

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: Feb. 3, 2004

TC/TG/TRG TITLE: Energy Calculations

DATE OF MEETING: January 27, 2004 LOCATION: Anaheim

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS & ADDIT'L ATTENDANCE
Dru Crawlev (CHM)	2000	n		
	2000	Les Norford (VC)		
Dan Fisher (SEC)	2002	p		
Vern Smith (RES)	2000	p		
Jeff Haberl (PROG)	2002	p		
Jim Willson (APP)	2000	p		
bahnfleth	2003	p		
Joel Neymark (SC)	2000	p		
	2000	Jan Hensen (INTL)		
Patrick Carpenter	2003	p		
Phil Haves	2000	p		
Michael Brandemuehl	2003	p		
Tim McDowell	2002	p		
Rick Strand	2001	p		
Robert Sonderegger	2002	p		
Gren Yuill	2000	p		
Ian Beausoleil-Morrison	2000	p		
George Walton	2003	p		
John Wright (INTL)	2003	p		

DISTRIBUTION

ALL MEMBERS OF THE TC/TG/TRG

TAC CHAIR	Mark C. Hegberg
TAC SECTION HEAD	Craig C. Wray
SPECIAL PUBLICATIONS LIAISON	Marilyn A Listvan
JOURNAL/INSIGHTS LIAISON	Harvey Sachs
STANDARDS LIAISON	Richard D. Hermans
HANDBOOK LIAISON	William S. Fleming
PROGRAM LIAISON	Peter Simmonds
RAC RESEARCH LIAISON	Michael J. Brandemuehl
ALI LIAISON	Douglas C. Hittle
TEGA LIAISON	Charles E. Gullede III
STAFF LIAISON (RESEARCH)	Michael R. Vaughn
STAFF LIAISON (TECH SERVICES)	Michael R. Vaughn
STAFF LIAISON (STANDARDS)	Claire Ramspeck

ASHRAE TC 4.7 Energy Calculations

ANAHEIM MEETING

ACTION ITEMS

1. 1049-RP: Request for no cost extension. Final report will be submitted on May 29 for a vote in Nashville. Motion (brandemuehl/Haberl) No Cost Extension to August 31. 2004: approved (15-0-2) Chair and PI not voting.
2. 1197-RP Motion (Smith/Neymark) No Cost Extension to August 31. 2004: approved (15-0-1) Chair and PI not voting.
3. Ian Beausoliel-Morrison will circulate ranking criteria for wish lists to the full committee
4. RP1305 PES recommended not funding the proposal (PES McDowell, Krarti, Kosny). (smith/walton) motion to accept PES recommendation: approved (16-0-0) CNV
5. Crawley noted RAC has revised RTAR forms. Will distribute forms to TC
6. motion(haberl/bahnfleth) to accept the program prioritization (as shown in Appendix G) approved (16-0-0)CNV
7. Rick Strand will distribute a revised RTAR '*Develop a Radiant/Convective System Module for an Energy Simulation And Analysis Program*' from TC 6.5 prior to Nashville for TC 4.7 co-sponsorship consideration.
8. motion to co-sponsor seminar titled Models for Automated Building and HVAC Diagnostics(brandemuehl/haberl) approved (16-0-0)

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TC/TG/TRG MEETING SCHEDULE				
LOCATION – past 12 months		DATE	LOCATION - planned next 12 months	
Kansas City		July 1, 2003	Nashville	
Anaheim		January 27, 2004	Orlando	
TC/TG/TRG SUBCOMMITTEES				
Function			Chair	
Simulation and Component Models			Ian Beausoliel-Morrison	
Applications			Jim Willson	
Data-Driven Modeling			Agami Reddy	
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/Fleming
STANDARDS ACTIVITIES - List and Describe Subjects				
SPC 140 Standard Method of Test for Building Energy Software – Joel Neymark				
TECHNICAL PAPERS from Sponsored Research - Title, when presented (past 3 yrs. present & planned)				

Appendix 3
TC/TC/TRG Sponsored Symposia - Title, when presented (past 3 yrs. present & planned)
Appendix 4
TC/TG/TRG Sponsored Seminars - Title, when presented (past 3 yrs. present & planned)
Appendix 5
TC/TG/TRG Sponsored Forums - Title, when presented (past 3 yrs. present & planned)
None
JOURNAL PUBLICATIONS - Title, when published (past 3 yrs. present & planned)
None

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
Add to email list	Anaheim July 2004	Kansas City July 2003	Chicago January 2003	Honolulu June 2002			
	X	X	X		Abushakra	Bass	abushakr@msoe.edu
X	X	X			Anderson	J.R.	jrhazel@bellsouth.net
	X		X	X	Bahnfleth	Bill	wbahnfleth@psu.edu
	X	X	X	X	Barnaby	Chip	CBarnaby@wrightsoft.com
				X	Bauman	Fred	fbauman@uclink.berkeley.edu
	X		X	X	Beausoleil-Morrison	Ian	IBeausol@nrcan.gc.ca
				X	Bojic	Milorad	bojic@knez.uis.ac.yu
			X		Bradley	Brian	bbradley@nrcan.gc.ca
	X		X	X	Brandemuehl	Mike	michael.brandemuehl@colorado.edu
			X		Braun	Jim	jbrown@ecn.purdue.edu
		X	X	X	Carpenter	J Patrick	pcarpenter@kling.us
		X			Chantrasrisalai	Chanvit	chanvit@okstate.edu
	X	X	X		Claridge	David	Claridge@esl.tamu.edu
	X	X	X	X	Crawley	Dru	Drury.Crawley@ee.doe.gov
	X	X			Degelman	Larry	larry@taz.tamu.edu
		X			Deng	Zheng	zhengd@okstate.edu
		X	X		Eldridge	David	dancingdavid@hotmail.com
	X				Ellis	Peter	peter_ellis@nrel.gov
	X	X	X	X	Fisher	Dan	DFisher@okstate.edu
			X		Fleming	Bill	flemg@aol.com
	X				Gardner	Carol	gems@teleport.com
	X				Gehlin	Sigge	gehlin@siki.se
	X			X	Gowri	Krishnan	k_gowri@pnl.gov
			X		Guan	Don	yzguan@ksu.edu
	X	X	X		Haberl	Jeff	JHaberl@esl.tamu.edu
					Haddad	Kamel	khaddad@nrcan.gc.ca
		X			Haiad	Carlos	Carlos.haiad.sce.com
	X	X	X	X	Haves	Philip	PHaves@lbl.gov
		X	X	X	Hensen	Jan	j.hensen@tue.nl
	X	X	X	X	Huang	Joe	YJHuang@lbl.gov
			X	X	Judkoff	Ron	ron_judkoff@nrel.gov
		X			Klaassen	Curtis	curtk@energy.iastate.edu
		X			Kong	Weixiu	weixiu@okstate.edu
		X			Koran	Bill	William.koran@honeywell.com

