

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 person listed below within 60 days following the meeting.)

TC/TG/TRG No. TC 4.7 DATE: May 23, 2002

TC/TG/TRG TITLE: Energy Calculations

DATE OF MEETING: January 15, 2002 LOCATION: Atlantic City

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS & ADDIT'L ATTENDANCE
Jeff Spittler (CHM)	2000	Rick Strand	2001	
Dru Crawley (VC)	2000	Jan Hensen (INTL)	2000	
Les Norford (SECY)	2000	Carol Gardner	1998	
Chip Barnaby (RES)	1999	Gren Yuill	2000	
Ian Beausoleil-Morrison	2000			
Klaus Sommer (INTL)	1999			
Joel Neymark	2000			
Moncef Krarti	1999			
Phil Haves	2000			
Agami Reddy	1999			
Vern Smith	2000			
Jim Willson	2000			
Craig Wray	2000			

DISTRIBUTION

ALL MEMBERS OF THE TC/TG/TRG

TAC CHAIR

K. William Dean

TAC SECTION HEAD

Eckhard Achim Groll

SPECIAL PUBLICATIONS LIAISON

Joseph Driscoll

JOURNAL/INSIGHTS LIAISON

Harvey Sachs

STANDARDS LIAISON

David Knebel

HANDBOOK LIAISON

David Claridge

PROGRAM LIAISON

Emil Friberg

RAC RESEARCH LIAISON

Sheila Hayter

TEGA LIAISON

William Knight

STAFF LIAISON (RESEARCH)

William Seaton

STAFF LIAISON (TECH SERVICES)

Martin Weiland

STAFF LIAISON (STANDARDS)

Claire Ramspeck

**ASHRAE TC 4.7 Energy Calculations
ATLANTIC CITY MEETING
ACTION ITEMS**

Agenda for Atlantic City and minutes from Cincinnati approved by voice vote.

No-cost extension to August 31, 2002 for 865-RP. Approved 11-0-1, chair not voting.

Unsolicited research proposal 1148-URP. Rejected 11-0-1, chair not voting.

Program plan For Honolulu approved by voice vote.

Dissemination of results of RP-1052 via appropriate means; Spitler and Neymark to consider a request for a special-publication CD or posting the results on a web site. Approved 11-0-1, chair not voting.

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TC/TG/TRG MEETING SCHEDULE			
LOCATION - past 12 months	DATE	LOCATION - planned next 12 months	DATE
Cincinnati	June 26, 2001	Honolulu	June 25, 2002
Atlantic City	January 15, 2002	Chicago	January 28, 2003

TC/TG/TRG SUBCOMMITTEES			
Function	Chair		
Simulation and Component Models	Dan Fisher		
Applications	Jim Willson		
Inverse Methods	Jeff Haberl		

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		Strand/Claridge

STANDARDS ACTIVITIES - List and Describe Subjects
SPC 140P Standard Method of Test for Building Energy Software - Ron Judkoff

TECHNICAL PAPERS from Sponsored Research - Title, when presented (past 3 yrs. present & planned)
none

TC/TC/TRG Sponsored Symposia - Title, when presented (past 3 yrs. present & planned)
Appendix 3
TC/TG/TRG Sponsored Seminars - Title, when presented (past 3 yrs. present & planned)
Appendix 4
TC/TG/TRG Sponsored Forums - Title, when presented (past 3 yrs. present & planned)
Characterizing the Performance of Central Plants for Multi-Building Campuses, Chicago (1/99)
JOURNAL PUBLICATIONS - Title, when published (past 3 yrs. present & planned)
none

Additional Attendance

This 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. Email addresses are listed for those who have explicitly authorized their inclusion in the minutes, which are posted on the TC's web site.

Present at TC 4.7 Meeting?					Last Name	First Name	Email
Agree to email on list	Atlantic City Jan 2002	Cincinnati June 2001	Atlanta Jan 2001	Minneapolis June 2000			
		X	X	X	Anderson	J R	jrhazel@bellsouth.net
X	X				Armstrong	Peter	parmstr@mit.edu
X	X			X	Bahnfleth	Bill	wbahnfleth@psu.edu
X	X	X	X	X	Barnaby	Chip	CBarnaby@wrightsoft.com
X	X	X	X	X	Beausoleil-Morrison	Ian	IBeausol@nrca.gc.ca
X	X		X	X	Black	Al	ablack@mcclureeng.com
				X	Blake	Jeff	
				X	Bowman	Jim	
X	X		X	X	Brandemuehl	Mike	
			X		Brau	Jean	
			X	X	Buhl	Fred	
X	X			X	Carpenter	J Patrick	pcarpenter@tklp.com
X	X				Chantrasrisalai	Chanvit	chanvit@okstate.edu
X	X	X	X		Claridge	David	Claridge@esl.tamu.edu
X	X	X	X	X	Crawley	Dru	Drury.Crawley@ee.doe.gov
		X			Dougherty	Brian	
				X	Degelman	Larry	
			X		Del Porte	Scott	
X	X				Deng	Zheng	zhengd@okstate.edu
				X	Dewitte	Jorre	
		X			Domanski	Piotr	
		X			Dubrous	Francois	
			X	X	Eldridge	David	
X	X	X		X	Fisher	Dan	DFisher@okstate.edu
X	X				Fleming	Bill	flemg@aol.com
			X		Garde	Francois	
					Gardner	Carol	
			X	X	Gu	Lixing	

Present at TC 4.7 Meeting?					Last Name	First Name	Email
Agree to email on list	Atlantic City Jan 2002	Cincinnati June 2001	Atlanta Jan 2001	Minneapolis June 2000			
X	X	X	X	X	Haberl	Jeff	JHaberl@esl.tamu.edu
X	X		X	X	Haddad	Kamel	khaddad@nrca.gc.ca
					Hanby	Victor	
X	X	X	X	X	Haves	Philip	PHaves@lbl.gov
				X	Henderson	Hugh	
		X	X		Hensen	Jan	JaHe@fago.bwk.tue.nl
			X		Howell	Jamie	
X	X			X	Huang	Joe	YJHuang@lbl.gov
			X		Hydeman	Mark	
X	X				Iu	Ipseng	iip@okstate.edu
X	X				Jin	Hui	jinh@okstate.edu
				X	Kelso	Richard	
			X		Kimura	Ken-ichi	
		X	X		Klaassen	Curtis	
		X			Klein	Sandy	
		X	X		Knappmiller	Kevin	
X	X				Kong	Weixiu	weixiu@okstate.edu
	X	X	X	X	Kosny	Jan	kyo@ornl.gov
				X	Kossecka	Elisabeth	
X	X			X	Krarti	Moncef	krarti@colorado.edu
			X		Kreider	Jan	
				X	Leber	Jon	
			X		Liesen	Richard	
		X			Logee	Terry	
			X		Lotfi	Nemat	
X	X	X	X	X	McDowell	Tim	Mcdowell@tess-inc.com
				X	Morner	Svein	
		X	X		Mottillo	Maria	
X	X	X	X	X	Neymark	Joel	neymarkj@msn.com
		X			Nichols	Laurier	
X	X	X	X	X	Norford	Les	lnorford@mit.edu
		X			Nguyen	Phuong	
X	X				Parson	Jim	parsons@me.msstate.edu
X	X	X	X	X	Pedersen	Curt	cpederse@uiuc.edu
				X	Purdy	Julia	
X	X	X	X	X	Reddy	T. Agami	reddyta@drexel.edu

Present at TC 4.7 Meeting?					Last Name	First Name	Email
Agree to email on list	Atlantic City Jan 2002	Cincinnati June 2001	Atlanta Jan 2001	Minneapolis June 2000			
X	X	X	X	X	Rees	Simon	SJRees@okstate.edu
X	X				Riemer	Paul	paulr@twgi.com
			X		Scharpf	Dan	
		X			Schwarz	Walter	
X	X	X	X	X	Smith	Vernon	VSmith@archenergy.com
X	X	X	X	X	Sommer	Klaus	Klaus.Sommer@vt.fh-koeln.de
X	X		X	X	Sonderegger	Robert	rsonder@siliconenergy.com
				X	Sowell	Ed	
X	X	X	X	X	Spitler	Jeffrey	Spitler@okstate.edu
		X	X	X	Strand	Rick	R-Strand@uiuc.edu
X	X	X	X	X	Walton	George	GWalton@nist.gov
X	X				Wassmer	Mike	wassmer@colorado.edu
	X	X	X	X	Willson	Jim	jimwill@indy.net
			X		Winkelmann	Fred	FCWinkelmann@lbl.gov
		X	X		Witte	Mike	MJWitte@gard.com
X	X	X	X	X	Wray	Craig	CPWray@lbl.gov
		X	X		Wright	Jonathan	J.A.Wright@lboro.ac.uk
				X	Wyndham-Wheeler	Paul	
X	X				Xiao	Dongyi	xdongyi@okstate.edu
		X			Yuill	Gren	yuill@unomaha.edu
		X			Zhang	Weiming	wz@gkceme.com
X	X				Zhang	Yi	y.zhang@lboro.ac.uk

Appendix 1**RESEARCH PROJECTS****TC 4.7 Research Projects Status****Active projects**

#	Title	Joint TC	Cognizant Subcommittee/ Contractor	PMSC	Dates / status
865-RP	Accuracy Tests for Mechanical System Simulation		Sim/Comp Penn/TAMU Gren Yuill	George Walton (chair), Ron Judkoff, Robert Sonderegger, Dave Knebel	Rec: 2-20-96 (San Antonio) NCE: 2-28-98 (7-1-97) NCE: 8-31-98 (1-20-98) NCE: 3-31-99 (6-23-98) NCE: 3-31-00 (1-27-99) NCE: 3-31-01 (2-8-00) NCE: 8-31-01 (1-30-01) NCE: 3-31-02 (6-26-01)
1049-RP	Building System Synthesis and Design	1.5	Sim/Comp Loughborough University Jonathan Wright	Curt Pedersen (chair), Ed Sowell, Dave Knebel, Ron Nelson (TC 1.5), Mike Brandemuehl (TC 4.6), Jan Hensen	WS: 1-20-98 (SF) Rec: 6-22-99 (Seattle) End: 8-02?
1050-RP	Development of a Toolkit for Calculating Linear, Change-point Linear, and Multiple Linear Inverse Building Energy Analysis Models		Inv U. of Dayton Kelly Kissock	Jan Krieder (chair), Robert Sonderegger, Moncef Krarti, Agami Reddy	WS: 7-1-98 (Boston) Rec: 6-23-98 (Toronto) NCE: 3-31-01 (6-27-00) NCE: 10-1-01 (1-30-00)
1197-RP	Updated Energy Calculation Models for Residential HVAC Equipment	7.6	Sim/Comp U Colorado Michael Brandemuehl	Chip Barnaby (chair), Craig Wray, Brian Dougherty (TC 7.6)	WS: 2-8-00 (Dallas) Start: 1-02
1222-RP	Incorporation of Nodal Room Heat Transfer Models into Energy and Load Calculation Procedures		Sim/Comp MIT, Yan Chen	George Walton (chair), Ian Beausoleil- Morrison, Kevin Knappmiller, Phil Haves	WS: 6-00 (Minn) Start: 8-01

Appendix 2**RESEARCH PLAN**

**Technical Committee 4.7 Energy Calculations
2002-2003 Research Plan
August 1, 2001**

TC Priority 2002-2003	Prior TC priority	Society status	TC Status	Title	Subcommittee
0	3 (1998-1999)	No RTAR revised WS to be submitted 9/2001	Revised WS approved 6/2001	Procedures for Reconciling Computer-Calculated Results With Measured Energy Data (1051-WS)	Inverse Methods
0	2 (2001-2002)	RTAR, non-prioritized	WS vote expected 1/2002	Development of Comparative Test Cases for Evaluating Simulation Models of Slab, Crawl Space and Basement Heat Transfer Through Adjacent Ground	Simulation and Component Models
0	3 (2001-2002)	RTAR, non-prioritized		Inverse Bin Procedures for Analyzing Energy Savings	Inverse Methods
1		(new)	Draft WS	Procedures and Data for High-Performance Residential Design	Applications
2		(new)	Draft WS	Development of a Procedure for Base-lining Energy Use at Large Central Plants	Inverse Methods

Appendix 3

TC/TG/TRG SPONSORED SYMPOSIA

PLANNED:

Kansas City – June 2003

Interoperability and Tool Portability (Chair: Chip Barnaby)

Integrating Airflow Modeling into Energy Analysis Programs (Chair: Ian Beausoleil-Morrison)

Chicago – January 2003

Recent Advances in Building Energy Simulation (Co-sponsored by TC4.1/Chair: Jan Hensen)

Inverse Methods for Calculating Savings from Energy Conservation Retrofits (Chair: Jan Kreider)

Honolulu – June 2002

Recent Advances in the Thermal Simulation of HVAC Equipment (Co-sponsored by TC4.1/Chair: Ian Beausoleil-Morrison)

PRESENT:

