meeting on Tues 3:30 to 5:00 PM…
- Carol mentioned that the people that come to ASHRAE want to see the program on Sunday AM.
- Question, is brainstorming every meeting the right way to go?
- Comments, we've tried brainstorming and then working on the list for 6 months without success.
- Liesen said he was torn between this RTAR and that RTAR.
- Sonderegger said that the natural organization seemed to organize quickly around the different RTARs. Several produced a strawman for an RTAR.
- Huang said that he liked the idea but wanted to clarify that brainstorming should just incorporate simulation, not reformatting TC 4.7. This is where new ideas come up. Currently, the sessions are too short, nothing can get done.
- MacDonald said that the organization needed to also have an organization package to digest then come to the meeting.
- Haves then added that there would need to be more organization between the chairs to get this to work.
- Haves encouraged the committee to email their comments to him about the proposal. He is looking for specific ideas about how to move this forward. There will be a TC 4.7 Ex Com meeting to discuss this in the next few weeks, and we will then forward to the main committee for discussion for the next meeting to get slots, names, etc.

9. New Business

(none)

10. Executive Session

(none)

Attachments

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

Agenda
ASHRAE TC 4.7 Energy Calculations

Tuesday, January 27, 2009, 6:00-8:30 p.m.
Wabash Room, Palmer House Hotel
Chicago

1. Roll call and introductions	McDowell
2. Accept agenda & approve minutes of New York meeting	Haves
3. Announcements/Liaisons	Haves
4. Membership	Haves
5. Subcommittee reports	
5.1 Applications	Barnaby
5.2 Data-Driven Modeling	(Huang)
5.3 Simulation & Component Models	MacDonald
5.4 Research	Huang
• *Status:* 1311-RP Improving Load Calculations for Fenestration with Shading Devices (TC 4.1/4.5/4.7; Univ. of Waterloo)	
• *Status:* 1416-RP Development of Internal Surface Convection Correlations for Energy and Load Calculations (TC 4.1/4.7 Univ. of Texas at Austin)	
• *Status:* 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	
5.5 Handbook	Taylor
5.6 Program	Wetter
5.7 Standards	Neymark
• SSPC 140 SMOT for Eval Bldg Energy Analysis Computer Programs	
• IEA Annex 34/43 Test and Validation of Bldg Energy Sim Tools	
5.8 Web Site	
6. Related activities reports	
GPC 20 XML Definitions for HVAC&R	Barnaby
TC 2.8 Building Environmental Impacts and Sustainability	Crawley
TC 4.1 Load Calculation Data and Procedures	
TC 4.2 Climate Information	Barnaby
TC 4.5 Fenestration	---
TC 6.5 Radiant Heating and Cooling	Wetter
TC 7.5 Smart Building Systems (now includes TC 7.4)	
TC 7.6 Systems Energy Utilization	Abushakra
IAI International Alliance for Interoperability	---
IBPSA: USA, SimBuild 2008; Canada, eSim 2006; IBPSA, BS 2009	Haberl, Hensen
7. Old Business	
8. Committee Structure	
9. New business	
10. Adjourn	

Attachment B

ASHRAE TC 4.7 Energy Calculations
Subcommittee
Monday, January 26, 2009, 6-9 pm
Chicago, Illinois

Attendance: Tim McDowell, Iain MacDonald, Michael Wetter, Jan Kosny, Brno Cochran, Juan-Carlos Baltazar, Bass Abushakra, Kendra Tupper, Aleka Pappas, Dennis Jones, Jonathan Wright, Agami Reddy, Moncef Krarti, Therese Stovall, David Claridge, Robert Sonderegger, Chip Barnaby, Soolyeon Cho, Brian Coffey, Rupam Singla, Joe Huang, Chris Laughman, Chris Balbach, David Jump, Ron Judkoff, Fitsum Tariku, Larry Degelman, Philip Haves, W. Stuart Dols, Dan Fisher, Tom Webster, Fred Bauman, Jaya Mukhopadkyay, Jin Wen, Joel Neymark, Kamel Haddad, Richard Liesen