Present at TC 4.7 meeting?					Last name	First name	Email
Add to email list	Anaheim July 2004	Kansas City July 2003	Chicago January 2003	Honolulu June 2002			
		X	X		Kosny	Jan	kyo@ornl.gov
		X			Krarti	Moncef	krarti@colorado.edu
			X		Kreider	Jan	
				X	Lawrence	Tom	lawrenct@ecn.purdue.edu
			X		Lawrie	Linda	Linda@lawrie.com
	X				Lebrun	Jean	J.lebrun@ulg.ac.be
	X				Levermore	Geoff	geoff.levermore@umist.ac.uk
	X		X	X	Liesen	Richard	r-liesen@uiuc.edu
	X	X			Lisenbee	Larry	lrllisenb@southern.com
		X			Liu	Xiaobing	Xiaobin@okstate.edu
	X				Long	Nicholas	Nicholas_long@nrel.gov
		X	X		MacCracken	Mark	mmaccracken@calmac.com
	X	X	X		McDowell	Tim	Mcdowell@tess-inc.com
	X	X	X	X	Neymark	Joel	neymarkj@msn.com
		X	X	X	Norford	Les	lnorford@mit.edu
			X		Parson	Jim	parsons@me.msstate.edu
	X				Pegues	Jim	james.f.pegues@carrier.utc.com
			X		Phillips	Duncan	Duncan@cedarmere.ca
	X	X	X	X	Pedersen	Curt	cpederse@uiuc.edu
	X				Ramirez	Bob	Bob.Ramirez@itron.com
	X	X	X	X	Reddy	T. Agami	reddyta@drexel.edu
			X	X	Rees	Simon	SJRees@okstate.edu
			X		Rode	Carsten	car@byg.dtu.dk
		X			Sahlin	Per	per.sahlin@equa.se
			X		Scheatzle	David	scheatzle@asu.edu
	X				Selkowitz	Steve	seselkowitz@lbl.gov
	X	X			Shirey	Don	shirey@fsec.ucf.edu
		X			Silvetti	Brian	bslivetti@calmac.com
	X	X	X	X	Smith	Vernon	VSmith@archenergy.com
				X	Sommer	Klaus	Klaus.Sommer@vt.fh-koeln.de
	X	X	X	X	Sonderegger	Robert	rsonder@siliconenergy.com
	X	X	X	X	Spitler	Jeffrey	Spitler@okstate.edu
	X	X	X	X	Strand	Rick	R-Strand@uiuc.edu
	X	X	X	X	Walton	George	GWalton@nist.gov
				X	Wassmer	Mike	wassmer@colorado.edu
	X	X	X	X	Willson	Jim	jimwill@indy.net
	X	X	X	X	Wray	Craig	CPWray@lbl.gov
	X	X		X	Wright	Jonathan	J.A.Wright@lboro.ac.uk
		X			Xiao	Dongyi	xdongyi@okstate.edu
	X	X	X	X	Yuill	Gren	yuill@unomaha.edu
			X		Zhu	Daming	zdmhvaca@yahoo.com

Appendix 1**RESEARCH PROJECTS****TC 4.7 RESEARCH PROJECTS STATUS****Active projects**

#	Title	Joint TC	Cognizant Subcommittee/ Contractor	PMSC	Dates / status
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) NCE: 7-31-03 (6-25-02) NCE: 3-1-04 (7-1-03) NCE: 8-31-04 (1-27-04)
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 NCE: 3-1-04 (7-1-03) NCE: 8-31-04 (1-27-04)
1051-RP	Procedures for Reconciling Computer-calculated Results with Measured Energy Data		Data Driven Models Drexel Univ., Agami Reddy	Robert Sonderegger (chair) Ron Judkoff, Vern Smith, Marlin Addison	WS approved June 2003 Start: 12-03

Appendix 2**RESEARCH PLAN**

**ASHRAE
Technical Committee 4.7 Energy Calculations
2004-2005 Research Plan
1 August 2003**

TC 4.7 approved no new RTARs for consideration on the 2004-2005 Research Plan.

Title	TC Priority 2003-2004	Prior TC priority	Society status	TC Status	Comments	Subcom
Technical and Usability Enhancements to the Energy Calculation Toolkits	0	1 (2003-2004)	RTAR 2004-19, accepted	WS draft in progress	Dan Fisher:	SCM
Development of a Procedure for Base-lining Energy Use at Large Central Plants	0	2 (2002-2003)	RTAR, prioritized	WS draft in progress	Moncef Krarti, Jeff Haber!: Need to find additional support	DDM
Procedures and Data for High-Performance Residential Design	0	1 (2002-2003)	RTAR, accepted	WS draft in progress	Mike Witte, Vern Smith	A
Improving Load Calculations for Fenestrations with Shading Devices	Co-sponsor		Contract award approved, January 2004.	TC 4.1 RTAR. Draft WS approved by TC 4.1; co-sponsorship approved by TC 4.7 at June 2003 meeting	Chip Barnaby	

SCM = Simulations and Component Models

DDM = Data Driven Modeling (formerly Inverse Methods)

A = Applications

Appendix 3
TECHNICAL PAPERS FROM SPONSORED RESEARCH

RP	Title	Contractor	Approved	Paper
1093	Diversity Factors	TAMU, Haberl	Cincinnati, June 2001	Overview of Literature on Diversity Factors and Schedules for Energy and Cooling Load Calculations
987	Loads Toolkit	UIUC, Pedersen	Atlanta, January 2001	Pedersen, C.O., D.E. Fisher, R.J. Liesen, and R.K. Strand. 2003. "ASHRAE Toolkit for Building Load Calculations." ASHRAE Transactions 109(1). To be presented in Chicago, January 29, 2003
1052	Verification Test Suite	OSU, Spitler	Atlanta, January 2001	Rees, S.J., D. Xiao, and J.D. Spitler. 2002. "An Analytical Verification Test Suite for Building Fabric Models in Whole Building Energy Simulation Programs." ASHRAE Transactions. 108(1):30-41.
1145	Two- and Three-Dimensional Heat Transfer	Enermodal	Atlanta, January 2001	Carpenter, S.C., J. Kosny, and E. Kossecka. 2003. "Modeling Transient Performance of 2 and 3-D Building Assemblies: ASHRAE 1145-RP." ASHRAE Transactions 109(1). To be presented in Chicago, January 29, 2003
1093	Diversity Factors	TAMU, Haberl	Cincinnati, June 2001	Abushakra, B., D.E. Claridge and J.S. Haberl. "Electricity Diversity Profiles for Energy Simulation of Office Buildings;" "Electricity Diversity Profiles for Peak Cooling Load Determination in Office Buildings;" and "Overview of Literature on Diversity Factors and Schedules for Energy and Cooling Load Calculations." Submitted to ASHRAE December 27, 2001.
865	Accuracy Tests	UNO, TAMU	Honolulu, June 2002	Yuill, G.K. and J.S. Haberl. "Development of Accuracy Tests for Mechanical System Simulations."
1222	Nodal Models	MIT, Chen	Honolulu, June 2002	Two papers submitted to Int. J. of HVAC&R Research
1050	. Inverse Modeling TK	U Dayton, TAMU	Kansas City, June 2003	<i>Kissock,JK., J.S.Haberl D. E. Claridge,</i> "Inverse Modeling Toolkit - Numerical

				Algorithms"
1050	. Inverse Modeling TK	U Dayton, TAMU	Kansas City June 2003	<i>Haberl, J.S., A. Sreshthaputra, D. E. Claridge, J.K. Kissock, "Inverse Modeling Toolkit - Applications"</i>

Appendix 4
TC/TG/TRG SPONSORED SYMPOSIA

Current as of January 2004

PLANNED:

Orlando/February 2005

Validation of building simulation programs thru ASHRAE Standard 140 (Chair Jim Willson)

Recent Advances in Simulation (Chair Dan Fisher)

Nashville/June 2004

Modeling Moisture Sorption/Desorption by Building Materials (Chair Jan Kosny)

PAST:

Anaheim / January 2004

Applications and Knowledge-based Tools for Enhanced Building Energy Simulation (Chair, Vern Smith)