Atlantic City – January 2002

Tools and Techniques for Calibration of Component Models (TC1.5 sponsor; TC4.7 co-sponsor//Chair: Agami Reddy)

PAST:

Cincinnati – June 2001

Better Inputs for Better Outputs (TC9.6 co-sponsor/Chair: Jim Willson)

Atlanta – January 2001

Analysis Tools for the Design of Low-Energy Cooling Systems (Chair: Joe Huang)

Minneapolis – June 2000

International Experience with Weather Data for Simulation and Design, Part 1: Simulation, Ventilation and Daylighting (TC 4.2 co-sponsor/Chair: Dru Crawley)

International Experience with Weather Data for Simulation and Design, Part 2: Simulation (TC 4.2 co-sponsor/Chair: Dru Crawley)

Seattle - June 1999

Cover sheets *TC 4.7 Minutes, Atlantic City* *15 January 2002*
Applications of Heat and Mass Balance Methods to Energy and Thermal Load Calculations (Chair: Chip Barnaby)

Accuracy tests for simulation models (Chair: Mike Witte)

Chicago - January 1999

Application of Heat Balance Methods to Energy and Thermal Load Calculation (Chair: Chip Barnaby)

Appendix 4

TC/TG/TRG SPONSORED SEMINARS

PLANNED:

Kansas City, June 2003

Inverse Methods in Support of Building Commissioning (Chair: Jean Lebrun)

Chicago, January 2003

Automated Baseline Procedures Using Inverse Methods (Chair: Jeff Haberl)

Defining What Inverse Methods Mean to You (Chair: Agami Reddy)

Honolulu, June 2002

Getting started in Building Simulation (Chair: Chip Barnaby)

PRESENT:

Atlantic City, June 2001

Commercial Use of Building Energy Simulation Software (Chair: Kamel Haddad)

PAST:

Cincinnati, June 2001

A Review of State of the Art in Building Simulation Programs (Chair: Dru Crawley)

Atlanta, January 2001

Low-Energy Cooling Case Studies (Chair: Phil Haves)

Dallas - January 2000

ASHRAE's Software Toolkits for Energy Calculations (Chair: Dru Crawley)

Chicago - January 1999

Simulation Tool Interoperability and Component Model Portability (Chair: Phil Haves)

ASHRAE TC 4.7 Energy Calculations
Tuesday, January 15, 2002, 6:00-8:30 p.m.
Rm. 420, ACCC

1. Roll call and introductions. Chairman Jeff Spitler called the meeting to order at 6:00 p.m. Voting members in attendance were Jeff Spitler, Dru Crawley, Les Norford, Chip Barnaby, Ian Beausoleil-Morison, Joel Neymark, Klaus Sommer, Phil Haves, Moncef Krarti, Agami Reddy, Vern Smith, Jim Willson, and Craig Wray. All present introduced themselves.

2. Accept agenda & approve minutes of Cincinnati meeting. The agenda for this meeting is shown in Attachment A. Barnaby moved (Wray second) to accept the agenda for this meeting. The motion passed by voice vote. Barnaby moved (Willson second) to approve the minutes for the Cincinnati meeting. The motion passed by voice vote.

3. Announcements. Attachment A included announcements of two upcoming conferences, the Sixth International Conference on System Simulation in Buildings (SSB2002), and Building Simulation 2003. Building Energy Simulation 2002 will be held in Montreal in September 2002; more information is available via www.esim.ca. ASHRAE's policy on commercialism has been softened on a trial basis and permits authors to name software if doing so provides clarification.

4. Membership. Spitler announced that after the Honolulu meeting Crawley will take over as chair, Norford as vice-chair, Dan Fisher as secretary, Smith as research chair, Neymark as standards chair, and Jeff Haberl as program chair. Rick Strand will continue to chair the handbook subcommittee, Simon Rees will become the webmaster, Beausoleil-Morrison will chair the Simulation and Component Models Subcommittee, Reddy will chair the Inverse Methods Subcommittee, and Willson will continue to chair Applications. Gardner will roll off, Wray will resign because Haves represents LBNL, Tim McDowell and Robert Sonderegger will become voting members, and Bill Bahnfleth will be restored as a voting member.

5. Subcommittee reports.

5.1 Applications Subcommittee. Subcommittee Chair Willson reviewed a draft, two-page technical bulletin on estimating building-energy usage. The three topics, discussed in an FAQ style, are time-series weather data, energy-estimation software, and binned weather data. TC4.2 will develop a technical bulletin on weather data, which will allow TC4.7 to focus on using weather data for simulation. Review copies of the technical bulletin will be sent to committee members via list server. The subcommittee also discussed a format for classifying energy-simulation "customers," as a means of setting strategic directions for the technical committee. Barnaby is planning a seminar for Honolulu on getting started with building simulation. The agenda for the meeting of the full committee called for a status report on 1093-RP, but the final report for this project was approved at the Cincinnati meeting. Subcommittee-meeting minutes, with the draft technical bulletin, are in Attachment B.

5.2 Inverse Methods. Subcommittee Chair Haberl stated that the subcommittee is preparing a work statement on developing a procedure for baselining energy use in large central plants and is aiming for a vote of the full committee in Honolulu. He discussed other research topics, presented

in the subcommittee minutes (Attachment C). A draft work statement on inverse bin procedures for analyzing energy savings is considered premature, given the lack of literature on the subject.

The symposium on inverse methods for calculating energy savings is delayed due to delays in 1050-RP. Haberl will look for seminar papers, for Honolulu, on the topic of automated baseline procedures using inverse methods. Other potential topics include defining what inverse methods means to various users and inverse methods in support of building commissioning. Data mining was suggested as a term in more wide-spread usage than inverse methods.

865-RP Accuracy Tests for Mechanical System Simulation (PSU/TAMU). Walton, on behalf on the Project Monitoring Subcommittee, reported that the two contractors have achieved good agreement on 46 of 48 tests. The PMS proposes that TC4.7 and ASHRAE accept the results as is and that the contractors prepare a report, note differences, and place the calculations in appendices. Assurances were given that the contractors will finish before the Honolulu meeting but after the current deadline of March 31, 2002. Neymark moved (Reddy second) that a no-cost extension be granted until August 31, 2002. The motion passed, 11-0-1, chair not voting.

1050-RP Inverse Toolkit (U Dayton). The contractor submitted a draft final report but too late for PMS consideration at this meeting. Krarti stated that the PMS will review within a month and will recommend an email ballot if only minor changes are required. The project is past its current end date and due speed was urged.

5.3 Simulation & Component Models. Subcommittee Chair Dan Fisher stated that subcommittee activity on work statements is described in the subcommittee-meeting minutes, Attachment D. Program plans include a Honolulu symposium, recent advances in energy simulation, part 1, to be chaired by Beausoleil-Morrison. A follow-up symposium, part 2, is planned for Chicago and may be a double session. Two symposia are planned for Kansas City: interoperability and portability, and integrating airflow modeling into energy analysis programs.

1049-RP Building System Design Synthesis (Loughborough U). PMS Chair Pedersen that the project is in good shape and that the contractor has a well-organized list of remaining tasks. The PMS report is in Attachment E.

1197-RP Updated Energy Calc. Models for Residential Equipment (UC Boulder). PMS Chair Barnaby that the research contract has not been signed and the project is just underway. The PMS (Barnaby, Wray, and Brian Dougherty of TC4.6) met informally with the contractor to review goals and the general approach to the project. Specific deliverables will be identified for Honolulu.

1222-RP Incorporation of Nodal Room Heat Transfer Models into Energy Calculation Procedures (MIT). PMS Chair Walton stated that the project started on September 1, 2001 and will explore, in toolkit format, models that fall between fully-mixed zones and CFD. As much as half the work was done before Atlantic City and the contractor aims to finish in May 2002. The PMS must work quickly and plans to communicate with the contractor via email.

5.4 Research

Research Subcommittee Chair Barnaby described ASHRAE's reduced research activity: 90 projects, rather than the former 120, and funding at \$2.4M. Approximately 25 approved work statements await funding before being released for bid. TC4.7 submitted two RTARs last summer; both were accepted and one, on baselining central plant energy use, was prioritized. New RTARs (TCs may be limited to one or two) are due August 1, 2002.

Barnaby described two projects at the conceptual stage that will require joint efforts of at least two TCs: control of thermal storage under varying electricity prices, with TC 6.9 (McDowell is involved), and the effects of internal shading on fenestration heat gain, with TCs 4.1 and 4.5.

Barnaby noted that TC4.7 has five research projects in the Society's research plan: 1051-WS, approved and waiting for funding; two RTARs from 2001-02, development of computer test cases for slabs and crawl spaces and inverse bin procedures for analyzing energy savings; and the two RTARs noted above in the current plan. He urged that the TC move forward with work statements for approved RTARs and try to bring them to a vote in Honolulu.

The PES appointed to review 1148-URP, which concerns automated zoning decisions, unanimously recommended that the URP be rejected. Barnaby moved (Reddy second) that ASHRAE not fund 1148-URP. The motion passed, 11-0-1 CNV. Barnaby noted that TC4.1 also voted not to fund the URP.

Ad hoc subcommittee: Research Program Success Documentation. Subcommittee Chair Smith stated there had been no new work by the subcommittee and referred to work documented in the minutes of the Cincinnati meeting. He is willing to continue to gather information about the use of TC4.7 research, if desired. ASHRAE has provided no comments on the submitted documentation.

Ad hoc subcommittee: Strategic Research Plan. Haves reported on a well-attended Saturday-afternoon session, which was based on a draft strategic plan circulated via email prior to the meeting. The focus extended beyond research to include the handbooks, with a process-oriented view intended to help HVAC practitioners do specific jobs, including designing and operating HVAC plants. During the Saturday meeting, Barnaby put forward a test of the existing handbooks to identify gaps and inconsistencies: in a design charrette, representatives of HVAC design firms would attempt to design a system using only material found in the handbooks. Haves announced a meeting in Honolulu of Section 4 TC chairs and research subcommittee chairs, currently scheduled for 7 a.m. Sunday, June 23, 2002, with the intent of exchanging information about ongoing and planned research projects and developing collaborative research. Wray asked about allied TCs outside Section 4. Spittler asked Haves to work with RAC Liaison Hayter on invitations outside Section 4 as considered appropriate.

5.5 Handbook. Due to Rick Strand's illness, Fisher reported on the Handbook Subcommittee's work, documented in Attachment G. Bill Fleming, Handbook Liaison and the head of the ASHRAE Handbook Committee's electronic-handbook subcommittee, stated that TC4.7 and eight other TCs are test TCs for the electronic handbook. He asked for material within the coming year and urged consideration of color, moving pictures, simulation programs, and links within and outside the

handbook, with an emphasis on being practical. Haves asked about collaboration among TCs in preparing chapters. Fleming replied that TCs will still have individual chapters.

5.6 Program. Subcommittee Chair Beausoleil-Morrison noted that at Atlantic City TC4.7 was co-sponsoring a symposium chaired by Reddy, “Tools and Techniques for Calibration of Component Models,” and a seminar chaired by Kamel Haddad, “Commercial Use of Building Energy Simulation Software.” For Honolulu, Beausoleil-Morrison moved (Crawley second) that the program consist of a first-priority symposium, to be chaired by Beausoleil-Morrison, on recent advances in energy simulation, and a second-priority seminar, to be chaired by Barnaby, on getting started in building simulation. The symposium is ready to go but the seminar, which targets HVAC professionals who are not using simulation, needs speakers. The motion passed by voice vote. Program plans for Chicago include a follow-up symposium on recent advances in energy simulation, which may have enough papers to be a double session and will be chaired by Hensen, a symposium on the use of inverse methods for calculating retrofit savings, to be chaired by Jan Kreider, and two seminars focused on inverse methods. Two symposia and a seminar are tentatively planned for Kansas City. Complete program information is listed in Appendices 3 and 4 of the cover sheets and Attachment H.

5.7 Standards (SPC-140 SMOT). SPC-140 Vice Chair Neymark reported that ANSI approved the standard on September 26, 2001. ASHRAE’s Standard 90.1 committee is showing an interest in using Standard 140 as a means of establishing pass/fail criteria for software to be used for energy-cost budgets. Neymark also noted national and international interest outside ASHRAE in the standard. Future work will include development of tests for models of mechanical equipment, which could be based on performance maps or component models. Haberl is rolling off the committee and Neymark asked that those interested in serving contact him. HVAC skills would be particularly welcome. Minutes of the committee’s meeting are in Attachment I.

SPC-140 sees value in RP-1052, Development of an Analytical Verification Test Suite for Whole Building Energy Simulation Programs – Building Fabric, recently completed by Oklahoma State University. Options for dissemination of the results of RP-1052 were discussed at length, with consideration of ASHRAE’s licensing and sales policies. While the final report is available from the Manager of Research, it is essentially invisible to the public. Suggestions included a web site linked to TC4.7’s web site and a CD produced by ASHRAE Special Publications, although the latter option proved to be expensive for the loads toolkit. Neymark moved (Barnaby second) that Spitler and Neymark pursue making RP-1052 results available through appropriate means, such as a web site or a special-publication CD. The motion passed 11-0-1 CNV.