Brainstorming:

- Wetter summarized the ideas presented in the forum earlier in the day: Calibration to measured data, Inputs with random variations, Integrated tools, Real-time weather, Better GUIs, Better equipment input, Interior moisture transport, Shorter timesteps
- Possible session on calibration of the simulation models to measured data. Calibration has been a bigger topic for LEED modeling and retrofitting existing buildings is coming especially for lower income homes. Calibration using whole building simulation programs may be too complex. Simpler models may need to be used.
- Modeling real situations – leaky ducts, valves, out-of-control control systems. Is this really an energy model problem or a dynamic simulation issue? Modeling faults will not tell you that a fault is occurring. Only the difference from the perfect model will show the problem.
- Modeling of residential retrofit projects with a simple energy simulation. Can the process be automated for many of the common retrofits? A large number of residential load types could be easily aggregated to determine if individual homes are out-liers in the data set. Utilities are interested in the data. TC 7.5 could be interested in this topic. Maybe detailed models are needed, but simply a standard model that demonstrated what type of retrofits would be best for a specific home. Simulations can show the how different retrofit measures can interact.
- Manufacturer's data is not available for the off design performance. The data available is marketing data and may not represent actual performance of the equipment. The data is not available to optimize the systems.
- With the AMI coming with the utilities, soon hourly whole meter data will be available. In the future this data can be better used to determine the performance of specific load shapes of the homes and communities.

BIG TOPICS

Large scale determination of retrofit opportunities – utility, simulation, new models

- Short term
    - Need to specify how to use large data sets
    - Need to specify expected output
    - Link method to what data is obtainable
    - Link to other databases
- Interval Data
    - Need to identify what can be determined
    - Need to specify each step
    - Use google with image recognition

Validation issues – backlog of topics

- Updating existing example results
- Using new ORNL house for empirical validation
  - Building Physics
  - Calibration methods

Field project to identify input parameters

- Operating power draw of equipment (SMOT)
- Occupancy and occupant behavior
- Energy conversion equipment parameters

Variation in output from different users solving the same problem

- Quantify the variability in simulation results from different modelers
- Identify the causes of the variability
- Identify ways of addressing the causes
- Certification of modelers

ASHRAE TC 4.7 Energy Calculations
Subcommittee
Tuesday, January 27, 2009, 3:30-5 pm
Chicago, Illinois

Attendance: Tim McDowell, Jeff Haberl, Chris Balbach, Chip Barnaby, Klaus Sommer, Aleka Pappas, Anna Hueffed, Yiqun Pan, Larry Degelman, Soolyeon Cho, Liang Zhou, Iain MacDonald, Philip Haves, Jan Kosny, Michael Wetter

- PH reviewed the progress from Mon PM: Procedures for data mining using monthly bills to find candidates for weatherization, Procedures for analyzing interval data, Improvements to SPC 140, Improvements to obtaining data for simulations: plug loads, occupancy and occupancy behavior, characteristics in HVAC equipment, Variability in simulation results using different programs and/or different users. How to reduce the variability.
- PH then moved the discussion toward how the subcommittee organizes their time to get more done with the person(s) that attend the subcommittee meetings.
- LH suggested that it might be a more efficient use of people's time to partition by title. He's concerned that there is so much overlap in interest that many folks attend all 3 meetings.
- CB suggested moving program to its own session, and thought that reviewing RTARs over and over was not productive.
- CB thought that the best way to get RTARs written was to start the idea at the subcommittee meeting, then have someone go off and write the RTAR, then bring it back to the subcommittee for discussion.
- PH suggested pairing new, young members with older members on the committee.
- KS supported the idea that there was a need for a strong subcommittee chair that organizes the session, and then gets the attendees to get the work done and come back to the meeting.
- CB thought that (2) RTARs per meeting might be a goal for each meeting.
- TM reminded the committee that they should not short-change the discussions about Program.
- JHa suggested to the committee that research/program be one meeting with program chair taking responsibility for gathering the info and processing it.
- LD asked if the committee needed to be split into several committees. An example was that lots and lots of program get proposed but never accepted by ASHRAE.
- PH reviewed the 4 topics that were discussed on Mon to see how they matched the previous subcommittees. The input data matched S&CM, the Standard 140 matched applications, the data mining matched the data driven. So the parallel idea actually did cover the 3 subcommittees.