Kansas City, June-July 2003

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

Coupling of Building Airflow and Energy Modeling Programs (Co-sponsored with TC4.10 Chair: Jelena Srebric)

Chicago, January 2003

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

Honolulu, June 2002

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

Atlantic City, January 2002

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

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

Applications of Heat and Mass Balance Methods to Energy and Thermal Load Calculations
(Chair: Chip Barnaby)

Accuracy tests for simulation models (Chair: Mike Witte)

Appendix 5
TC/TG/TRG SPONSORED SEMINARS

Current as of January 2004

PLANNED:

Nashville/June 2004

Simulation Without Tears (Chair: Joe Huang)

PAST:

Anaheim / January 2004

Energy Use Calculations and Evaluations for Laboratories (co-sponsored with TC. 9.10, Chair Patrick Carpenter)

Kansas City, June-July 2003

Successful Applications of Energy Simulation in Building Design (Chair: Vernon A. Smith)

Chicago, January 2003

Getting started in Building Simulation (Chair: Chip Barnaby)

Using Monitored Data for Solving Engineering Problems (Chair: Agami Reddy)

Atlantic City, June 2001

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

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)

ASHRAE TC 4.7 Energy Calculations
Tuesday, January 27, 2004, 6:00-8:30 p.m.
212 a-b, Convention Center
Anaheim, California

1. Roll call and introductions Fisher

- Convened at 6:01 pm

2. Accept agenda & approve minutes of Kansas City meeting Crawley (Attachment A)

- Minutes accepted (willson/Haberl 13-0-0 CNV)

3. Announcements/Liaisons Crawley

- Craig Wray section 4 liaison reporting
- Section has plans for a design charet using only HOF material
- Still no clear guidance on chapter design and content
- Crawley announced a new ASHRAE technical group on energy conservation in buildings--a subgroup of TC 7.6, meeting Saturday 1:00 3:30 pm, forum in Nashville
- TC 2.8 looking for members to upgrade the 'ASHRAE Green Guide'

4. Membership Crawley

- Subcommittee changes: Vern Smith will chair Applications in Nashville

5. Subcommittee reports

5.1 Applications: Jim Willson (chair) reporting: (**Attachment B**)

- Willson reported 7 items on the Applications wish list
 1. Toolkit of Energy Conservation Measures for 90.1
 2. Prototypical Buildings for use in 90.1 ECB
 3. Standard Utility Rate Format & Converter for the common simulation programs
 4. sensitivity analysis on prototypical buildings and toolkit ECMS
 5. Demonstration Toolkit for building energy simulation design for training and ASHRAE chapter
 6. Modeling getting started--what is important
 7. Procedures and Data for Simulation of High Performance Residential Design (existing work statement)
- List will be circulated for additional comments

5.2 Data-Driven Modeling Agami Reddy (chair) reporting: (**Attachment C**)

- The committee revised the wish list to include 9 items as shown in the attachment
- 1051-TRP Procedures for Reconciling Computer-Calculated Results with Measured Energy Data (Sonderegger reporting) Contractor: Drexel University. Effort started in December and is off to a very good start. Literature review is complete

5.3 Simulation & Component Models Beausoleil-Morrison chair, Ian Beausoleil-Morrison reporting: (**Attachment D**)

- 1049-RP Building System Design Synthesis (Loughborough Univ) Pedersen reporting. RP-1049 (Curt Pedersen reporting) The genetic algorithm has been improved and is working well. Optimization runs are complete. Final report is 50% complete. Request for a no cost extension. Final report will be submitted on May 29 for a vote in Nashville. Motion (brandemuehl/Haberl) No Cost Extension to August 31. 2004 (15-0-2) Chair and PI not voting
- 1197-RP Updated Energy Calc Models for Residential Equip. (UC-Boulder) (Barnaby reporting) Project is wrapping up. Implementation of the models in a toolkit format and as TRNSYS types remains to be completed. Motion (Smith/Neymark) No Cost Extension to August 31. 2004 (15-0-1) Chair and PI not voting. Tim McDowell will test the TRNSYS models.

5.4 Research, Vern Smith reporting (**Attachment E**)

- Crawley requested that Ian Beausoleil-Morrison circulate ranking criteria for wish lists to the full committee

- Chip Barnaby liaison for shading for fenestration models has been approved for bidding.
- TC 4.7/ASHRAE Research Plan Status Smith
- RP1305 PES recommended not funding the proposal (PES McDowell, Krarti, Kosny). (smith/walton) motion to accept PES recommendation (16-0-0) CNV
- RTAR--'Procedure for baseline energy use at large central plants' RTAR approved and prioritized on the 2003 plan. Will fall off plan in June '06 if no action is taken.
- Robert Sonderegger will circulate RTAR for comments prior to Nashville meeting
- Crawley noted RAC has revised RTAR forms. Will distribute to TC

5.5 Handbook, Strand (chair) reporting (Attachment F)

- The draft of the handbook is essentially complete. The final draft is due by the June meeting.

5.6 Program, Haberl reporting (Attachment G)

- Nashville program due Feb. 13!
- prioritized rankings included in minutes
- motion(haberl/bahnfleth) to accept the program prioritization as follows: (16-0-0)

5.7 Standards, Neymark reporting (Attachment H)

SSPC 140 SMOT for Eval of Building Energy Analysis Computer

-

New IEA Annex on Validation Methods

- Six tests are currently under consideration including ground coupling, daylighting, shading, mechanical equipment and double facade.

5.8 Web Site,

- Simon Rees continues to maintain website

6. Reports on related activities

6.1 GPC 20 XML Definitions for HVAC&R

- Chip Barnaby reporting
- Draft forming of the guidelines--work on use cases prior to definition of the XML.

6.2 TC 4.1 Load Calculations

- Chip Barnaby reporting
- Joint work statement--1311TRP on Fenestration approved for funding
- RP1199 residential load calculation method based on heat balance

6.3 TC 4.2 Weather Information

- Dru Crawley reporting
- Contract to update chpt. 28 (weather data) 4060 weather sites. Monthly conditions will be included for all sites. Watch for seminar in Orlando

6.4 TC 4.5 Fenestration

- Curt Pedersen reporting
- No changes in the fenestration chapter that will affect TC 4.7
- Joe Huang reported that the weather information in the fenestration chapter will be moved to chapter 28 (the weather chapter).

6.5 TC 6.5 Radiant Heating and Cooling

- Rick Strand reporting
- Distributed an RTAR for TC consideration: *'Develop a Radiant/Convective System Module for an Energy Simulation And Analysis Program*
- TC 6.5 seeks TC 4.7 co-sponsorship
- Rick will circulate RTAR to list prior to Nashville

6.5 TC 7.4 Building Operation Dynamics

- Mke Brandemuehl reporting
- Looking at combination of energy and demand costs

6.6 TC 7.5 Smart Building Systems

- motion to co-sponsor seminar titled Models for Automated Building and HVAC Diagnostics(brandemuehl/haberl) approved (16-0-0)
- Contact Mike Brambly if interested in participating

6.7 TC 7.6 Systems Energy Utilization

- Jim Willson reporting

-

6.8 IAI International Alliance for Interoperability

- Phil Haves reporting
- Equipment performance in IFC format can now be ported directly into EnergyPlus
- Selkowitz noted that GSA will require IFC compliance by 2006

6.9 IBPSA (USA, Canada, BS 2003)

- Mike Brandemuehl reported that Simbild 2004 will be held in Boulder in August.
- IBPSA Canada organizing ESim conference in Vancouver

6.10 IBPSA International

- Spittler reported on BS '03. Distinguished Service Award to Curt Pedersen
- BS '05 in Montreal

-

7. Old Business

- No old business

8. New business

- Haberl distributed a presentation on problems related with code compliance simulation. A paper will be following. His study showed 10%-15% differences in annual simulation and 20%-30% differences in peak loads.