6. Reports on related activities.

IBPSA. Barnaby reported that very successful Building Simulation ’01, held in Rio de Janeiro in August, 2001, featured a well-organized program and 176 papers. The next conference will be in Eindhoven in August, 2003. Details are noted on the Agenda, Attachment A, including the abstract due-date in September, 2002. Spitler is the incoming president of IBPSA. About 50 people attended IBPSA-USA’s software demonstration and dinner at Atlantic City, with a talk by Norford on international building-energy studies. IBPSA-USA has eliminated dues because of adequate

income from the building-simulation conferences and those desiring to become members can email a request and contact information to IBPSA-USA secretary Rick Strand.

GPC 14P Measurement of Energy and Demand Savings. Haberl stated that the final report was voted out of committee in 2001 but is undergoing final editing and has not yet been approved by ASHRAE.

IAI International Alliance for Interoperability. Crawley stated that TC4.12 is ASHRAE's official liaison to IAI and that Tom Phoenix, former TC4.12 chair, is a good contact for IAI issues.

TC 4.1 Load Calculations. Barnaby reported that 1117-RP, Experimental Validation of Heat Balance and RTS Cooling Load Calculations, is nearly finished, with a final report due soon from PI Fisher of Oklahoma State University (OSU). Another project, 1199-RP, Updating the ASHRAE/ACCA Residential Heating and Cooling Load Calculation Procedures and Data, is about to start, under Wrightsoft and OSU. TC4.1 has prepared an RTAR on internal shading.

TC 4.2 Weather Information. Crawley reviewed a research project that has produced a CD with weather data from 227 international (outside USA and Canada) sites. TC4.2 is broadly soliciting comments on the content of Chapter 27 in Handbook of Fundamentals.

TC 4.5 Fenestration. Pedersen stated there is good communication among TCs 4.1, 4.5 and 4.7. Joe Klems, a member of TC4.5, is interested in loads calculations and presented a paper on interior shading.

TC 4.6 Building Operation Dynamics. Brandemuehl reviewed TC4.6's current research on dynamic modeling of coils, which ties into TC4.7's modeling efforts, and an RTAR on short-term load shift measures. TC4.6 also has interest in inverse methods to model building performance.

TC 4.11 Smart Building Systems. Norford stated that TC4.11 is seeking to ally itself with TCs 1.4 and 4.6 on future research projects and that current work focuses on chiller and roof-top package-unit fault detection and diagnosis.

TC 9.6 Systems Energy Utilization. Reddy stated that TC9.6 was strongly interested in Haves' research directions document, with its emphasis on collaborative research.

GPC 20 XML Definitions for HVAC&R. Haves reported that the committee is off to a somewhat slow start and currently lacks a chair and a roster. Draft data models developed at LBNL as part of the International Alliance for Interoperability's Building Services Project #8 have been sent to GPC 20 for review and comment.

7. Old business. There was no old business.

8. New business. Spitler reported that the TC subcommittees would not be restructured. Sonderegger stated that it is important for ASHRAE to be customer oriented and asked that a thoughtful justification for rejecting 1148-URP be sent to the proposers. Spitler will ask Pedersen

to write an explanation and will send it to Bill Seaton. Haves suggested that someone from RAC review the explanation, noting that ASHRAE encourages good URPs, despite the shortage of research funds.

Space will be tight in Honolulu and ASHRAE is asking if TCs will meet as usual, given the distant location. Based on informal feedback, TC4.7 will be well represented. Spitler will schedule subcommittee meetings as usual and so inform ASHRAE. Hawaiian casual dress code will be in effect.

Patrick Carpenter raised a question about TMY wet-bulb data, which are important for 100% outdoor-air systems. It was suggested that he raise the issue via list-server.

9. Executive Session. Spitler stated there was no business for executive session.

10. Adjourn. Neymark moved (Reddy second) that the meeting adjourn. The motion passed by voice vote at 8:15 p.m.

Attachments

- A. Agenda
- B. Applications Subcommittee
- C. Inverse Methods Subcommittee
- D. Simulation and Component Models Subcommittee
- E. 1049-RP PMS report
- F. Research
- G. Handbook
- H. Program
- I. SPC 140

ASHRAE TC 4.7 Announcements

December 24, 2001

1. Please note that two new PMSC meetings are not officially scheduled in the ASHRAE meeting schedule.
 - The meeting for 1222-RP, Incorporation of Nodal Room Heat Transfer Models into Energy Calculation Procedures is tentatively scheduled for 12-1 p.m. on Monday. If you're interested in attending, please contact the chair of the PMSC (George Walton george.walton@nist.gov) and/or the PI (Yan Chen QChen@MIT.EDU)
 - I don't know if the meeting for 1197-RP, Updated Energy Calculation Models for Residential Equipment has been scheduled yet. If you're interested in attending, please contact the chair of the PMSC (Chip Barnaby cbarnaby@wrightsoft.com)
2. We have a seminar scheduled for Wednesday 8 a.m. See below.

Meeting Announcements

The Sixth International Conference on System Simulation in Building (SSB2002) will be in Liège, Belgium, 16-18 December 2002. Abstracts are due February 15, 2002; papers are due May 31, 2002. Contact Jean Lebrun (j.lebrun@ulg.ac.be) or watch the web site: <http://www.ulg.ac.be/labothap> for more information.

Building Simulation 2003, the Eighth International Building Performance Simulation Association Conference will be held in Eindhoven, The Netherlands, August 11-14, 2003. Abstracts are due September 15, 2002; full papers are due February 15, 2003. See the web site: <http://www.bs2003.tue.nl> for more information.

Agenda

Tuesday, January 15, 2002, 6:00-8:30 p.m.
Rm. 420, ACCC

- | | |
|--|-------------------------------|
| 1. Roll call and introductions | Norford |
| 2. Accept agenda & approve minutes of Cincinnati meeting | Spitler |
| 3. Announcements | Spitler |
| 4. Membership | Spitler |
| 5. Subcommittee reports | |
| 5.1 Applications | Willson |
| 1093-RP Diversity Factors & Schedules for Egv & Loads (TA&M) | Reddy |
| 5.2 Inverse Methods | Haberl |
| 865-RP Accuracy Tests for Mech System Simulation (PSU/TAMU) | Walton |
| 1050-RP Inverse Toolkit (U Dayton) | Kreider |
| 5.3 Simulation & Component Models | Fisher |
| 1049-RP Building System Design Synthesis (Loughborough U.) | Pedersen |
| 1197-RP Updated Energy Calc. Models for Res. Equip. (UC-Boulder) | Barnaby |
| 1222-RP Incorporation of Nodal Room Heat Transfer Models ... (MIT) | Walton |
| 5.4 Research | Barnaby |
| <i>Ad hoc</i> subcommittee: Research Program Success Documentation | Smith |
| <i>Ad hoc</i> subcommittee: Strategic Research Plan | Haves |
| 5.5 Handbook | Strand |
| 5.6 Program | Bahnfleth/Beausoleil-Morrison |
| 5.7 Standards (SPC-140 SMOT) | Judkoff/Neymark |
| 6. Reports on related activities | |
| IBPSA | Barnaby |
| GPC 14P Measurement of Energy and Demand Savings | Sonderegger |
| IAI International Alliance for Interoperability | Crawley |
| TC 4.1 Load Calculations | Barnaby |
| TC 4.2 Weather Information | Crawley |
| TC 4.5 Fenestration | Pedersen |
| TC 4.6 Building Operation Dynamics | Brandemuehl |
| TC 4.11 Smart Building Systems | Norford |
| TC 9.6 Systems Energy Utilization | Reddy |
| XML Committee | Haves/Barnaby |

7. Old Business

8. New business

Subcommittee Restructuring

Spitler

9. Executive Session (no items currently scheduled)

Spitler

10. Adjourn

Web Site and Mailing List

TC 4.7 Web Site: <http://www.mae.okstate.edu/tc47/>

TC 4.7 E-mail List: This list is to be used only for communications related to TC 4.7. Do not distribute messages of any commercial nature. To subscribe or unsubscribe to the list, you must send an e-mail command to the address:

MAIL-SERVER@GARD.COM

Leave the subject line blank (if your e-mail software requires a subject, you may use a space). To subscribe to the mailing list, the body of the message should include the following:

SUBSCRIBE TC47-L

To unsubscribe from the mailing list, include the following in the body of the message:

UNSUBSCRIBE TC47-L

To see a list of subscribers, include:

LIST TC47-L

For a list of all available commands, include:

HELP

To send a message to all subscribers to the list, address your message to:

TC47-L@GARD.COM

Note: ASHRAE staff are not involved in the operation of these lists. Please do not ask them for help. If you have any questions, please contact: Mike Witte
mjwitte@gard.com 847-698-5685 FAX 847-698-5600

TC 4.7 Subcommittee Meeting Schedule

(excerpted from <http://www.ashrae.org> -- Search for TC 4.7)

Room assignment codes.

ACCC/ # Atlantic City Convention Center

C/ Room Name (floor location) Caesar's Atlantic City

S/ Room Name (floor location) Sheraton Atlantic City

Meeting Room Locations:

NUMBER TITLE DAY TIME ROOM #

TC 4.7 Energy Calculations (50) (OVH) Tuesday 6:00-8:30p ACCC/420

TC 4.7 Research Saturday 1:30-3:00p Sheraton/Ocean Pier

TC 4.7 1049-RP (10) (OVH) Sunday 10a-12N ACCC/405

TC 4.7 1050-RP (10) Sunday 12N-2:00p ACCC/405

TC 4.7 1093-RP (10)(OVH) Monday 7:00-8:00a ACCC/414

TC 4.7 Handbook (10) Monday 5:00-6:00p Sheraton/Ambassador

TC 4.7 Simulation and Component Models (30) Monday 6:00-7:30p Sheraton/Ambassador

TC 4.7 Inverse Methods (20) Monday 7:30-9:00p Ambassador (L)

TC 4.7 Applications (25) Tuesday 3:30-5:00p ACCC/415

TC 4.7 Programs

Wed. 8-10 a.m. Seminar 36. Commercial Use of Building Energy Simulation Software **ACCC/418**

TC 4.7 Applications Subcommittee
Atlantic City Meeting Agenda and Minutes
Tuesday, January 15, 2002, 3:30-5:00p ACCC 415

Agenda

Introductions (5 minutes)

Review of Agenda (5 minutes)

Review role of the Applications Subcommittee

Review of TECHNICAL BULLETIN on Estimating Building Energy Usage (10 Minutes)

STRATEGIC DIRECTION – Determining Who Our Customers Are (40 Minutes)

I. Possible Structure of Building / HVAC Design Community with Respect to Building Energy Simulation

LEVEL	TYPE OF FIRM	CHARACTERISTICS	SIMULATION CAPABILITIES
TIER 1	Small to Medium A & E (or E only)	5 to 75 employees, General Practice, Little Specialization	Performs few, if any, building energy simulations
TIER 2	Large A & E Firms	50 to 250 employees, internal departments developing specialized designs for certain applications	Often have internal departments with building and energy simulation capabilities.
TIER 3	Building Energy Engineering and Modeling Firms	1 to 30 employees with specialized training and experience in modeling, measuring, and analyzing building energy use.	Very experienced in energy analysis including the use of building energy simulation tools.
TIER 4	Simulation Engine User Interface Software Firms	1 to 10 employees. Create and support commercial software to make public domain simulation engines more user friendly	Posses software development capabilities
TIER 5	Simulation Engine Creators	Primarily large higher education institutions, research institutions, or scientific institutions	Extensive pool of highly trained, knowledge pool growth oriented personnel.

TIER 6	Simulation Engine Creators	Primarily large higher education institutions, research institutions, or scientific institutions	Extensive pool of highly trained, knowledge pool growth oriented personnel.
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II. Validating “Possible Structure”

- A. Can you place your firm / institution into one of the 6 TIERS ?
1. If YES, do the descriptions associated with that Tier effectively describe your firm / institution ? If not, describe (on the back side of this page) how they need to be changed.
 2. If NO, create (on the back side of this page) a new TIER in between two of the above TIERS where your firm / institution does fit.
 - Label that TIER using the numbers above and below it (e.g., a new TIER created between TIER 3 and TIER 4 would be labeled TIER 3-4)
 - Write down the Type of Firm, Characteristics, and Simulation Capabilities for this new TIER that you have created.
- B. Placing yours and other firms in to the resultant TIER structure
1. List the firms that you know in the building design business and the firms you know in the simulation business
 2. Beside each firm, write the TIER Number which, to you, best defines it.

PROGRAMS (15 minutes)

1. Atlantic City
 - a. Seminar 36 - Kamel Haddad, Commercial Use of Building Energy Simulation Software
2. Honolulu
 - a. Seminar - Chip Barnaby, Getting started with Building Simulation
3. Chicago
4. OTHER
 - a. Condense a Seminar into a 25 minute program available to local ASHRAE chapters?
 - b. Create a Professional Development Seminar (PDS) on the Use of Building Energy Simulations ?