- PH emphasized the need for the generation of new ideas, with everybody together, then break into working groups, then reconvene.
- PH suggested a "planning" perhaps with "program" subcommittee meeting on Sunday.
- JHu was not in favor of a special meeting for program, and again reviewed the need for concurrent meetings. Brainstorming in the beginning, then RTAR writing, then recap with program, summarize.
- PH suggested having program at the end of the Tues meeting.
- CB reviewed the current Sun AM meetings and noted that there already were meetings on Sun AM of a technical nature.
- TM reminded the committee that it might be unreasonable for the committee to require members to come for 3 hours on Mon and 3.5 hours on Tues…For some members, this would be in addition to the 4+ hours they are attending for Standard 140.
- Discussion then went on to WS #1404. The subcommittee read the current version of #1404, and then discussed it.

Attachment C (repeated from New York City)

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 (prioitized)				
Assessment of the potential for application of moisture absorption/desorption models in whole bldg energy simul- ations 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 – Voted by TC
ASHRAE Meeting
01/27/09

Chicago, January 24-28, 2009 * Deadlines: Manuscripts 4/4/08; Package 8/8/08. Theme: Sustainable Urban Design**

HVAC&R Research Seminar "Evolutionary Synthesis of HVAC System Configurations: Experimental Results"
Organized by: HVAC&R Research (co-sponsor)
Chair: Radermacher.

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

Forum "Limitation of Energy Simulation for NZEB"
Organized by: TC 4.7 (Simulation and Component Models)
Chair: Tim McDowell

Louisville, June 20-24, 2009 * Deadlines: Manuscripts 9/26/08; Package 02/06/09**

Theme: Optimal Air Quality Management
Tracks: Applications *** Business Management *** Fundamentals *** Indoor Air Quality *** Operational Topics *** Refrigeration *** Sustainability/LEED *** Systems and Equipment

Transaction "Improving Load Calculations for Fenestrations with Shading Devices" [3 more papers in review from RP-1311.]
Organized by: TC 4.1 (lead)/4.5/4.7
Chair: Glenn Friedman
Status: Moved from NYC.

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.

2) 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.

3) 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)

4) 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).

5) 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)

6) 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.

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 *** 6/10/2009 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

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.

---------- 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).

Attachment E

SSPC 140 Chicago Meeting Summary – 1/26/09 (submitted 1/27/09)

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

From Chair Announcements

Chair Announcements/Communications since last meeting *[Judkoff]*

- IRS notice 2008-40, published Apr 7, 2008, updates the previous **IRS requirements** relating to the deduction for energy efficient commercial buildings by changing testing requirements for software developers from Standard 140-2004 to Standard 140-2007. Currently 1 program (EnergyPlus) has satisfied the new requirements. 10 programs had satisfied the previous requirement (issued June 2006) to submit test results for Standard 140-2004.
- ANSI/ASHRAE Standard **140-2007 Addendum A (Data Format) was published/posted** by ASHRAE October 21, 2008. The addendum includes updates to modeling notes and related examples for alternative modeling methods, anomalous results, and software/platform requirements – to be consistent with materials for posting Std 140 results on DOE web site.
- In June, Autodesk Green Building Studio (Omari Fuller) identified a problem with the informative (non-mandatory) material accompanying DOE-2.1E files for the Standard 140-2007 **Furnace BESTEST** cases, which were developed by NRCan. In consultation with NREL, NRCan (Kamel Haddad) updated the DOE-2 input files (and subsequent results) for the furnace cases to be consistent with the normative requirements. An **errata** document and accompanying files for this was submitted to ASHRAE by NREL, and is **posted** at http://www.ashrae.org/technology/page/120.