10. Adjourn

Meeting adjourned 8:00 pm (haberl/ yuill)

Attachments

- A. Agenda
- B. Applications Subcommittee Minutes
- C. Inverse Methods Subcommittee Minutes
- D. Simulation and Component Models Subcommittee Minutes
- E. Research Subcommittee Minutes
- F. Handbook Subcommittee Minutes
- G. Program
- H. SSPC 140 Minutes

**ASHRAE TC 4.7 Energy Calculations
Agenda**

Tuesday, January 27, 2004, 6:00-8:30 p.m.
Room 212 A/B, Anaheim Convention Center
Anaheim, California

1. Roll call and introductions Fisher
2. Accept agenda & approve minutes of Kansas City meeting Crawley
3. Announcements/Liaisons Crawley
4. Membership Crawley
5. Subcommittee reports
 - 5.1 Applications Willson
 - Applications Research Wish List Willson
 - 5.2 Data-Driven Modeling Reddy
 - Data-Driven Modeling Research Wish List Reddy
 - 1051-RP Procedures for Reconciling Computer-Calculated Results with Measured Energy Data (Drexel Univ) Sonderegger
 - 5.3 Simulation & Component Models Beausoleil-Morrison
 - Simulation & Component Models Research Wish List Update Beausoleil-Morrison
 - 1049-RP Building System Design Synthesis (Loughborough Univ) Pedersen
 - 1197-RP Updated Energy Calc Models for Residential Equip. (UC-Boulder) Barnaby
 - 5.4 Research Smith
 - TC 4.7/ASHRAE Research Plan Status Smith
 - Section 4 Research Subcommittee Chairs Ad Hoc Smith
 - 5.5 Handbook Strand
 - 5.6 Program Haberl
 - 5.7 Standards Neymark
 - SSPC 140 SMOT for Eval Building Energy Analysis Computer Programs Judkoff
 - IEA Annex 34/43 Test and Validation of Building Energy Simulation Tools Judkoff
 - 5.8 Web Site Rees
6. Related activities reports
 - GPC 20 XML Definitions for HVAC&R Haves
 - TC 4.1 Load Calculation Data and Procedures Barnaby
 - TC 4.2 Climatic Information Crawley
 - TC 4.5 Fenestration Pedersen
 - TC 6.5 Radiant Heating and Cooling Strand
 - TC 7.4 (4.6) Building Operation Dynamics Brandemuehl
 - TC 7.5 (4.11) Smart Building Systems Norford
 - TC 7.6 (9.6) Systems Energy Utilization Willson
 - IAI International Alliance for Interoperability Haves
 - IBPSA: USA, Canada, BS 2005 Norford/Beausoleil-Morrison/Spitler
7. Old Business
8. New business
9. Executive Session
10. Adjourn

TC 4.7 APPLICATIONS SUBCOMMITTEE
Tuesday, 27 January 2004
Room 212 A/B, Anaheim Convention Center

The meeting was called to order by Applications Subcommittee Chair Jim Willson at 3:45 pm.

Attending:

Ian Beausoil-Morrison	NRCan
Jeff Haberl	Texas A&M
Joe Huang	LBNL
Moncef Kararti	Univ. of Colorado
Tim McDowell	Thermal Energy System Specialists
Joel Neymark	Joel Neymark Associates
Vernon Smith	Architectural Energy Corporation
Klaus Sommer	Univ. of Applied Sciences, Cologne, Germany
George Walton	NIST
Jim Willson	Honeywell
Hofu Wu	Cal Poly
Gren Yuill	U. of Nebraska

Self introductions were made.

Willson announced that he will not be chair of the Applications Committee after this meeting. He has agreed to take a position on the ASHRAE Board of Directors.

Willson said that the main purpose of this meeting will be to review research ideas. There were no additions to the agenda.

Action items update from Kansas City meeting:

Action Item: **Yuill** will call Les Norford and find out details regarding the proposed IBPSA speaker materials and feasibility of coordinating his short course development with the IBPSA efforts. He will report back on his findings and progress. **Status:** Not done. The IBPSA materials are now available. **Yuill** will contact Norford to coordinate with his short course development.

Action Item: **Willson** agreed to work with HB SC chair on what should be done to review the chapter from the applications viewpoint and then make assignments. Haberl suggested that this be done soon so that we don't miss the review cycle. **Status:** **Smith** and **Walton** had volunteered to look at the HB chapter sections with direction from Willson. The review was to assess whether the applications viewpoint was adequately covered and to suggest changes if needed. Willson suggested sections for review via email at the beginning of January. Smith and Walton did not complete reviews before this meeting. It is too late to affect the current chapter, which is nearly at the end of the current four-year publication cycle, but the reviews should still be completed and ideas forwarded to the HB subcommittee chair for use in the next cycle.

Action Item: Willson agreed to chair the symposium titled "Validation of Building Simulation Programs" that Joel Neymark had been organizing. **Status:** Papers are under way.

Action Item: Willson will contact Alan Daley to ask if he would consider preparing an article based on his seminar this morning. **Status:** Willson contact Daley and he agreed to prepare an article.

Action Item: Judkoff noted that it is time to publish a Journal article on Standard 140 since it will be used and cited by codes. **Willson** will send an e-mail to Judkoff to remind him to write the article. **Status:** Judkoff has agreed to do article on Std 140 – Neymark commented that it will be difficult to get to it; realistically no earlier than September. No start until after April. ACTION ITEM: Willson to send reminder in May, or the 3rd week of April. Willson reported that a 50% draft exists of special pub on how to beat Standard 90.1 by 30% for buildings of 20,000 sf or less (SP 102)

Action Item: **Smith** to continue working on the draft WS for “Procedures and Data for High Performance Residential Design.” Mike Witte prepared the first draft. **Status:** No progress. Short discussion. Haberl sees value. McDowell says more demand of residential simulation. Huang says scope may be too large. Smith agreed to renew efforts and to coordinate with Haberl and McDowell for review and input.

Action Item: **Willson** will coordinate with Agami Reddy about research ideas and relationship with Inverse Methods committee. **Status:** Willson discussed status of research ideas with Reddy and they decided that no concepts need to be referred to their respective subcommittees.

RESEARCH WISH LIST

JASON GLAZER, ENERGY COST BUDGET SUBCOMMITTEE CHAIR OF STANDARD 90.1, HAD SUBMITTED THREE RESEARCH IDEAS:

Toolkit of Energy Conservation Measures for Standard 90.1 ECB (with specific examples in a variety of simulation programs)

There was discussion about what the intended content would be. Huang mentioned that California’s Energy Code (Title 24) has a 500-page users manual for Alternative Calculation Methods. Creating a similar document for several simulation engines would be a very large task. But Standard 90.1 is now formulated to avoid specifying schedules and specifics on how to setup the simulation.

Yuill: Gaming could still be a problem.

STANDARD UTILITY RATE DESCRIPTION FORMAT AND CONVERTER FOR COMMON ENERGY SIMULATION PROGRAMS

Yuill: This would be valuable. Is this a format to just allow data gathering? Or is this a format to input the rates into a simulation.

Haberl: It would be more valuable if it included specific code for selected simulation engines.

Prototypical Buildings for Use in Standard 90.1 ECB.