RESEARCH (5 Minutes)

Research Projects:

1. 1093-RP Diversity Factors & Schedules for Energy & Loads (TA&M) – Reddy

RTAR/Work Statements:

1. Methodology to define bounds of variability in building energy use predictions using detailed simulation models and how it can be incorporated into the design process. (Haddad, Wyndham-Wheeler)
2. Defining performance factors for primary and secondary equipment simulation inputs for commercial buildings (LeBrun, Nall) it is believed that no work has been done since Atlanta
3. Procedures and Data for High Performance Residential Design (Witte)

OLD AND NEW BUSINESS (10 Minutes)

ADJOURN

Meeting Minutes

Attendance List

Name	Affiliation	E-mail
Jim Willson	Honeywell	jimwill@indy.net
Vernon Smith	AEC	vsmith@archenergy.com
Chip Barnaby	Wrightsoft	cbarnaby@wrightsoft.com
Jeff Haberl	Texas A&M	jhaberl@tamu.edu
Ian Beausoleil-Morrison	CETC	ibeausol@nrcan.gc.ca
Dru Crawley	DOE	drury.crawley@ee.doe.gov
Kamel Haddad	CETC	khaddad@nrcan.gc.ca
Joe Huang	LBNL	yjhaung@lbl.gov
Jan Kosny	ORNL	kyo@ornl.gov
Tim McDowell	TESS	mcdowell@tess-inc.com
Simon Rees	OSU	sjrees@okstate.edu
George Walton	NIST	gwalton@nist.gov
Jean LeBrun	ULg	j.lebrun@ulg.ac.be
Klaus Sommer	Univ. of Applied Sciences, Cologne, Germany	klaus.sommer@vt.fh-koeln.de

Meeting began at 3:35 p.m. Introductions were made followed by a review of the agenda by J.Willson

J. Willson told the subcommittee that the main focus of the Applications subcommittee was to take research products and capabilities developed by TC 4.7 and to increase the use of them by ASHRAE members. This can take several forms, ranging from activities to increase member awareness of what TC 4.7 has developed (and is available) to activities which extend or supplement existing research to increase member usefulness. Thus the agenda is structured with these aims in mind.

J. Haberl requested that research not be minimized so severely and that additional time be allowed for discussion of topics, new ideas, etc. He said that this was one of the reasons why members were coming to the meetings.

Discussion of the Two Page Technical Bulletin Draft

J. Willson then introduced the draft TB-2001-x memo on Estimating Building Energy Usage for discussion. The subcommittee was then given a few minutes to read the draft memo, followed by discussion.

J. Haberl asked if it was o.k. to mention commercial names. J. Willson said that ASHRAE policy had changed on this issue. J. Kosny provided details. J. Huang suggested that it might be appropriate to split this into two technical bulletins.

C. Barnby said that most of these weather programs were not ready to be used out-of-the-box. D. Crawley said that this involved stripping several columns of data. C. Barnaby said that there should be some caveats that say that this requires programming knowledge and time by the user. T. McDowell said that another problem is that most users need weather data ready for use by DOE-2, and that this would be a better article to write. J. Kosney said that he would like to see a classification of databases ready for use by simulation programs. For example, hydrothermal calculations. G. Walton said that he would like to see some clarification of the different formats of data used by simulations. D. Crawley agreed with T. McDowell that this should be a quick 2 pager that shows how do you find and use weather data for energy calculations.

C. Barnaby said that the question about weather data should really refer the user to the their vendor so the vendor supplies weather data. The real question was where to find data that are not provided by their vendor. T. McDowell said that he was referring to 3/4 s of the questions on building simulation list server that refer to weather data. J. Huang said that he did not see how this could be done. He also wondered if the bulletin could refer to readers to vendors that provide weather data. He asked if these vendors were on the DOE site then why not refer to these. J. Huang said that his observations of the traffic on the building simulation list server was looking for weather data for sites not available from vendors.

There was also some discussion about making weather files for DOE-2. C. Barnaby said that there was Weathermaker. D. Crawley said that there was also a firm in Switzerland that makes weather files. J. Kosny said that it might be useful to have a table that shows the sources and comments on: if it is useful, where from, and whether or not in DOE-2 format. C. Barnaby said that this should say: the vendors will supply weather data for selected sites, and a user can also take a similar site and use it for their site. D. Crawley said that Weathermaker did this and a program by L. Degelman did this. C. Barnaby said that the user still needs to know about sources, whether it is data from the airport versus city center. D. Crawley said that Energyplus provides all TMY2 weather data sites.

C.Barnaby said there are two issues: go to the vendor to get a new site, or make your own weather file. C.Barnaby said that there was also an issue of whether there was weather data for the last month or average weather data. J.Huang said that it was clear that there needed to be some discussion of the different types of weather data. J.Willson said that this was the need for the TC 4.2 tech bulletin, to discuss the different types of weather data.

D.Crawley said that DOE has reinstated the GRI live weather data feed. J.Haberl asked if this included solar weather data. D.Crawley said that this did not include solar data.

J.Willson said that this would be difficult to keep all our material to two pages. C.Barnaby said that the subcommittee should make 2 or 3 tech bulletins. He went on to say that the plan would be for TC 4.2 to make one tech bulletin to be on what weather data are available. Then TC 4.7 will make a tech bulletin on how to make this useful by simulation, which one is the right one.

What about bin data? C.Barnaby said that the users can take the ASHRAE program and make bin data. D.Crawley said that NCDC also makes "binned" data.

C.Barnaby said that this should make it clear that one should not pay the \$100 for the WYEC2 data until you know how to convert this. There was some discussion that it should make it clear that the output from the engineering data maker did not produce electronic data (i.e., PDF format). G.Walton said that ASHRAE also had weather data in PDF format.

T.McDowell said that he agreed that it would not be appropriate to mention only one vendor.

ACTION: J.Haung said that he would draft a TC 4.2 Technical Bulletin defining the different types of weather data. He thought this could be done in the next couple weeks. J.Willson said that he would re-draft the 4.7 Technical Bulletin by Mid-February. The redraft will be distributed on the TC 4.7 list server for interested parties to comment.

Discussion of TC 4.7 Customers

Discussion then went on to look at the classification of TC 4.7 Customers:

TIER 1,2,3, list on the agenda. J.Willson explained the reasoning behind the listings. J.Willson asked the subcommittee to think about how their firm fits into the structure.

T.McDowell said that his company fits into 3,4 and 5. V.Smith said that his firms also fits into these TIERS. T.McDowell asked how a firm fits into this that does research. There were several questions about 5 and 6. J.Willson said that you could scratch 6.

S.Reese asked about the need for the number of employees. J.Huang said that maybe it might be better to mention the skills of the workers at the firm. J.Haberl suggested listing tasks (i.e., what do they do) and skills (what do they know). I.Beausoleil-Morrison asked what the purpose of the classification was.

G.Walton asked what ASHRAE was going to do with this. J.Willson said this would help both TC 4.7 and ASHRAE understand how the results of TC 4.7 research flow down to benefit ASHRAE members.

D.Crawley said that this would help DOE with understanding what things people were using and why. That there was a draft document that DOE was developing, and that this would support this effort. That this effort was going to help TC 4.7 organize themselves.

J.Kosney said that there should be 4 categories: program developer, energy consultant, engineering consultant, educational, and other. J.Haberl suggested that there might be use for just listing the tasks (several items), skills (several items), etc. J.Huang said that there was need to list: always uses simulation, occasionally uses it, and develops software.

Programs

Discussion then moved into programs.

Atlantic City - Kamal's Seminar.

Honolulu, Seminar by Chip Barnaby.

C.Barnaby said that no volunteers had contacted him. Several folks asked if it was possible to pull this together. T.McDowell wondered what this was all about. I.Beausoleil-Morrison said that this was target at the practicing engineer. C.Barnaby said that one approach was to have one firm describe what they do.

D.Crawley said that he could get someone from CIBSE. J.Kosny said he could do something. K.Sommer asked if this could have several case studies. V.Smith said that AEC could give a talk about how they use simulation. I.Beausoleil-Morrison said that a presentation could talk about the different programs they use. J.Haberl mentioned that there was an increasing use of simulation in energy services businesses. J.Kosney said it should include: vendors, educational people, etc.

C.Barnaby said possible speakers include: CIBSE, AEC, applications – case studies. J.Huang mentioned his work at Steven Winter, doing simulation work for utilities. J.Haberl mentioned getting someone from Nexant. I.Beausoleil-Morrison said getting someone to talk about education...maybe Mike Witte. Possible speakers, CIBSE (Dru), Overview (AEC), case studies (T.McDowell), thermal storage study.

C.Barnaby asked about classic simulation studies? D.Crawley said that he could get one of the NREL folks to talk about high performance simulation. Possibly D. Nall or Peter Simmons, Steve Taylor, Mark Hydeman, Adrian Toluca. C.Sommer asked if it would be interesting to get a designer who uses simulations from architects...maybe use of energy simulation specialists.

C.Barnaby said that he had 6 ideas for 4 presentations...which looked pretty good.

Research

J.Willson asked the subcommittee to bring their RTARs to Honolulu.

ACTION:

Hadad will have an updated RTAR for Honolulu.

J.LeBrun said that he would get his RTAR together.

J.Willson will contact M.Witte to complete an RTAR on Procedures and Data for High Performance Residential Design

C.Barnaby said that there was an RTAR on shading, and an RTAR on thermal storage models for changing electric pricing. J.Haberl mentioned several possible ideas for RTARs: one for using simulation for emissions calculations, another one for simulation to support energy codes (90.1, 90.2).

Other

K.Sommer offered some work that has been in Germany on energy simulation, requirements of simulation of buildings and plants. Something that is used by developers and designers. Contact: German Society of Engineers, tga@vdi.de. The scope of these are much broader than just ASHRAE. Some of this integrated into REBA. A copy of these newly developed guidelines was given to J.Neymark for any aspects relevant to ASHRAE/ANSI Standard 140.

Meeting was adjourned at 5:16 p.m.

TB – 2001 – X

TECHNICAL BULLETIN

Estimating Building Energy Usage

OVERVIEW

The purpose of this Technical Bulletin is to provide guidance to prospective users of building energy usage estimating tools with respect to three areas:

1. The readily available sources of applicable hourly, daily, and monthly weather data for a given location.
2. Available energy estimating software packages and whether any are recommended by ASHRAE.
3. The readily available sources of bin weather data for a given location.

SOURCES OF HOURLY, DAILY, AND MONTHLY WEATHER DATA

The most commonly used sources of energy modeling weather data are:

- **TMY2 – 239 US locations**
Available from ASHRAE as the WYEC2 Data and Toolkit CD-ROM
Also available from http://rredc.nrel.gov/solar/old_data/nsrdb/tmy2/ This website also has a good discussion of TMY2 vs. TMY data
- **CWEC – 47 Canadian locations**
Available from <http://www.cmc.ec.gc.ca/climate/energy2.htm>
- **IWEC – 227 International locations**
New and available from ASHRAE as the International Weather for Energy Calculations CD.
Available from <http://www.ashrae.org>

AVAILABLE ENERGY ESTIMATING SOFTWARE PACKAGES

It is not the role of ASHRAE to recommend one particular energy estimating software package over another. Instead, ASHRAE provides in Chapter 31 (Energy Estimating and Modeling Methods) of the 2001 ASHRAE Handbook – Fundamentals a section entitled “Selecting Energy Analysis Computer Programs”. This section discusses the major considerations in making a selection. They principally include:

- Complexity of input
- Quality of the output
- Availability of weather data
- Auxiliary capabilities
- Availability of good support to answer questions

Chapter 31 also covers the broader issue of “Choosing an Analysis Method”.

In regard to a listing of the available energy estimating programs, the U.S. Department of Energy (D.O.E.) maintains an up-to-date listing of such programs. Available at no charge through their website (www.eren.doe.gov/buildings/tools_directory/), it currently includes over 200 building energy software tools including whole building as well as component and special application programs. This website includes a summary of each software program’s characteristics, strengths and limitations, plus hotlinks to other sites for specific cost and availability information.

SOURCES OF BIN WEATHER DATA

Today there are two different ways to obtain bin weather data.

One approach is to go to a source which has pre-made bin weather data based upon predetermined hours of the day and days of the week. The often used U.S. Air Force 1978 *Engineering Weather Data* is an example of this. This has now been superseded by the *Engineering Weather Data CD-ROM* which contains approximately 800 world wide weather stations. It can be found at:

<http://ols.ndc.noaa.gov/plolstore/prodspecific?prodnum=C00515-CDR-A0001>

Bin weather data specific to ASHRAE Region X is also available. Ordering information can be found at:

<http://www.ashraex.org/FSInfo.htm>

The second approach is to use a software program which allows you to create your own custom bin weather data by specifying the specific hours of the day, days of the week, and months of the year to include in the binning. These programs also provide the capability to:

- Select the bin size, such as 2F, 5F or 10F
- Use parameters other than just dry bulb temperature, such as humidity ratio, wet bulb, etc.
- Determine the average value of other parameters which occurs coincident with that of the binned parameter. For example, determine the average enthalpy coincident with a 75F to 80F dry bulb bin.
- Copy a TMY2 record from to CD for use in an hourly energy analysis program.