ADAPTATION OF HERS BESTEST FOR STANDARD 140 (140-2007 ADDENDUM B)

DOE's Builder Challenge Program desires that software certifications they use (e.g., HERS BESTEST) be under the umbrella of Std 140, which raised the prioritization for 140-adaptation of HERS BESTEST. SSPC 140 is developing 140-2007 Addendum B. The work is being done by Philip Fairey/FSEC; with guidance/reviews provided by Neymark. Objective is to have an addendum ready for **a PC internal publication/public review approval vote as soon as possible (current plan is for Feb/Mar 2009).** Timing also coincides well with Obama administration and/or Congressional proposals to improve building energy efficiency. The addendum will propose 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; example applications of such tools are for residential energy code compliance using performance-based compliance paths, and for home energy rating applications.

In March 2008, SSPC 140 letter-ballot approved including in an *informative* (non-mandatory) annex example procedures for developing acceptance range criteria for proposed new Section 7 test cases (HERS BESTEST). These are the example acceptance range criteria that were published in HERS BESTEST, and as written are only directly applicable to the proposed new test cases.

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.

Other

Knebel asked for SSPC 140 opinion regarding the following topics that the general membership wants ASHRAE to do (140 recommendation in parenthesis)

- Develop a load calculation program: (NO)
- Develop a building energy analysis computer program: (NO)
- Develop a method for certifying tools for 90.1: (As 90.1 already cites 140 for performance path analysis [model to be tested with 140 and results made available], we didn't understand the statement, e.g., do they mean certifying for ability to model 90.1's prescriptive criteria? or other?)

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: "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."

Action Item (All): Send justifications for need to update example results to Judkoff/Neymark

The following justification response was provided by Haberl: "Such work is important because it improves the accuracy of the building energy simulation programs that are used to identify and analyze energy efficiency retrofits."

UPDATE FOR IEA TASK/ANNEX 34/43

This IEA research effort focuses on validation and testing of building simulation tools. The Task finished December 2007, with **all but one final report approved (approval for that report expected soon)**. Some of this work could be included with Standard 140 in the future.

There were **actively contributing participants** from **32 organizations** in **13 countries. 24 computer programs/models were tested** by the participants. **So far among all projects, the work has identified 106 results disagreements that have led to 80 software or modeling fixes, as a result of the field trials**.

The following projects are included:

- Comparative Tests (Software-to-software comparisons)
  - Ground coupled heat transfer related to floor slabs (NREL, US)
  - 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.**
  - Multi-zone envelope test cases (NREL, US) 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.
  - Airflow test cases including single- and multi-zone (INCT, Japan)
- Empirical Validation Tests (Compare software to empirical data)
  - Daylighting/shading/load interaction – EMPA (Switz.); ERS (Iowa)
  - Double-Skin Façade (DSF) – Aalborg University, Denmark
  - Mechanical equipment test cases - Dresden University of Technology (Germany):
    - Focusing on water-side components/systems: chillers, boilers, pumps, piping, valves, etc
    - Includes empirical validation and comparative test cases.

WE'RE PREPARING PAPERS FOR AN INVITED SESSION ON THE TASK'S WORK AT IBPSA GLASGOW.

BESTEST-EX

This is a **new comparative test suite (in early development stage) 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). Judkoff initially presented this at the Affordable Comfort (ACI) conference in April 2008:

- Generate base case synthetic utility bill and other data with best state of the art simulation programs (e.g., E+, DOE2, SUNREL, TRNSYS, HOT-3000/ESP-r)
- Provide input and output data that various retrofit software uses (and can "reasonably" obtain)
- Introduce noise into input data (committee of software producers to determine what is "reasonable" noise) (include occupant effects)
- Generate energy savings with state of the art simulation programs
- Tests retrofit software and true-up techniques against base case energy and savings projections

END