Huang explained how PNNL selected typical buildings by building type. The building descriptions are available as DOE-2 files – they are real buildings that are representative of the defined categories.

Other ideas:

Sensitivity Analyses on Prototypical Buildings and Toolkit of Common Energy Conservation Measures

Guideline for Beginning Modelers Based on Research into Sensitivity of Input Parameters –

Beausoleil-Morrison: what's important to focus on in terms of influence of accuracy of results. The guideline should include some detailed examples.

Teaching Manual for Energy Efficient Design. (from Varkie Thomas)

Demonstration Toolkit for Building Energy Simulation Design for Training and ASHRAE Chapters Uses (with focus on Std 90.1)

PROGRAM UPDATE

Haberl provided a program update (see Program Subcommittee Report for details of final update at main TC meeting). Programs to be submitted for the Nashville meeting must be into ASHRAE by Feb 13, 2004.

Three seminars from the Applications Subcommittee were scheduled for Nashville/June 2004 at the Kansas City meeting. These were discussed as follows.

1. “Applications of HVAC-01 Primary and Secondary Toolkits” chaired by Jean Lebrun. Lebrun did not attend this meeting, so the proposed seminar was postponed to Orlando/Jan 2005.
2. “Application and Experiences with the New EnergyPlus Software” chaired by Joe Huang. Joe did not recall volunteering to chair this symposium, so it will be postponed until Orlando without a designated chair.
3. “Simulation Without Tears” chaired by Joe Huang. This one will remain scheduled for Nashville.

A symposium titled “Validation of Building Simulation Programs through ASHRAE Standard 140” chaired by Jim Willson is scheduled for Orlando.

The meeting was adjourned shortly after 5 pm.

TC 4.7 Applications Subcommittee
RESEARCH WISH LIST
January 2004, Anaheim, CA

1. Toolkit of Energy Conservation Measures for ASHRAE Standard 90.1 Energy Cost Budget Method.
2. Prototypical Buildings for use in ASHRAE Standard 90.1 Energy Cost Budget Method.
3. Standards Utility Rate Formatter and Converter for the common building energy simulation programs.
4. Sensitivity analysis on the Prototypical Buildings in Item #2 and the Toolkit ECM's in Item #1.
5. Demonstration Toolkit on building energy simulation use in building design for training and ASHRAE chapter uses.
6. Modeling – getting started – what's important.
7. Procedures and Data for Simulation of High Performance Residential Design (Existing Work Statement – Vern Smith)

TC 4.7 SUBCOMMITTEE: DATA-DRIVEN MODELING
Anaheim Meeting
January 26, 2003

MINUTES

Agami Reddy (AR) started the meeting at 7:41 p.m. Introductions were then made. Copies of the minutes were passed around and discussed.

Rober Sonderegger (RS) moved to approve the minutes from the Kansas City meeting.

AR said that there were a lot of ACTION items that were not addressed since the last meeting. Minutes were approved.

AR then informed the subcommittee that Dru Crawley (DC) had asked each sub-committee in TC 4.7 to develop a “wish list” of ideas for developing RTARs.

AR thought that it was important to review the charge for the subcommittee.

AR then refocused the discussion on the previous “wish list” from Kansas City.

AR then suggested combining #7, 8 and 9, refocusing the title around “Baselining Procedures for Green Buildings including renewable energy, non-renewable energy, and water use”.

Jeff Haberl (JH) suggested that # 3 needs to be removed since it is on S&C’s list and was being developed by TC 6.5.

AR suggested “Inverse Models for Thermal Storage Systems” be added to the list.

JH suggested that we needed “Inverse Models for IEQ”, for example a model that is driven by delta-T using indoor-outdoor temperature, referring to Kelly Kissock’s presentation at a previous ASHRAE meeting about this topic that showed significant improvements in model accuracy. Perhaps called “Inverse Models for Non-uniform Interior Temperatures”.

Lots of discussion followed this suggestion.

JH suggested that this could be folded into the “Baselining Procedures for Green Buildings including renewable energy, non-renewable energy, and water use”, to include Green Buildings that use night setback, natural ventilation, etc.

AR suggested that this needed to have a catchy title to get funded. For example, Home Land Security.

RS mentioned that with forward models there were certain dynamics, and that there was a need to identify these dynamics to accurately and automatically develop forward models.

AR mentioned that there is lots of inverse modeling that is not being explored as “compartment modeling”, and that this needed further exploration.

AR suggested “Dynamic macro models”, or “inverse compartment models”.

RS suggested “development of procedures to characterize dynamic behavior of indoor bio-chemical contaminants”.

AR then asked the subcommittee to read and be prepared to discuss the RTAR by RS.

Lots of discussion followed this.

JH asked if the RTAR could be edited to include “Run simulation for a number of example facilities using a program such as DOE-2 or EnergyPlus.”

The subcommittee agreed that the RTAR was in reasonably good shape, and that it should go forward to the main TC 4.7 committee.

AR then asked the subcommittee to review the RTAR by Bass Abushakra (BA).

Lots of discussion followed this.

BA agreed to incorporate the comments in his RTAR and bring the next version to Nashville. JH agreed to work with BA to help him incorporate the comments from the subcommittee.

AR then asked the subcommittee to look at the RTAR that David Claridge had written.

Lots of discussion followed this.

JH suggested that this needed to be tied more strongly to what's missing with Guideline 14, 1093-RP, 1050-RP. Also that there was a previous paper in 1992 to 1995 time frame that addressed missing data and what the DOE-2 weather packer did to the missing data.

DC agreed to revise the RTAR and bring it back to the subcommittee for review.

Discussion then moved to program.

A seminar was suggested for Orlando by Claridge entitled "What do you do when you data misbehave?".

Meeting was adjourned at 9:25.

**TC 4.7 Simulation and Component Models Subcommittee
Anaheim Meeting Minutes
Monday, January 26 2004, 18h00 to 19h30
Anaheim Convention Centre, Room 201A**

Introductions / Additions to agenda

Meeting called to order at 18h05. No additions to the agenda. There were 28 attendees as shown in attachment 1.

Program

Anaheim (January 2004)

- No SCM program items.

Nashville (June 2004)

- **Symposium** on Modelling Moisture Sorption/Desorption by Building Materials (Chaired by Jan Kosny). Jan reported prior to this meeting that the symposium was in good shape: papers have been reviewed and are now undergoing revisions. The package should be ready for the February deadline.
- **Forum** on *Thermal Modeling of Phase Change Materials in Building Envelopes: Old problems, New Developments* (Chaired by Jan Kosny). Status unknown.

Orlando (January 2005)

- **Symposium** on Recent Advances in Energy Simulation (Chaired by Dan Fisher). The call for papers has not yet been issued and no papers are in hand. Some authors have indicated their interest and Dan has some others in mind that he will approach. Dan will issue a call for papers as soon as possible and will target for paper submissions in April. Therefore, this might be in shape for Orlando.

Denver (June 2005)

- Ron Judkoff volunteered to organize either a seminar or a symposium on the use of simulation for designing low-energy buildings. Rob and Dru Crawley will decide whether to organize this as a seminar or a symposium. TC 2.8 and TC 7.1 should be interested in co-sponsoring.

Research Projects in Progress

1049-RP Design Synthesis

Mike Brandemuehl presented an overview of the project's status. Curt Pedersen (PMS chair) provided further details upon his arrival. Jonathen Wright (PI) presented the research to the PMS on Sunday. The technical problems discussed at Kansas City have now been resolved. The system is now demonstrating near-optimal configurations. With these recent accomplishments the PMS feels that the

PI has now satisfied the bulk of the contract's technical requirements. The PI plans to have a draft final report ready for review at Nashville, but a NCE will be required. The PI will develop a plan for completion of the project for TC 4.7's consideration of the NCE.