One such program is BinMaker™PLUS which provides custom binning for 239 locations from TMY2 data. It is available at www.BinMaker.com

TC 4.7 SUBCOMMITTEE ON INVERSE METHODS

Monday, January 14th, 2002
Atlantic City, New Jersey

Chair: Jeff Haberl
Secretary: Joe Huang

MINUTES

AGENDA

1. Introductions
2. Discussion of the minutes from the Cincinnati, Ohio meeting
3. Discussion of Work Statements
 - WS “Development of a procedure for baselining energy use at large central plants.” (Krarti)
 - WS “Inverse bin procedures for analyzing energy savings” (Haberl)
4. Discussion of other RTARs
 - RTAR “Methodology Development to Extend ASHRAE Semi-empirical Chiller Models to include Models for Screw Chillers, Package Air-conditioners, and Heat Pumps.” (Reddy)
 - RTAR (One page) “Genetic Methods” (Nelson)
 - Suggestions for new RTARs
 - “Parameter Determination Using Monthly Utility Billing Data” (Haberl)
 - “Inverse Methods for Peak Load Determination” (Haberl)
4. Program
 - June 2002 meeting (Honolulu)...Due in August
 - January 2003 meeting (Chicago)
 - SYM “Inverse methods for calculating savings from energy conservation retrofits” (Kreider)
 - 2 PAPERS “RP1050 Inverse methods” (Kissock et al.)
 - PAPER “SMTP Method” (Abushakra)
 - PAPER “Neural Network Savings Calculation Method” (Krarti)
 - SEMINAR “Automated baseline procedures using inverse methods” (Haberl)
 - SEMINAR “Defining what inverse methods means to you.” (Reddy)
 - June 2003 meeting (Kansas City)
 - SYMPOSIUM “Inverse methods for support of building commissioning” (LeBrun)
 - January 2004 meeting (Anaheim)
6. Old Business
7. New Business

8. Adjourn

ATTENDEES

NAME	AFFILIATION	EMAIL
Joe Huang	LBNL	yjhunag@lbl.gov
Vernon Smith	AEC	vsmith@archenergy.com
Tom Lawrence	Purdue University	lawrency@ecn.purdue.edu
Moncef Krarti	University of Colorado	krarti@colorado.edu
Kamil Haddad	CETC	khaddad@nrcan.gc.ca
Mike Witte	GARD Analytics	mjwitte@gard.com
Robert Sonderegger	Silicon Energy	rsonder@siliconenergy.com
Carol Gardner	Self	gems@teleport.com
Jean LeBrun	University of Leige	j.lebrun@ulg.ac.be

The meeting was called to order by Subcommittee Chair Jeff Haberl at 7:40

Introductions were then made.

The agenda and minutes of the last meeting were circulated by Jeff Haberl.

Jeff Haberl gave an overview of what transpired at the last meeting in Cincinnati, and asked the attendees to review the minutes. The main points from that meeting are that WS-1051 has been approved and is going out to bid. The inverse bin WS was tabled.

The subcommittee received several comments to the WS on the baselining energy use at large central plants which will likely be the major topic of discussion at this meeting.

Jeff Haberl said he was asked by TC 4.7 Committee Chair to poll the attendees to see how many intend to attend the Honolulu meeting. A show of hands showed 6, with one additional known to attend, for a total of 7.

MOTION: Moncef moved, Vernon seconded, that the minutes be approved.

The next item of discussion is the Work Statement on “Development of a Procedure for Baselining Energy Use Use at Large Central Plants” (Krarti). Moncef reviewed the comments received from the previous meeting, and explained his responses to these comments.

Comment 1 is whether this procedure was not already covered by other procedures. Moncef explained the peculiarities of this procedure, and why it was not covered by others. He added material to this effect.

Comment 2 is who is going to use this procedure ? Is there enough market for this effort ? Moncef’s response was the users are most likely to be universities and large institutions.

Jeff Haberl said there might be proprietary tools for doing this. Jeff Haberl suggested that Moncef reference the paper presented at this ASHRAE conference (AC-45-17) on a “Method for baselining energy use at large central plants”.

Mike Witte asked if that procedure in the ASHRAE paper AC-45-17 is robust enough to be incorporated in the ASHRAE Handbook, and hence this WS is not needed ? Jeff Haberl said, no, that the procedure in AC-45-17 is only anecdotal and an example done by one graduate student for his thesis. He felt this WS would help proceduralize this.

Vernon reminded the Subcommittee that the current perspective of the Society is for work statements to be co-sponsored by other TCs, and quantify the benefits of the proposed work. Moncef thought that these questions are already addressed in the WS.

Jeff Haberl suggested that the WS clearly identify where the quantification of benefits are described. Jeff suggested that Moncef contact the Chairs for the following TCs for co-authoring this WS: 9.1, 9.6, and 9.8. Kamel Haddad also suggested contacting TC 6.2.

ACTION: Moncef agreed to contact the Chairs for TC 9.1, 9.6, and 9.8 for co-sponsors.

In conclusion, Jeff Haberl urged Moncef to follow through on the suggestions to push this WS further along, particularly since the RTAR for this WS was given a high priority at the previous Cincinnati meeting.

ACTION: Jeff Haberl will send Moncef a copy of 1051 as a sample of the new formatting for Work statements. Jeff Haberl also reminded Moncef that whatever changes are made to the WS must be folded back into the RTAR. Krarti agreed to put 1051WS into the proper format.

Mike Witte asked if there is an estimated budget. Moncef said that it would be in the range of \$150K. However, the budget is not stated in the current WS draft. Jeff Haberl also said the WS needs a list of WS contributors. Jeff also pointed out some typographical mistakes in the references.

ACTION: Krarti agreed to put a budget into the WS.

Kamel Haddad asked whether the WS would result in a piece of software, which then opened up the question whether the title should state it is the development of a “procedure” or a “toolkit”. Several people commented that it definitely should not be called a “toolkit” and be kept as a “procedure”.

Jeff Haberl said that the WS should not be limited to inverse models, since other types of models can also be used. Jean Lebrun concurred with this opinion.

ACTION: Krarti agreed to make it clear that other types of models could be incorporated.

Jeff Haberl said that 1050 RP is now completed, and should be referenced in the revision for the next meeting in Honolulu.

ACTION: Krarti agreed to incorporate a reference to 1050RP.

There were other editorial comments and suggestions by Jeff Haberl and Jean Lebrun. An overall editorial suggestion by Jeff was to make the language more precise in giving the potential contractor as much guidance as possible on how to carry out this work.

ACTION: Krarti agreed to incorporate the editorial comments.

Jeff Haberl thought the Phase 2 of Scope should be subdivided into 3 tasks in a backwards process – a. estimate the total output of the plant (i.e. the cooling, heating, and electricity requirements of the buildings), b. develop the models for the individual energy consuming equipment, and c. develop a dispatching procedure for linking b to a, d. develop an overall framework for all the procedure to work together and demonstrate the procedure with the appropriate computer program.

Jean Lebrun and Mike Witte questioned the stated deliverables of only a paper, and asked whether software would be included. The general consensus is that there should be some form of software requirement as a deliverable.

ACTION: Moncef agreed to make sure that the deliverables were consistent with the tasks. Krarti said he would incorporate the comments into the next draft and circulate for review to the subcommittee. Haberl said that the goal was to have a WS ready to vote out of subcommittee that would be well accepted by the full committee so it can go forward to RAC.

The discussion then moved to other RTARs. These will be bequeathed to the new incoming Subcommittee chair who will be coming on after the Honolulu meeting. Therefore, the discussion is along the line of recommendations for the continued development of the RTARs.

Jeff Haberl explained two suggested new RTARs: one on “parameter determination using monthly utility billing data”, and another on “inverse methods for peak load determination”.

The parameter determination would encourage a WS that would seek to develop methods for determining different aspects of a building from a utility bill analysis, such as the cooling, heating and non-cooling-heating portions of the energy use.

Haberl then asked the subcommittee if there were any other ideas for RTARs. There were no other ideas for new RTARs. Haberl then asked the subcommittee to please be thinking of RTARs for the future meetings.

Jeff Haberl then briefly described the program for the Subcommittee.

In Cincinnati Kreider had proposed a Symposium on “inverse methods for calculating savings from energy conservation retrofit” for Honolulu. Haberl said that this Symposium was not yet ready. 1 of the papers was done, 2 more promised and 1 on hold. Therefore this Symposium was moved to Chicago. Tom Lawrence said that he had a potential paper with Jim Braun for the same symposium.

For Chicago (January 2003), there is one Seminar for “Automated baseline procedures using inverse methods” (Haberl), and another seminar proposed by Agami Reddy titled, “defining what ‘inverse method’ means”.

For Kansas City (June 2003), Jean Lebrun suggested a Symposium on “inverse methods in support of building commissioning”.

Nothing planned yet for Anaheim (January 2004).

Carol Gardner moved, and the meeting was adjourned at 9:03 p.m.

TC 4.7 Simulation and Component Models Subcommittee

Atlantic City Meeting

Minutes

Monday, Jan. 14, 2001, 6:00-7:30pm,

Introductions/Additions to Agenda (5 minutes)

The meeting was called to order at 6:06 pm with 39 people in attendance as shown in attachment 1.

Addition request from Ian--Mike Witte and Ian working on research wish list, covered later in agenda.

Program

1. Ian Beausoleil-Morrison reported on the status of the Honolulu symposium, *Recent advances in energy simulation: Part 1*. The symposium is co-sponsored by TC 4.1. All papers through second round of review, authors preparing final version, and should meet deadline—good to go!
2. Ian also reported on the proposed Chicago symposium, *Integrating Airflow Modeling into Energy Analysis Programs*. Bump this on to Kansas City
3. Ian reported on the proposed Chicago symposium, *Interoperability and Portability*. Going to get bumped to KC.
4. Ian reported on *Recent advances in energy simulation: Part II*, a symposium that is also planned for Chicago. Might have enough for TWO symposiums out of this.
5. Several new program were put forward. Looks like TC4.7 has only one program item so perhaps we need something (Crawley—ASHRAE not encouraging addition of more program elements). ((Straw poll—most of the attendees are planning to attend the Honolulu meeting). We can always try to add things and let them turn us down.

Work Statements in Progress

1. Joel Neymark reported on the proposed development of ground coupling. IEA Task 22 is covering some of the items already. Joel recommended that we put the workstatement on back burner until we get some sense of direction from IEA 22.
2. Jan Kosny asked for help to complete a new version of the work statement to simulate refrigerated warehouses. ACTION ITEM—Joe Huang and Kamel Haddad will help Jan bring the workstatement to completion for Honolulu. The WS scope includes modeling of equipment, scheduling and phase change of product. Don Shirey suggested talking to TC10.5 and 10.7 (Tim McDowell said that the word on the street is that this work statement is dead without support of section 10 TCs). Dru reminded us that because of funding limits co-sponsorship and co-management is imperative. Jeff Spitler suggested that the committee contact Al Black. ACTION ITEM—Dan Fisher volunteered to make the contact.
3. Dan Fisher presented an RTAR to upgrade the toolkit trilogy by integrating them on a single CD, upgrade all of the code to F90 (and/or go to C++), and upgrade documentation from primary and secondary toolkits to the standards used in the Loads Toolkit (hotlinks, linear and non-linear navigation). Justification—need to upgrade code anyway; while doing that, may as push things into electronic publishing format. Need co-sponsorship from TC4.1. Seems like this would be fairly low budget. Ian—will this fly as a “research” project. Tim McDowell—TC6.9 got a similar project kicked back (but that could change and doesn’t necessarily mean we shouldn’t do it). The committee agreed that the toolkits required an upgrade, but weren’t in agreement on how to upgrade the material. A number of comments and suggestions were offered.
 - Integrate the toolkits with the electronic handbooks.
 - Include annotated guides, dynamic models and RP 1145 results.
 - The persistent problems with toolkit licenses will have to be revisited.
 - There appears to be no funding mechanism to get this work done...It’s not really research.
 - Some of the material from the previous toolkits in archaic formats. Quality control and other production difficulties are expected.

4. Dru Crawley updated the committee on the “back-burnered” work statement, *Development of Detailed Descriptions of HVAC Systems (Templates) for Simulation Programs*. Les Norford reported that there does appear to be some justification for the project. Notwithstanding, the consensus of the committee was to stop trying to revive this project. Dru confirmed that since the project had already been **rejected** by RAC once, no further action necessary.

Research Wish List

Ian reported on a wish list of research items that he and Mike Witte were tasked to draw up at the last meeting. Needs to be fleshed out and prioritized. Broken into four categories (see attachment from Ian and Mike). Dan requested that this document become a living web document. Jeff will put the list up there and put Ian’s address that will allow people to suggest additions. Small group will be needed to then prioritize and evaluate the ideas. Consensus that this is a good start. ACTION ITEM—Ian needs to email this to Jeff Spitler and Jeff needs to put it up on the web site. Mike Witte, Dan Fisher, and Tim McDowell volunteered will assist Ian in prioritizing the list by Honolulu.

Other RTAR Issues: Tim McDowell reported that TC6.9 has some RTARs that they are boiling down into a single good idea and is looking for people in this subcommittee who are interested in thermal storage. ACTION ITEM—Tim will correspond with TC 6.9 to develop RTAR that would also address TC 4.7 interests.—Klaus Sommer, Mike Brandemuhl, and Vern Smith all volunteered to help with this.

Research projects in Progress

1. Curt Pedersen gave a brief update on the status for RP-1049, *Design Synthesis*. One of the fun, high-risk projects at Loughborough University. John Wright is now the PI and things seem to be moving along smoothly. PMS met on Sunday with one of the graduate students working on the project. About 5 people total involved. Automatic configuration generator working well and have done some cases based onw IBPSA papers. PMS is going to send a list of cases to PI directly. Project on-schedule and seems like it will be successful.
2. Brent Griffith gave a brief update on the status of RP-1222, (Extension of Toolkit for Multi-node air models). Implemented simple several node models and two more CFD models with toolkit. Expected to be finished by Honolulu.
3. Mike Brandemuehl reported that RP-1197 just getting started so nothing to really report yet.

Old and New Business

1. Dan Fisher introduced the new sub-committee chair, Ian Beausoleil-Morrison. Ian will be taking over after Honolulu.
2. Jeff Spitler updated the committee on the TC Chairs meeting on the handbook. A lengthy discussion followed the details of which are included in the Handbook committee report.

Meeting adjourned at 7:27pm.

ATTACHMENT 1: Attendance

Atl. City	Cinci.	Atlanta	Last Name	First Name	E-Mail
		X	Armstrong	Peter	pr_armstrong@pnl.gov
	X	X	Barnaby	Chip	cbarnaby@wrightsoft.com
X	X	X	Beausoleil-Morrison	Ian	ibeausol@nrcan.gc.ca
X			Brandemuehl	Mike	michael.brandemuehl@colorado.edu
		X	Buhl	Fred	wfbuhl@lbl.gov
X	X	X	Crawley	Dru	drury.crawley@ee.doe.gov
X			Chanvit	Chantrasrisalai	chanvit@okstate.edu
X			Deng	Zheng	zhengd@okstate.edu
X			Deringer	Joseph	jderinger@deringergroup.com
X			Deru	Michael	michael_deru@nrel.gov
		X	Eldridge	David	eldridd@okstate.edu
	X		Fisher	Dan	d-fisher@uiuc.edu
X			Gardner	Carol	gems@teleport.com
X	X		Griffith	Brent	griffith@mit.edu
		X	Gu	Lixing	gu@fsec.ucf.edu
	X		Haberl	Jeff	jhaberl@tamu.edu
X	X	X	Haddad	Kamel	Khaddad@nrcan.gc.ca
X	X	X	Haves	Philip	phaves@lbl.gov
	X	X	Hensen	Jan	j.hensen@tue.nl
		X	Holmes	Mike	Michael.holmes@arup.com
X			Huang	Joe	YJHuang@lbl.gov
X			Iu	Calvin	iip@okstate.edu
X	X		Judkoff	R.	Ron_judkoff@nrel.gov
X			Jin	Hui	jinh@okstate.edu
X			Kong	Weixiu	weixiu@okstate.edu
	X		Knappmiller	Kevin	kevink@kevtec.com
X	X	X	Kosny	Jan	kyo@ornl.gov
X		X	Krarti	Moncef	krarti@colorado.edu
		X	Laouadi	Aziz	Aziz.laouadi@nrc.ca
		X	Liesen	Richard	r-liesen@uiuc.edu
	X		Lubun	mike	mlubun@nrcan.gc.ca
X			Lawrence	Tom	lawrenct@ecn.purdue.edu
X			Lebrun	Jean	j.lebrun@ulg.ac.be
X			Liu	Xiaobing	xiaobin@okstate.edu
X			Mangini	Jim	jim.mangini@carrier.utc.com
X	X	X	McDowell	Tim	mcdowell@tess-inc.com
		X	Mottillo	Maria	mmottillo@nrcan.gc.ca
X	X		Neymark	Joel	neymarkj@sni.net
	X		Nguyen	Phuong	pnnnguyen@pplant.msu.edu
X	X	X	Norford	Les	lnorford@mit.edu

Attachment D Simulation and Component

Models Subcommittee Minutes

TC 4.7 Minutes, Atlantic City

15 January 2002

Atl. City	Cinci.	Atlanta	Last Name	First Name	E-Mail
	X		Novoselac	Atila	aqn102@psu.edu
X			Parsons	Jim	parsons@me.msstate.edu
X	X		Pedersen	Curt	cpederse@uiuc.edu
		X	Reddy	T. Agami	Reddyta@drexel.edu
X	X	X	Rees	Simon	SJRees@okstate.edu
	X		Shipley	David	Shipley@marbek.ca
X	X		Shirey	Don	Shirey@fsec.ucf.edu
X	X	X	Smith	Vernon	vsmith@archenergy.com
X	X		Sommer	Klaus	klaus.sommer@vt.fh-koeln.de , Sommer.Roycroft@T-online.De
X		X	Sonderegger	Robert	rsonder@siliconenergy.com
X	X	X	Spitler	Jeffrey	spitler@okstate.edu
	X		Sreedharan	Priya	psreedharan@lbl.gov
X	X	X	Strand	Rick	r-strand@uiuc.edu
X	X	X	Walton	George	gwalton@nist.gov
X			Wassner	Mike	wassner@colorado.edu
		X	Winkelmann	Fred	fcwinkelmann@lbl.gov
X	X		Witte	Mike	mjwitte@gard.com
	X	X	Wray	Craig	cpwray@lbl.gov
	X		Wright	Jonathan	J.A.Wright@lboro.ac.uk
X			Xiao	Dongyi	xdongji@okstate.edu
X	X		Xu	Peng	pxu@lbl.gov
X			Zhang	Peter	peter@deringergroup.com

RP: 1049 Progress Report January 2002

Monitoring Committee:

Curtis Pedersen (TC 4.7), chair
Dave Knebel (TC 4.7)
Ron Nelson (TC 1.5)
Ed Sowell (TC 4.7)
Mike Brandemuehl (TC 4.6)

Contractor: University of Loughborough, UK

Department of Civil and Building Engineering

PI: **Jonathan Wright**

Plamen Angelov, Yi Zhang, Richard Buswell, Victor Hanby¹

Mr. Yi Zhang met with the monitoring committee on January 13, 2002. Knebel and Sowell were not present at the meeting. An interim progress report was presented to the committee. It is available on request from the monitoring committee chair.

The project status is summarized below.

Task	Time Allocated (months)	Completion, June 2001 (%)	Completion, January 2002 (%)
1. HVAC Design Inventory	3	85	100
2. Selection of a Simulation Program	15	100	100
3. Component Model Development	12	5	60
4. ACG Development	30	60	75
5. Optimization-Simulation Interface Editors and Interpreter	12	65	70
6. Implement Optimization Method	24	75	75
7. Develop Run-time Supervisor	9	20	35
8. Design Test Briefs	18	15	60
9. Evaluation of Project and Final Report	9	20	25

Table 1.1, Progress to January 2002

¹ Institute of Energy and Sustainable Development, De Montfort University, Leicester, LE7 9SU, UK

The presentation by Mr. Zhang covered the progress since June 2001, and demonstrated several systems produced by the configuration generator. The committee is developing a short list of questions that will be forwarded to Dr. Wright. None of the questions represent serious problems.

The tasks to be completed along with the estimated time to completion are shown below.

Main Task	Sub Task	Duration (person/months)
3 Component Model Development	(a) complete the energy, capital cost, operating cost, and design constraint models.	0.5
	(b) implement the energy, capital cost, operating cost, and design constraint models.	1.0
4 ACG Development	(a) investigate methods for improving the computational performance of the ACG.	2.0
	(b) evaluate the effectiveness of the ACG in generating novel and optimal system configurations for the example design briefs.	5.0
5 Editors and Interpreter	(a) implement a procedure for automatically editing the IDA input file for new model parameter values and boundary conditions generated by the optimization.	1.0
	(b) implement a procedure for automatically interpreting the IDA output file for the information relating to the optimization criteria and constraints.	1.0
6 System Size and Performance Optimization	(a) implement a procedure for the semi-automatic definition of the system sizing and performance optimization.	2.0
	(b) implement a fitness formulation suitable for solving HVAC system sizing and optimization problems.	0.5
	(c) evaluate the performance of the approach in optimizing the size and performance of systems generated by the ACG for the example design briefs.	2.0
7 Run-time Supervisor	(a) continuing enhancement of the interface.	1.0
8 Design Briefs	(a) define example zone geometries in EnergyPlus and simulate zone loads the example buildings.	0.5
9 Final Report	(a) collate information and write the report.	1.5

TC 4.7 Research Status

Last updated April 30, 2002

Active projects

#	Title	Joint TC	Cognizant subcom / Contractor	PMSC	Dates / status
865-RP	Accuracy Tests for Mechanical System Simulation		Sim/Comp Penn/TAMU Gren Yuill	George Walton (chair), Ron Judkoff, Robert Sonderegger, Dave Knebel	Rec: 2-20-96 (San Antonio) NCE: 2-28-98 (7-1-97) NCE: 8-31-98 (1-20-98) NCE: 3-31-99 (6-23-98) NCE: 3-31-00 (1-27-99) NCE: 3-31-01 (2-8-00) NCE: 8-31-01 (1-30-01) NCE: 3-31-02 (1-15-02)
1049-RP	Building System Synthesis and Design	1.5	Sim/Comp Loughborough University Jonathan Wright	Curt Pedersen (chair), Ed Sowell, Dave Knebel, Ron Nelson (TC 1.5), Mike Brandemuehl (TC 4.6), Jan Hensen	WS: 1-20-98 (SF) Rec: 6-22-99 (Seattle) End: 8-02?
1050-RP	Development of a Toolkit for Calculating Linear, Change-point Linear, and Multiple Linear Inverse Building Energy Analysis Models		Inv U. of Dayton Kelly Kissock	Jan Krieder (chair), Robert Sonderegger, Moncef Krarti, Agami Reddy	WS: 7-1-98 (Boston) Rec: 6-23-98 (Toronto) NCE: 3-31-01 (6-27-00) NCE: 10-1-01 (1-30-00)
1197-TRP	Updated Energy Calculation Models for Residential HVAC Equipment	7.6	Sim/Comp Univ. of Colorado Mike Brandemuehl	Chip Barnaby (chair), Craig Wray, Brian Dougherty (TC 7.6)	WS: 2-8-00 (Dallas) Start: 1-02
1222-TRP	Incorporation of Nodal Room Heat Transfer Models into Energy and Load Calculation Procedures		Sim/Comp MIT, Yan Chen	George Walton (chair), Ian Beausoleil-Morrison, Kevin Knappmiller, Phil Haves	WS: 6-00 (Minn) Start: 8-01

In process

#	Title	Joint TC	Champion(s) / PES	Committee	Dates / status
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Attachment F

Research Subcommittee Minutes TC 4.7 Minutes, Atlantic City

15 January 2002

1051-WS	Procedures for Reconciling Computer Calculated Results Against Measured Energy Data (note new title)		Inv; Jeff Haberl, Robert Sonderegger	Robert Sonderegger (chair), Agami Reddy, Vern Smith	WS: 7-1-97 (Boston) Returned by RAS Resubmitted 9-1-01 Approved, funding hold 10-01
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Workstatements – Inverse Methods

Title	Champion(s)	Ranking	Dates/status
Methodology Development to Extend ASHRAE Semi-Empirical Chiller Models to include Models for Screw Chillers, Package Air-Conditioners, and Heat Pumps	Agami Reddy, Jeff Haberl		WS being developed
Development of a Procedure for Baseline Energy Use of Large Central Plants	Moncef Krarti, Jeff Haberl	2 (2002-2003)	WS 2-1-00
Inverse Bin Procedures for Analyzing Energy Savings	Jeff Haberl	3 (2001-2002)	WS 2-1-00
Use of Evolutionary Computation for Inverse Problems			

Workstatements – Applications

Title	Champion(s)	Ranking	Dates/status
Procedures and Data for High-Performance Residential Design	Mike Witte	1 (2002-2003)	RTAR submitted, 8-01
Define Performance Factors for Primary and Secondary Equipment Simulation Inputs for Commercial Buildings	Dan Nall, Bill Bahnfleth		WS being developed
Characterization of Building Secondary Thermal Loads from Chiller of Electric Use Data	Robert Sonderegger, Agami Reddy		
Development of Standardized Computer Simulation Input Files for Describing Typical Residential Homes and Common Energy Conservation Retrofits	Jeff Haberl, Joe Huang		No progress, 1-29-01
Methodology to Define Bounds of Variability in Building Energy Use Predictions Using Detailed Simulation Models and How it can be Incorporated in the Design Process			
Analysis and Testing of the Energy Cost Budget Method in ASHRAE 90.1			