1197-RP Updated Energy Calculation Models for Residential HVAC Equipment

As none of the PMS members were present, the PI (Mike Brandemuehl) gave an overview of the project's status. Most of the research has been completed. One remaining item is the implementation of the model from EES to FORTRAN. A draft final report has been distributed to the PMS, but this is too preliminary for external review. As the current contract expires in March a NCE will be required to complete the work.

Research Wish List

The bulk of the meeting was spent discussing the SCM research wish list.

The wish list was started at Atlantic City. Input at that meeting and responses from the posting on the TC 4.7 web site resulted in an expanded list that was tabled in Honolulu. The list was further fleshed out in Honolulu and those present cast ballots on their top seven research priorities. The priority rankings of the list discussed during today's meeting reflect these votes cast in Honolulu.

Ian Beausoleil-Morrison proposed a set of six criteria for assessing the relevancy and ranking the priority of research topics. The intent is to apply these criteria to each item on the wish list and to proposed items before adding them to the list. There was general agreement with the criteria with some good suggestions for improvements. Jeff Haberl and Dru Crawley suggested some changes to the wording of environmental emissions. Ron Judkoff suggested some wording changes to address validation topics. The criteria presented in the wish list in attachment 2 reflect these changes.

The new criteria were then applied to the five topics that were in the "highest" priority category on the wish list. These five topics were as follows:

- 1) Models for natural and hybrid ventilation, e.g. solar chimneys, raised floor and displacement ventilation distribution systems, controls, wind-driven air flow.
- 2) Create algorithms to allow mapping of manufacturer's or available data to simulation inputs.
- 3) More detailed modelling of internal surface convection and stratification within rooms.
- 4) Assess impact of explicit modelling of radiant heating (in-floor, wall panels, gas fireplaces, etc.) and radiant cooling and devise appropriate modelling strategies.
- 5) Moisture absorption/desorption by building materials and furnishing (necessary to accurately model night ventilation).

Each topic was discussed in detail and was rated against the six criteria. The following decisions were made:

- The "natural and hybrid ventilation" topic will remain on the highest priority list. The project may focus more on validation rather than model development. Paul Linden is currently

working on a project for CEC on this topic: TC 4.7 SCM needs to learn about the objectives of this work.

- The “mapping algorithms” topic will be downgraded. Perhaps it better fits within TC 4.7’s application committee.
- The “internal surface convection” topic will remain on the highest priority list. Some aspects of the “radiant heating/cooling” topic should be incorporated into this topic, specifically the treatment of convective heat transfer from the heating sources.
- Although the “radiant heating/cooling” topic will remain on the highest priority list, TC 4.7 SCM should not develop a work statement at this time. Rather TC 4.7 SCM needs to improve its communication with TC 6.4 and TC 6.5. TC 6.5 is currently developing an RTAR related to this topic: TC 4.7 SCM needs to be more involved in reviewing and assisting with the TC 6.5 RTAR. Some aspects of this topic, specifically the convective heat transfer from the heating sources, should be incorporated into the “internal convection” topic.
- Although much work has been done on the “moisture absorption/desorption” topic already, this item will remain on the highest priority list. The support for this item was not as high as for the “natural and hybrid ventilation” and “internal surface convection” topics. We need to talk to TC 4.4 about what has been done.

The wish list presented in attachment 2 reflects the above decisions.

Following the detailed discussion of the highest priority topics, some time was spent discussing whether any remaining topics should be promoted. Suggestions were made to elevate the following topics: network air flow models, intra-zone air flow models, duct models, fuel cells and other cogeneration technologies. There was insufficient time to discuss these in detail. Rather it was decided that a voting grid would be formed and votes cast in the future to revise the priority rankings of the items not currently on the highest priority list.

Work Statements in Progress

There was insufficient time to discuss the work statements that have been in progress.

TC 4.7 SCM’s goal is to have well developed RTARs for the “natural and hybrid ventilation”, “internal surface convection”, and the “moisture absorption/desorption” topics ready for detailed review and refinement in Nashville. Ian will seek volunteers off-line to work on these items before Nashville.

New Business

No new business.

Adjourn

The meeting was adjourned at 19h30.

Attachment 1

Anaheim	KC	Chicago	Last Name	First Name	E-Mail
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	X		Deru	Michael	Michael_deru@nrel.gov
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X		X	Huang	Joe	YJHuang@lbl.gov
X			Judkoff	R.	Ron_judkoff@nrel.gov
X			Klaassen	Curt	curtk@energy.iastate.edu
	X		Kong	Weixiu	weixiu@okstate.edu
	X	X	Kosny	Jan	kyo@ornl.gov
	X		Koran	William	William.koran@honeywell.com
X	X		Krarti	Moncef	krarti@colorado.edu
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Attachment D Simulation and Component

Models Subcommittee Minutes

TC 4.7 Minutes, Anaheim

27 January 2004

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	X		Yuill	Gren	yuill@unomaha.edu

Attachment 2

TC 4.7 Simulation Subcommittee Research Wish List January 27, 2004

Purpose

TC 4.7 SCM will strive to develop RTARs/work statements for all the highest priority items on this “wish list”. Notwithstanding items already in the system, TC 4.7 SCM will only consider RTARs/work statements for highest and high priority items.

Ranking criteria

The following criteria are used to assess the priority of a research topic. A topic should address most or all of these criteria to receive the “highest” ranking.

- a) Few or no existing simulation programs adequately treat the phenomenon or technology.
- b) The technology or design approach is currently being used by the building industry or is expected to be in the near term.
- c) The energy consumption, energy demand profile, environmental emissions, energy cost, and other performance aspects of the technology/approach are not well understood or the model predictions have not been adequately validated.
- d) Enhanced models or validation tests would significantly improve the accuracy of and confidence in building simulation programs.
- e) An ASHRAE research project on the topic is feasible and would have an impact: i.e. the new models would likely be incorporated within existing simulation tools, the validation tests would lead to better models or a higher degree of confidence in the models, or simulation tool users would likely apply the new techniques.
- f) TC 4.7 is the appropriate technical committee to lead the project.

Highest priority

- 1) Models for natural and hybrid ventilation, e.g. solar chimneys, raised floor and displacement ventilation distribution systems, controls, wind-driven air flow.

- 2) More detailed modelling of internal surface convection and stratification within rooms, including the convective heat transfer from radiant heating and cooling devices.
- 3) Assess impact of explicit modelling of radiant heating (in-floor, wall panels, gas fireplaces, etc.) and radiant cooling and devise appropriate modelling strategies.
- 4) Moisture absorption/desorption by building materials and furnishing (necessary to accurately model night ventilation).

High priority

- 5) Create algorithms to allow mapping of manufacturer's or available data to simulation inputs (demoted from highest priority category at Anaheim, January 2004).
- 6) Development of pragmatic strategies for using integrated network air flow models for simulating infiltration and inter-zone air flow.
- 7) Integration of dynamic thermal comfort models with spatial distribution.
- 8) Integration of intra-zone air flow models.
- 9) Duct models to consider air leakage and thermal losses.
- 10) HVAC-integrated fuel cells.
- 11) Shading and reflection by external objects: buildings, trees (including impact of seasonal leaf cover).
- 12) Impact of internal shading devices associated with windows on room heat transfer.
- 13) Modelling of micro-climate effects (e.g. courtyards, heat islands, city wind, local landscape).
- 14) Integration of electric power flow modelling.
- 15) Integration of IAQ modelling.