Attachment F

Workstatements – Simulation and Component Models

Title	Champion(s)	Ranking	Dates/status
Development of Detailed Descriptions of HVAC Systems (Templates) for Energy Simulation Programs (formerly WS-1198)	Les Norford, Jan Hensen, Dru Crawley		1198-WS rejected by RAS 3-00 Rewrite underway 1-30-01 Terminated by S&CM 1-13-02
Development of a Toolkit of HVAC Models (Algorithms) for Refrigerated Warehouses	Jan Kosny		
Development of comparative test cases for evaluating simulation models of slab, crawl space, and basement heat transfer to adjacent ground	Ian Beausoleil-Morrison, Joel Neymark, Jan Kosny	2 (2001-2002)	Indefinite hold (1/2002); IEA task 22 is doing some of this work

Recently completed projects

#	Title	Joint TC	Cognizant subcom / Contractor	PMSC	Dates / status
987-RP	Preparation of a Toolkit for Building Load Calculations	4.1	Sim/Comp Univ. of Illinois Curt Pedersen	Dru Crawley (chair), Chip Barnaby, George Walton, Dave Knebel; Tom Romine (TC 4.1)	Rec: 1-28-97 (Phil) Accept report: 1-30-01
1052-RP	Development of an Analytical Verification Test Suite for Whole Building Energy Simulation Programs – Building Fabric		Sim/Comp OSU Jeff Spitler	George Walton (chair), Ron Judkoff, Joel Neymark, Fred Winkelmann	Rec: 6-23-98 (Toronto) Accept report: 1-30-01
1093-RP	Compilation of Diversity Factors and Schedules for Energy and Cooling Load Calculations	4.1	App TAMU (TEES) Jeff Haberl	Agami Reddy (chair), Bill Bahnfleth, Joe Huang, Suzanne LeVisuer (TC 4.1)	Start: 2-1-99 Accept report: 6-26-01
1145-RP	Modeling Two- and Three-Dimensional Heat Transfer Through Composite Wall and Roof Assemblies in Hourly Simulation Programs		Sim/Comp Enermodal Engineering Ltd	Ian Beausoleil-Morrison (chair); George Walton; Fred Winkelmann, Doug Hittle (TC 4.1)	Rec: 6-22-99 (Seattle) Accept report: 1-30-01

second draft – 6/14/01

Towards a Strategy for TC 4.7

Scope of TC4.7

“ASHRAE Technical Committee 4.7 is concerned with identifying, evaluating, developing, and recommending procedures for calculating energy performance of buildings.”

- design and operation of individual buildings (including analysis of retrofit options)
- generic assessments for policy purposes, including codes and standards development
- implementation in tools – should be “useable” or “easy to use”
- ensure that calculation procedures are available for systems that are potentially more energy-efficient than conventional systems.

Action Plan

The considerations discussed above suggest that we do the following:

1. Ensure that available energy calculation procedures are complete with respect to:
 - a. Different environmental control systems (active/HVAC and passive/envelope)
 - b. Different applications (operations, policy ... as well as design)
2. Work to integrate energy calculation procedures with other analysis procedures used in different aspects of building procurement and operation.
3. Work to develop complete, end-to-end analysis procedures (emphasis on complete) and ensure that we have working implementations of the core calculations of each step of the selected procedures (leaving interfaces to others). These procedures will generally involve other considerations as well as energy.

The first is largely (though by no means completely) internal to TC4.7 and the current subcommittee structure seems reasonably well matched to fulfilling this aim. This would provide a focus and a filter. For a research topic to be adopted, we should be able to justify the statement that it represents (one of) the highest priorities within our scope. We need a process that involves the whole TC in the assessment of the completeness of existing energy calculation procedures and the prioritization of the gaps to be filled.

The second and third, by their very nature, cut across the scope of many other TCs, mostly in Section 4, some in Section 9.

There is currently no mechanism in ASHRAE to support this level of cross-cutting. We should resist the temptation to spawn Task Groups; there are already too many TC/TGs and setting up separate groups/committees does not necessarily promote integration, which is the underlying need.

We need to identify/invent a way for existing TCs to work together that goes beyond cosponsorship of research projects and program but doesn't create all the bureaucratic baggage of a new TG/TC. Aims of such a collaboration might include:

1. Identification of research needs in a broad technical area, e.g. procedures for the calculation of building/HVAC performance (this would be very helpful to RAC, particularly if carried out across the range of broad topic areas covered by the whole Society)
2. Identification of changes to the structure and content of the Handbook that would make it more useful to the designer.

One partial way to advance this idea would be to hold a series of forums. This vehicle would make it easier to solicit a range of views and also to transcend TC boundaries and allegiances. Another, complementary, approach is to work at the Section level to set goals and define a set of projects that would fill the gaps that prevent those goals being met using current knowledge. A possible way of working would be to create a (set of?) 'virtual' TG(s) on the web, each with a list server for exchanging ideas and an ftp site for developing work statements.

One major goal would be to provide a procedure or process for each of the major tasks in the design, commissioning and operation of buildings that involves (or should involve) energy calculations, e.g.:

- system selection
- system sizing
- performance verification
- retrofit analysis

The aim would be produce a Handbook chapter or group of chapters for each task, linked to a self-consistent and comprehensive set of (interoperable!) computer-based analysis tools and sources of data. These chapters could replace current chapters or form a new Procedures volume. A starting point would be for RAC to commission a set of case-study solutions of some typical design problems using Handbook methods. This would be a relatively short-term project that would rapidly reveal how poorly the current Handbook structure serves the member who "just wants to do <whatever>."

More generally, to get started, we should identify a few problems where:

1. Cross-cutting research is likely to be highly useful
2. The other interested TCs are likely to be cooperative

3. The number of other interested TCs is relatively small, say one to three.

Overall, what we are proposing is a radical change in the way the Society conducts research and produces the Handbooks.

**TC 4.7 Research Planning Meeting
ASHRAE Winter Meeting
Atlantic City
Saturday, January 12, 2002
1:30-3:00 p.m.**

Haves opened the meeting by proposing a three-part agenda:

1. Are TC 4.7 activities “covering the waterfront?”
2. How to fill in identified gaps?
3. How should TCs work together?

Barnaby amplified the first item by suggesting that it covers three topics:

1. Models
2. Procedures
3. Assumptions (positions of window blinds, size of internal loads)

Wray asked what the working world needs, in day-to-day operations. Crawley noted that ARTI has done Web-based surveys of what is desired and what problems exist, from a design perspective. Crawley will seek permission to share a report in second-draft form.

Reddy noted that models include equations, user interfaces, and input-output processing. Within ASHRAE, user interfaces may overlap with TC 1.5 and modeling with TCs 4.6, 4.11, 9.6 and 9.9.

Haves is looking for a mechanism within ASHRAE for 2-4 TCs to work together, driven by such process needs as design. There is no precedent or mechanism for this kind of collaboration.

Barnaby suggested that standard data and standard ratings could serve the needs of multiple committees, in contrast to such ratings as SEER, which is useless for simulation. A common vocabulary is needed.

Pedersen was able to get the fenestration (TC 4.5) and load-calculation (TC 4.1) communities to work together, after considerable effort, and the beneficial results are in the 2001 Handbook of Fundamentals. TCs 4.1 and 4.2 (Weather Information) are working together on 12-month weather files. Haves would like to be more pro-active and less reactive to Handbook deadlines.

Hayter (RAC liaison) stated that RAC has more research projects than funds and must prioritize approved work statements. RAC has 25 work statements on the table and will be able to send out 5-

6 for bid this year. She noted that research subcommittee chairs will meet Monday morning and proposed a meeting in Honolulu for Section 4 research chairs, to share summaries of current projects. The goal is to write and submit very strong, combined work statements in lieu of separate, weaker work statements that concern only a single TC. It would benefit RAC for Section 4 to conduct a section-level WS prioritization. Crawley noted that RAC may ask each section for a plan, in lieu of research plans from individual TCs.

Barnaby proposed an HVAC design charrette to identify specific failings with the handbooks: lack of information or common descriptions. Designers would be invited to design an HVAC system for a large building, using only material from the handbooks. It might be learned that designers use the handbooks infrequently.

Smith notes that the electronic handbook permits frequent updates.

Klems proposed liaison subcommittees: not just a single person but a group representing two or more TCs.

Wray noted that ASHRAE needs to support performance-base codes and designs, as well as prescriptive approaches.

Barnaby proposed a procedures volume that would include loads calculations and how to select systems. Sommers stated that such a volume could complement but not replace the existing four volumes. Willson stated that selection of HVAC systems is not well covered in the existing volumes.

Barnaby noted that a new volume would focus the efforts of TC 4.7. Haves stated that energy efficiency will be left out unless championed, due to relatively cheap energy. Next steps on such a volume would start with TCs from sections 4 and 9, and possibly 1 and 6.

Klems stated that a relationship between ASHRAE's Handbook and Standards Committees would help. Haves suggested taking the major design standards, 62 and 90, and assessing how a designer works to meet these standards. He asked whether Handbook could fund the design charrette, in lieu of proposing it as an RTAR. Klems thought that a correctly worded RTAR would garner wide support. Haves noted that it is not a conventional research project and advocated trying to sell it at a higher level, possibly by submitting it to the Board of Directors via Don Colliver. This would yield a quick answer and prompt the Board to think of something better. If a charrette, ASHRAE could entice firms to send participants and pay travel.

Wray identified aspects of the HVAC design problem: different stages of design (conceptual, detailed) and different levels of experience among designers. A charrette would need a cross-section or a deliberate bias.

Barnaby and Haves suggested that an ASHRAE design-procedures volume could be prescriptive (a contract could require that the designer follow the procedures), in the form of a design standard, or could be a design guideline. Barnaby said that TC 4.7 could initiate the procedures volume, but Haves cautioned that it would be hard to sell if it did not integrate other issues.

Wray suggested that a Web-based survey could gather useful information about design practice.

Haves asked whether TC 4.7 subcommittees should assess gaps in knowledge or its presentation. Spitler replied that S&CM is responsible for components and Applications for procedures.

Moving beyond boundaries of TC 4.7, Haves suggested that there could be a fifth handbook volume for design and a sixth for operations.

The meeting concluded with Haves' commitment to contact Ekhard Groll, Section 4 head in TAC, to ask for time for the Section 4 TC chairs to meet as part of the meeting of all TC chairs, scheduled for Monday morning.

TC 4.7 Energy Calculations
Handbook Subcommittee
Meeting Minutes
Atlantic City, Jan. 14, 2002

Introduction

The meeting was called to order at approximately 5:00 pm with 21 people in attendance as shown in the attachment.

Report From TC Chair Meeting

Rick Strand reported the following items from the TC Chair meeting:

1. The electronic handbook on CD is now the official version of the handbook series. The printed version will be a subset of the electronic version.
2. The handbook needs to be relevant to the end-user. The concern is that the handbook is being written by those in academia for other researchers in academia. The goal should be to have the handbook series be understandable to an engineer just starting out of college (junior level engineer). Thus, terms and jargons must be well-defined and the text needs to be clear yet concise.
3. Handbook committees need to refer back to the “ASHRAE Handbook Author and Reviser Guide” and follow the spirit of this document.
4. Updates to the handbooks will be allowed yearly and such changes are being encouraged for the electronic version. The society will maintain the 4 year cycle for more comprehensive reviews of the handbooks.
5. ASHRAE leadership is calling for a significant change in the handbooks and realizes that this is a major undertaking. It is expected that this will be a gradual process to take place over 10-20 years. We are not expected to rewrite the entire chapter overnight but the process of change should begin immediately.
6. The leadership feels that ASHRAE’s identity is closely coupled with the perception of the handbook quality. When practicing engineers are not being served by the handbooks, there is concern that these engineers will view ASHRAE in a less than positive light.

Bill Fleming, Handbook liaison, reported that there were no comments on Chpt. 31. The negative comments have been somewhat overstated. Most comments are to the effect that the member is confused by material presented in the book. He stated that TC 4.7 has been selected as a testbed for innovative approaches to the handbook. There are definitely electronic handbooks of some sort in the future. Jim Willson noted that although the handbook on CD would be useful for some activities, a printed format was more readable and useful for many activities.

Handbook Survey/Electronic Additions to Chapter 31

The committee felt that for a first cut at an electronic handbook sound, media players, interactive graphics and animation would not be feasible. The following ideas came out of a brainstorming session aimed at eventually creating an electronic chapter 31:

- Jeff Spitler suggested that implementing simple simulation algorithms in MS Excel VBA with an Excel front end could be an effective way of illustrating simulation methods. The committee agreed that engineers are generally comfortable with working in a spreadsheet environment. Other related comments included:
 - Excel is ubiquitous. Nearly everyone has access to it.
 - Using named variables makes detailed calculations tractable in a spreadsheet.
 - A spreadsheet could be used to “animate” a bin method.
 - The toolkit models could be ported to VBA for inclusion in the handbook
 - Inverse methods could also possibly be illustrated in a spreadsheet format.
- Ron Judkoff suggested that we could include hot links to other documents including web documents. BESTEST could possibly interact with the chapter in some way.
- Joe Deringer suggested that we would need to do some sort of market analysis to determine if our ideas will fly with the membership. Jeff Spitler noted that the Applications subcommittee could take the lead in developing examples showing how the procedures worked. Membership interaction with the examples could be one mechanism that would give us feedback on the usefulness of the chapter.

Action Items

- Rick Strand will contact Mick Schwedler to confirm that TC4.7 is interested in being one of the TCs that push forward with example changes to the Handbook. He will also remain in contact with our Handbook Liaison, Bill Fleming.
- Dru Crawley, Ron Judkoff, and Peter Zhang volunteered to assist the chair with the initial cut at some of the electronic improvements to Chapter 31.
- Rick Strand will coordinate with the webmaster of TC4.7 to put some of our example improvements up on the TC4.7 web site.

Additional Notes from Sim&CompModels Subcommittee

Jeff Spitler asked Bill Fleming (Handbook Liaison) if we were singled out as an “offending” chapter TC. Answer was “no”. We want to be one of the first TCs that will add electronic elements to the handbook. Each subcommittee may need to have a handbook focus. Mike Brandemuhl wondered about the potential problem for links getting out of hand and some of the information being redundant, contradictory, etc. Jeff Spitler reported that Section 4 chairs met today at noon to discuss this issue. We will need to make a broader effort than in the past and asked the members to consider how they might contribute to our leadership in this area. Robert Sonderegger talked about getting the toolkit into the Handbook. Jeff Spitler said we discussed this and also turning small models into VBAs. (Jeff Spitler volunteered to do some of these and volunteered Dan Fisher as well.) Les Norford noted that only feedback from outside world on the chapter was something obscure from the degree-day method (Les will forward comments to Rick Strand) and that bin method be put back in. Phil Haves noted that during the Saturday meeting we were expecting some big announcement but was disappointed that TC chair meeting message was that we didn’t follow the instructions and that because of that it’s our own fault; there were no concrete proposals and thus it is up to us to come up with concrete advances. Mike Brandemuhl talked about the need for market research on what the problems are with the handbook—what can’t they do and what is in there that they can? Jeff Spitler—Bill Fleming was at Handbook and he will send Jeff Spitler a survey (we weren’t singled out, perhaps because we are “fundamentals”). Phil Haves—should our presence only be

in the fundamentals volume, can it be in some other special publication? Jeff Spitler—we have also been asked to do technical bulletins; perhaps we need something like a “wish list” of frequently asked questions with answers. Les Norford reported that TAC hopes to get feedback from different regions and also use that potentially as some “market research”; some of us need to talk to Mark Hegberg about these issues. Jean LeBrun—equations need to be exhibitable (?). Carol Gardner may have some practitioner perspective to add.

The meeting was adjourned at 5:59pm.

Attendance List

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**TC 4.7 programme plan
following Atlantic City meeting
January 2002**

Atlantic City / January 2002

1) Symposium

Applications and development of calibrated models for chillers and cooling towers.

Organized by TC 1.5; co-sponsored by TC 4.7 and TC 8.6.

Chaired by Agami Reddy.

2) Seminar

Commercial use of building energy simulations

Organized by TC 4.7 (Applications)

Chaired by Kamel Haddad

Honolulu / June 2002

1) Symposium

Recent advances in the thermal simulation of HVAC equipment (title changed).

Organized by TC 4.7 (Sim and comp models); co-sponsored by TC 4.1.

Chaired by Ian Beausoleil-Morrison.

Status: Review completed. Final papers (4) due January 21.

2) Seminar

Getting started in building simulation.

Organized by TC 4.7 (Applications).

Chaired by Chip Barnaby.

Status: Topic fleshed out. Speakers yet to be lined up.

Chicago / January 2003

1) Symposium

Recent advances in building energy simulation (title changed).

Organized by TC 4.7 (Sim and comp models); co-sponsored by TC 4.1.

Chaired by Jan Hensen.

Status: 5 abstracts accepted. First draft of papers due April 2002 (one in already).

Reviewers required. Could potentially pull in a technical paper or two on 1093-RP and one on 1052-RP to make this a double symposium.

2) Symposium

Inverse methods for calculating savings from energy conservation retrofits.

Organized by TC 4.7 (Inverse methods).

Chaired by Jan Kreider.

Status: A couple of papers have been submitted. Deferred from Honolulu as waiting on paper on 1050-RP.

- 3) Seminar
Automated baselining procedures using inverse methods.
Organized by TC 4.7 (Inverse methods).
Chaired by Jeff Haberl.
Status: Deferred from Honolulu.

- 4) Seminar
Defining what inverse methods mean to you
Organized by TC 4.7 (Inverse methods).
Chaired by Agami Reddy.
Status: New.

Kansas City / June 2003

- 1) Symposium
Interoperability and tool portability.
Organized by TC 4.7 (Sim and comp models).
Chaired by Chip Barnaby.
Status: Abstract call not yet issued.

- 2) Symposium
Integrating air flow modelling into energy analysis programs.
Organized by TC 4.7 (Sim and comp models).
Chaired by Ian Beausoleil-Morrison.
Status: Abstract call to be made February 2002.

- 3) Seminar
Inverse methods in support of building commissioning
Organized by TC 4.7 (Inverse methods).
Chaired by Jean Lebrun.
Status: New.

MINUTES
SPC-140 SMOT FOR BUILDING ENERGY SOFTWARE
Cincinnati, June 25, 2001
Chair: R. Judkoff (submitted Jun, 26 2001)

ATTACHMENTS

- A. Agenda for June 25, 2001 meeting
- B. Mailing List

CORRESPONDANCE SINCE LAST MEETING

ASHRAE Staff is working towards publication of Standard 140. According to Ron Anderson, the galley for Standard 140 have been completed and should arrive at NREL very soon. ASHRAE anticipates that ANSI review should take about 2 weeks, and that publication within a month is possible.

The following roster recommendation was submitted to the MOS by Judkoff in May.

Name	Type of Member	Interest Category	Initial Term (years)
Beausoleil-Morrison, Ian	PCVM	Producer	5
Crawley, Dru	PCVM	Gen Int	4
Fairey, Philip	PCVM	Gen Int	6
Haberl, Jeff	PCVM	User	3
Judkoff, Ron	PCVM, Chair	Gen Int	4
Neymark, Joel	NVM, Vice Chair	Gen Int	4
Rees, Simon	PCVM	User	3
Walton, George	PCVM	Gen Int	5
Wilcox, Bruce	PCVM	Producer	3
Winkelmann, Fred	PCVM	Producer	6
Witte, Michael	PCVM	User	4

GENERAL

None

DIAGNOSTIC TESTS

The primary purpose of the meeting was to discuss test cases that could be added to Standard 140.

Attendees (see mailing list for full names, etc)

Note: Members of the future SSPC 140 group were in attendance, however, SPC 140 does not officially become SSPC 140 until Standard 140 is actually published by ASHRAE.

Voting Members

Crawley

Haberl

Judkoff (chair)

Walton

Wilcox

Witte

Non-Voting Members

Neymark (vice chair)

Other

Baxter (SPLS Liason)

Beausoleil-Morrison

Deru

Griffith

Henderson

Rees

Shirey

Torcellini

Committee Discussion

Approval of Prior Minutes

SSPC 140 would have had a quorum at this meeting, but does not officially exist until Std 140 is published. There was not a quorum of SPC 140 members at the beginning of the meeting so that no official actions could be taken.

Motion (): Accept Minutes of Jan 2001 meeting (Atlanta).

2nd ():

Vote: Yes = , No =

Absent = ()

Motion = passed/failed.

Discussion regarding Standards Committee Approvals (Baxter)

The following actions were taken regarding the SSPC 140 roster:

22 June 2001: SPLS approved the SSPC 140 Chair's roster recommendation.

23 June 2001: Standards Committee ratified SPLS's SSPC 140 roster approval.

We will have a new SPLS liason next year.

Update on activities regarding federal Senate Bill 207 that includes tax credit legislation for energy efficiency in buildings, and could reference Std 140 (Fairey)

There are 3 bills on tax credit legislation in the U.S. Senate; each bill has a very similar companion bill in the House. All 3 bills reference International Energy Conservation Code (IECC 2000 formerly Model Energy Code [MEC]) and mention certification of software. Of these, Fairey primarily discussed the bi-partisan bill (SB 207 – Smith/Feinstein) – that covers residential, commercial, and public/municipal new buildings and retrofit of existing buildings. SB 207 has a clause requiring certification of software that would be used to estimate energy savings related to tax credit evaluation.

SB 207 currently references the California ACM 98. Fairey's criticisms of using ACM 98 (acronym = ?) for this are that it is too complex and too constrained – some specifics are:

- ACM requires a minimum of 300 simulations for compliance.
- In some cases the state of the art in modeling is limited because some specific algorithms are required, e.g. for:
 - o Ground modeling
 - o Duct modeling
- ACM needs a range of acceptability rather than a single number.

Update on IECC citing of Std 140 (Fairey)

IECC 2000 currently uses HERS BESTEST as method of test for certification, but they would prefer to use a referencable document. They plan to reference Standard 140 when it gets an ANSI/ASHRAE designation.

Discussion of Test Cases that could be added to Standard 140

Presentations were given on test cases included in the following procedures that could be added to Standard 140:

- HERS BESTEST (Neymark)
- HVAC BESTEST (Neymark)
- RP-1052 Envelope Analytical Tests (Rees)
- RP-865 Air-Side Mechanical Analytical Tests (Haberl)

The sense of the future-SSPC 140 members present was that RP-1052 and RP-865 both need more field trials before those test cases could be considered for Standard 140.

Unofficial motion (Fairey): Incorporate HVAC BESTEST E100-Series test cases into Standard 140 as soon as possible.

Unofficial 2nd (Witte):

Discussion points in favor of motion included:

- Fairey: Energy consumption is the primary metric, therefore testing of mechanical systems models is essential.
- Witte: For a given software, the results (good or bad) of the specific performance map-based tests of HVAC BESTEST can be used as a general measure of the quality of other performance-map based models that exist in that given tool. Any fixes to a given software that were applied in specific cases are likely to be needed throughout its other performance-map related models.

Discussion point against motion included:

- Beausoleil-Morrison: Space cooling is a low priority in Canada

Unofficial Vote: Yes = 6 , No = 0, Abstain = 1 (Chair)

SSPC future members Absent = (Crawley, Wilcox, Winkelmann)

Motion = unofficially passed.

Later discussion of whether to prioritize HVAC BESTEST inclusion above HERS BESTEST inclusion resulted in

For HVAC BESTEST: Haberl, Rees, Fairey

For HERS BESTEST: Beausoleil-Morrison

Based on discussion, the following actions will be taken:

- VC: Send out copies of HERS BESTEST and HVAC BESTEST to SSPC 140.
- VC: Set up a conference call to discuss prioritization of HVAC BESTEST versus HERS BESTEST.

- Chair: Discuss feasibility of supporting work statements related to RP-1052/RP-865 field trials with ASHRAE R&T Committee

- VC: Modify framework of Chapter 4 to include new tests (after SSPC 140 formally decides which new tests are going in)

Meeting Adjourned.

References

ASHRAE. BSR/ASHRAE Standard 140P, *Method of Test for the Evaluation of Building Energy Analysis Computer Programs*. March 2001. ASHRAE, Atlanta, GA.

Attachment A – Agenda

SPC 140 Preliminary Agenda

Date: Monday, 25 June 2001

Time: 2:15P - 6:15P

Location: Room CC/234 (2nd level, of Cincinnati Convention Center)

0) Introductions

1) Approval of Previous Minutes (29 January 2001, Atlanta), attached

2) Update on publication status of Std 140 (Judkoff/Neymark)

3) Report on approval of SSPC 140 roster. (Baxter/Judkoff)

4a) Update on activities regarding federal Senate Bill 207 that includes tax credit legislation for energy efficiency in buildings, and could reference Std 140 (Fairey)

4b) Update on IECC citing of Std 140 (Fairey)

5) Discussion regarding mission for SSPC 140 including

- Incorporate more test cases (HERS BESTEST, HVAC BESTEST, 1052-RP, 865-RP)
- Update the current reference results
- Assist with development of compliance criteria that could be called out by other Standards
- Render official interpretations of the Standard
- Identify areas for additional research.

This discussion will include review/refreshers presentations on:

5a) HERS BESTEST (Neymark, 15 minutes)

5b) HVAC BESTEST (Neymark, 15 minutes)

5c) RP-1052 Envelope Analytical Tests (Rees, 15 minutes)

5d) RP-865 Air-Side Mechanical Analytical Tests (Haberl, 15 minutes)

5e) Committee discussion to obtain a sense of preferred direction of activities.

6) Other

Attachment B - SPC 140 ADDRESS LIST 12 December 2000

(note: in general email attachments should go out as both *.DOC, *.RTF and *.WP5)

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