Medium priority

- 16) Building-integrated photovoltaics and wind turbines.
- 17) Improved models for exhaust-air heat recovery, including moisture exchanger and defrost cycles (residential).
- 18) Model that gives ground reflectivity as function of current and time-history of weather data (snow cover, snow age) and ground temperatures.
- 19) Formal treatment for quantifying impact of uncertainty in input data (experimental design and analysis of results).
- 20) Stochastic modelling of occupant behaviour (operating schedules, occupancy patterns, lighting usage, window openings, etc).
- 21) Development of models to simulate window air conditioners in residential buildings, including the effects of partially conditioned buildings and inter-zone air movement.

- 22) More accurate models to determine heat transfer from lighting equipment: radiant/convective split, heat transfer to plenums.
- 23) Integration of illumination simulation (daylighting and artificial lighting).
- 24) Development of techniques to use simulation to assist in design synthesis.
- 25) Building-level cogeneration equipment (e.g. micro-turbines, Stirling cycle) other than fuel cells.
- 26) Accurate characterization of occupant-driven electric demand profiles in residential buildings. Necessary for accurate simulation of cogeneration equipment.
- 27) Models to simulate domestic hot water loads, rather than treating as user-input.
- 28) Geothermal heat pumps (model for ground field).
- 29) More accurate models for predicting deep-sky temperature for night-time radiation from external surfaces of envelope (important for modelling “cool roofs”).
- 30) Models to simulate the effect of rain and snow on the building envelope.
- 31) Development of validation tests for SPC 140 that cover all significant building-load and HVAC processes: ground heat transfer, heating equipment, cooling equipment, ventilation equipment, calculating infiltration rates, etc.
- 32) Development of techniques to predict GHG emissions, embodied energy, capital and maintenance costs, primary energy requirements, and life-cycle costing.

Lower priority

- 33) Buried ducts for pre-heating or pre-cooling ventilation air.
- 34) Modelling the control of hybrid HVAC systems wherein multiple systems condition a space.
- 35) Modelling HVAC systems at different levels of resolution.
- 36) Under-floor air distribution systems, including the thermal coupling with the ground.
- 37) Impact of shading upon surrounding surface temperatures which are in radiant contact with the external envelope.
- 38) Model for moisture sources within housing (cooking, cleaning, from ground).
- 39) Ventilated double facades.
- 40) Modelling the effect of carpets on the room energy balance (unexpected results from RP 1117).
- 41) Package primary systems, secondary systems, and loads toolkits as VBA so that they can be invoked from spreadsheet programs.
- 42) Update primary systems and secondary systems toolkits and package all toolkits in a single CD.
- 43) Models for air- and water-based thermal solar systems.
- 44) Determine impact of surrounding vegetation on infiltration.
- 45) Modelling the impact of vegetation (e.g. green roofs, vines on walls) upon evaporative heat transfer and solar gains.

RESEARCH SUBCOMMITTEE Anaheim

At its Anaheim meeting, the SCM subcommittee of TC 4.7 established a list of six criteria for assessing the relevancy and ranking the priority of research topics. The intent is to apply these criteria to each item on the SCM wish list and to proposed items before adding them to the list. A topic should address most or all of these criteria to receive the "highest" ranking on the wish list.

The six criteria are as follows:

- a) Few or no existing simulation programs adequately treat the phenomenon or technology.
- b) The technology or design approach is currently being used by the building industry or is expected to be in the near term.
- c) The energy consumption, energy demand profile, environmental emissions, energy cost, and other performance aspects of the technology/approach are not well understood or the model predictions have not been adequately validated.
- d) Enhanced models or validation tests would significantly improve the accuracy of and confidence in building simulation programs.
- e) An ASHRAE research project on the topic is feasible and would have an impact: i.e. the new models would likely be incorporated within existing simulation tools, the validation tests would lead to better models or a higher degree of confidence in the models, or simulation tool users would likely apply the new techniques.
- f) TC 4.7 is the appropriate technical committee to lead the project.

The 2004-2005 Research Plan, approved at the Kansas City Meeting, is included for reference.

Title	TC Priority 2003-2004	Prior TC priority	Society status	TC Status	Comments	Subcom
Technical and Usability Enhancements to the Energy Calculation Toolkits	0	1 (2003-2004)	RTAR 2004-19, accepted	WS draft in progress	Dan Fisher:	SCM
Development of a Procedure for Base-lining Energy Use at Large Central Plants	0	2 (2002-2003)	RTAR, prioritized	WS draft in progress	Moncef Krarti, Jeff Haberl: Need to find additional support	DDM

Attachment E

Research Subcommittee Minutes

TC 4.7 Minutes, Anaheim

27 January 2004

Procedures and Data for High-Performance Residential Design	0	1 (2002-2003)	RTAR, accepted	WS draft in progress	Mike Witte, Vern Smith	A
Procedures for Reconciling Computer-Calculated Results With Measured Energy Data (1051-TRP)	0	3 (1998-1999)	Contract award approved, June 2003		TC responded to Tech Council comments – reconsidered and approved at Kansas City meeting, June 2003	DDM
Improving Load Calculations for Fenestrations with Shading Devices	Co-sponsor		RTAR 2004-12, prioritized.	TC 4.1 RTAR. Draft WS approved by TC 4.1; co-sponsorship approved by TC 4.7 at June 2003 meeting	Chip Barnaby	

Additional TC 4.7 RTARs and Ws in Process – status as of 1 August 2003

Title	TC Priority 2004-2005	Prior TC priority	Society status	TC Status	Lead/ Comments	Subcom & Priority
Development of a Toolkit of HVAC Models (Algorithms) for Refrigerated Warehouses				No progress (Jan-03); Draft in progress (Jun-03)	Jan Kosny (Joe Huang, Kamel Haddad)	SCM
Models for Natural and Hybrid Ventilation				New RTAR draft (Jan-03)	Paul Linden, Guilmerme	SCM
Algorithms for Mapping Manufacturer's or Available Data to Simulation Inputs				New RTAR draft (Jan-03); no progress Jun-03.	Milorad Bojic, Bruce Billedeaux, Brandemuehl	SCM
Explicit Modeling Strategies for Radiant Heating and Cooling				New RTAR draft (Jan-03); no progress Jun-03	Milorad Bojic, Jan Hensen, Rick Strand	SCM
Exterior Boundary Conditions (shading by external objects and deep-sky temperature)				Concept proposed Jan-03; No progress Jun-03	Tim McDowell; Jan Hensen, Jeff Spittler	SCM
Moisture absorption/desorption by building materials and furnishings				Concept proposed Jan-03; Draft RTAR distributed for comment Jun-03	Rich Liesen, Jan Kosny, Mike Brandemuehl (forum input).	SCM
Owner-centered Building Energy DataMart				Concept proposed Jan-03; RTAR draft reviewed Jun-03	Robert Sonderegger	DDM
Characterizing Building Cooling Thermal Loads over a Year from Short-Term Monitoring				Concept proposed Jan-03; RTAR draft reviewed Jun-03	Agami Reddy, Bass Abushakara	DDM 3 (Jun-03)
Procedures for adjusting baseline models for M&V projects due to creep and other causes				Concept proposed Jan-03; discussed Jun-03	Dave Claridge	DDM 4 (Jun-03)
Procedures to rehabilitate missing energy use data				Concept proposed Jan-03; discussed Jun-03	Dave Claridge	DDM 5 (Jun-03)
Procedures for baselining energy savings for renewables and sustainability projects				Concept proposed Jun-03	Jeff Haberl	DDM 6 (Jun-03)
Procedures for baselining electricity demand savings				Concept proposed Jun-03	Jeff Haberl	DDM 7 (Jun-03)
Defining Performance Factors for Primary and Secondary Equipment Simulation Inputs for Commercial Buildings		2 (2000 – 2001)		No progress (Jan-03)	LeBrun, Nall, Bahnfleth,	A
Analysis and Testing of the Energy Cost Budget Method in ASHRAE 90.1				No progress (Jan-03)		A
Characterization of Building Secondary Thermal Loads from Chiller Electric Use Data				No progress (Jan-03)	Robert Sonderegger, Agami Reddy	A

SCM = Simulations and Component Models

DDM = Data Driven Modeling (formerly Inverse Methods)

A = Applications

Work Statements listed below were on Prior Society Research Plans, but will not go forward for reasons listed.

Title	TC Priority 2004-2005	Prior TC priority	Society status	TC Status	Notes	Lead Sub-com
Development of Comparative Test Cases for Evaluating Simulation Models of Slab, Crawl Space and Basement Heat Transfer Through Adjacent Ground	0	2 (2001-2002)	RTAR, accepted	Hold, IEA work underway		SCM
Inverse Bin Procedures for Analyzing Energy Savings	0	3 (2001-2002)	RTAR, accepted	Drop	dropped	A
Standard Operating Conditions in North American Residential Buildings (1163-TRP)			Cancelled by Tech Council after bids received and evaluated			A
Development of Detailed Descriptions of HVAC Systems (Templates) for Energy Simulation Programs (1198-WS) SCM = Simulations and Component Models DDM = Data Driven Modeling (formerly Inverse Methods) A = Applications		3 (2000 – 2001)		Rejected 3/00 (?)	TC will not pursue further (Jan-02)	SCM

ASHRAE TC4.7 HANDBOOK SUBCOMMITTEE NOTES

Monday, January 26, 2004, 5:00-6:00PM

Anaheim Convention Center 201A

The meeting was extremely informal and centered around a “final review” of the current version of Chapter 31. As members arrived, Rick Strand (chair) distributed a printed copy of the chapter for review. Comments were noted by the chair and will be incorporated into the Word version of the chapter. A final version was submitted to the full TC the following evening with a review of the approaching deadlines for submission.

Developments Since Kansas City

All comments, additions, and verified corrections received prior to the Handbook subcommittee meeting were incorporated into the current version of Chapter 31 distributed during the meeting.

Items Received During Informal Review

Equations 41 through 44. Moncef Krarti verified corrections to these equations and communicated those to the chair. Changes will be made. Moncef will also send an example that will further explain these equations.

Summary of Action Items for Nashville

- Final version is due to ASHRAE by June 21, 2004—this must be approved by the full TC by mail (email ballot)
- Chair hopes to have all “final” corrections and additions by the end of February to allow time for incorporation and review by the full TC

The meeting was adjourned at approximately 5:59pm.

ATTENDANCE LIST

<u>Name</u>	<u>Affiliation</u>	<u>Email Address</u>
Rick Strand	UIUC School of Architecture	rkstrand@uiuc.edu
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TC 4.7 PROGRAM PLAN
Anaheim – 1/27/2004

Anaheim 2004

Poster Paper (4685)

“Overview of Literature on Diversity Factors and Schedules for Energy and Cooling Load Calculations (RP-1093)”

Symposium AN-04-03

“Applications and Knowledge-based Tools for Enhanced Building Energy Simulation”

Organized by TC 4.7 (Data Driven and Applications)

Chaired by Vern Smith

Seminar

“Energy Use Calculations and Evaluations for Laboratories”

Organized by TC 4.7 (Applications)

Chaired by Pat Carpenter

NASHVILLE/JUNE 2004

Symposium

“Modeling Moisture Sorption/Desorption by Building Materials”

Organized by TC 4.7 (Sim and Comp Models)

Chaired by Jan Kosny

Status: New

#1 Seminar

“Simulation Without Tears”

Organized by TC 4.7 (Applications)

Chaired by Joe Huang

Status: New

#2 Seminar

“What to do When Data Misbehave?”

Organized by TC 4.7 (Data Driven Models)

Chaired by David Claridge

Status: New (contributions by Claridge, Sonderegger, Gillespie, Elleson)

#3 Forum

“Modeling Phase Change Material Applications in Building Envelopes”

Organized by TC 4.7 (Sim and Comp Models)

Moderated by Jan Kosny

Status: New

#4 Forum

“Do ASHRAE Members Need an Energy Simulation Model of Refrigerated Warehouses”

Co-organized by TC 10.5 (Refrigeration Distribution and Storage Facilities), TC 10.8 (Refrigeration and Load Calculations) and TC 4.7 (Sim and Comp Models)

Moderated by Daniel Dettmers, Don Fenton and Jan Kosny

Status: New

ORLANDO/FEBRUARY 2005

Symposium

“Validation of building simulation programs thru ASHRAE Standard 140”

Organized by TC 4.7 (Applications)

Chaired by Jim Willson

Status: 5 papers being considered (865-RP (Haberl & Yuill), Validation (Judkoff & Neymark), HVAC Bestest (Purdy & Beauseleil-Morrison), Standard 140 & HVAC Bestest Experience (McDowell), Iowa Empirical Test (Maxwell et al.)

Symposium

“Recent Advances in Simulation”

Organized by TC 4.7 (Sim and Comp Models)

Chaired by Dan Fischer

Status: New

Seminar

“Application and Experiences With the New EnergyPlus Software”

Organized by TC 4.7 (Applications)

Chaired by ???needs chair???

Status: New

Denver/June 2005

Symposium

“Use of Simulation in the Design of Low Energy Buildings”

Organized by TC 4.7 (Sim and Com.Models)

Co-sponsored by TC 2.8 & 7.1

Chaired by Ron Judkoff

Status: New

Chicago/January 2006

Quebec City/June 2006

Dallas/January 2007

Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs, Summary of Anaheim meeting 1/26/04.

PUBLIC REVIEW OF ADDENDUM “A” TO STANDARD 140-2001

Addendum “a” adds the HVAC BESTEST E100-series cases to Standard 140. These are analytical verification test cases for space cooling equipment.

- Public Review closed 9/22/03
- 4 Comments were received from 1 commenter
 - 2 of those comments were withdrawn by the commenter
 - The PC generated responses to the 2 remaining comments involving editorial revisions to Addendum “a”
 - The commenter Replied that the PC adequately responded to his comments, and signed off as resolved on both responses
- Next step: Publication phase of the process

The PC voted to request to Standards Committee that Standard 140 be put on Continuous Maintenance

- This was done because the PC anticipates that addenda will be published more often than once every four years.

UPDATE FOR IEA TASK/ANNEX 34/43

This new IEA research effort focuses on validation and testing of building simulation tools. The work is mostly in its early stages. Some of this work could be included with Standard 140 in the future. The following projects are included:

- Comparative Tests (Software-to-software comparisons)
 - Ground coupled heat transfer related to floor slabs and basements – this project is a carry-over from Task 22 and is currently further along than the others
 - Multi-zone envelope test cases including inter-zonal air flow
 - Extension to radiant hydronic system test cases
- Empirical Validation Tests (Compare software to empirical data)
 - Daylighting/shading/load interaction
 - Double-façade building
 - Mechanical equipment test cases (specific applications to be determined)