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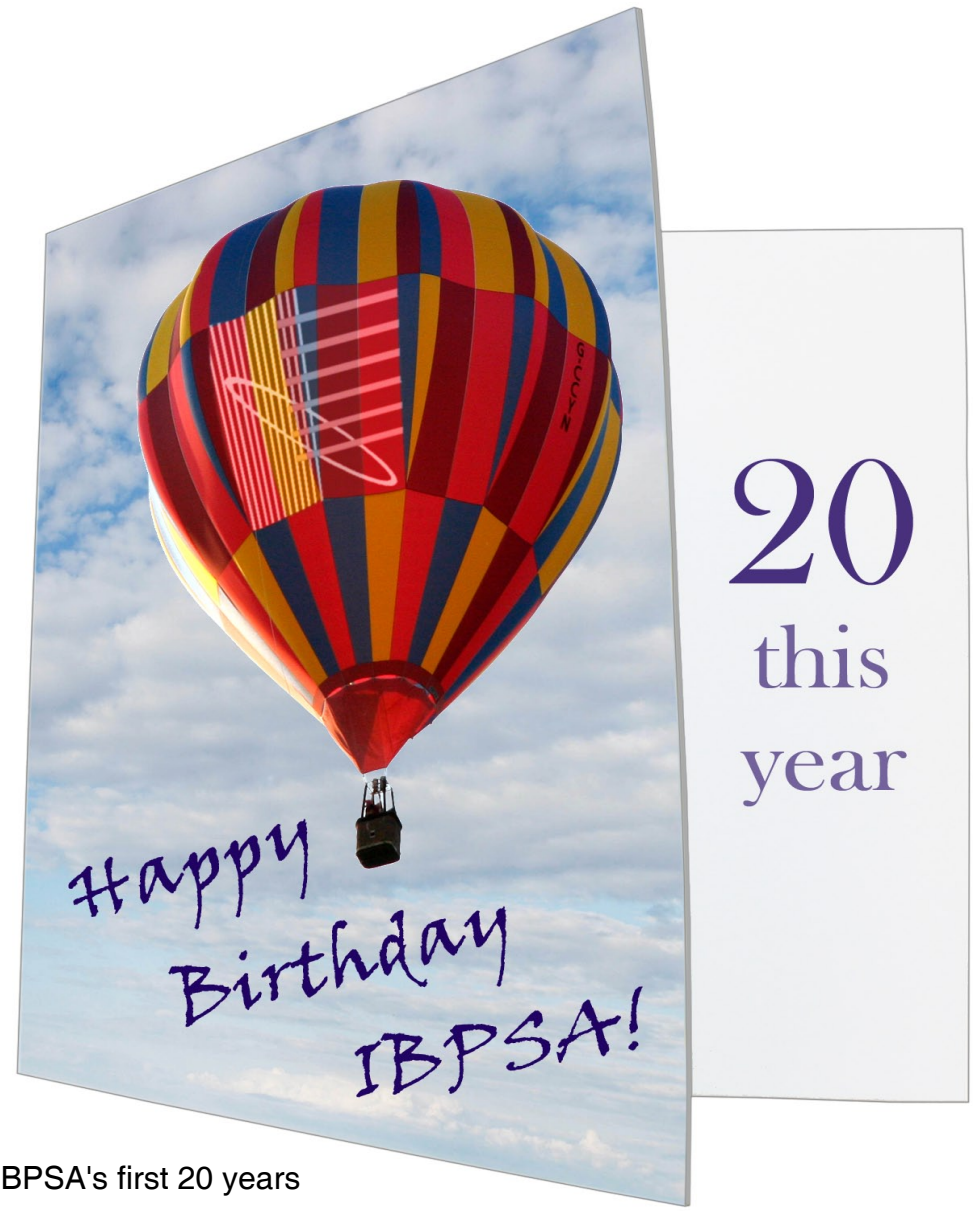

Inside:

- A review of IBPSA's first 20 years
- Articles on residential energy efficiency in hot and humid climates, and on sky luminance mapping for daylight modelling
- Reports on events in Germany, Japan and Scotland, and information on 6 forthcoming events
- Two new IBPSA Affiliates

... plus information about new (free!) software and IBPSA activities

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Contents

President's message

IBPSA Members and Friends,

Welcome to this issue of IBPSA News. It is a rather special one because, as you can read in **Larry Degelman's article** about the history of IBPSA, this year marks IBPSA's 20th anniversary.

IBPSA currently comprises 16 regional organizations. We recently welcomed IBPSA Spain and IBPSA United Arab Emirates. You can read about these two latest member organizations in this issue. There are currently start-up plans and activities in the Nordic countries, Bulgaria and in Poland. We hope to see a re-start in Ireland. If you are interested in joining these activities or if you are interested in establishing an IBPSA affiliate organization in another region, please do not hesitate to contact our Regional Development Officer, Karel Kabele, or our Regional Affiliate Liaison, Drury Crawley.

This year will also see **Building Simulation 2007** in Beijing, which will be IBPSA's 10th international conference (**www.bs2007.org.cn**). With around 300 papers this is going to be IBPSA's largest conference ever. It will bring the total number of papers presented at Building Simulation conferences to about 1500. As you may know, the papers from all previous conferences are on-line available at **www.ibpsa.org** — a truly unique reference source. Thank you, IBPSA Brazil, for making this work!

One of the main objectives of the IBPSA international conferences is to enable interactions and face-to-face meetings between delegates. The conferences are also a good opportunity to speak to any of the Board members. We look forward to your comments or suggestions !

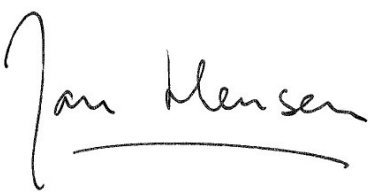
Glasgow is getting ready for Building Simulation 2009. Looking further ahead, if you are interested in hosting Building Simulation 2011 or an international IBPSA conference in 2013 or beyond, do get in touch with our Conference Location Coordinator, Jeff Spitler.

What may become another unique reference source is the IBPSA Germany Simupedia initiative, which is introduced on **page 45**.

Apart from a lot of news, this Newsletter contains two scientific articles. Malhotra and Haberl's article discusses energy efficiency in hot and humid climates, while Spasojevic and Mahdavi's describes work showing that a standard digital camera can be an excellent source of sky luminance distributions for daylight prediction.

I hope you will find this issue of IBPSA News interesting. I would like to finish this short introduction with a big "thank you" to all contributors and especially our Newsletter chairman Larry Degelman, and producer Marion Bartholomew.

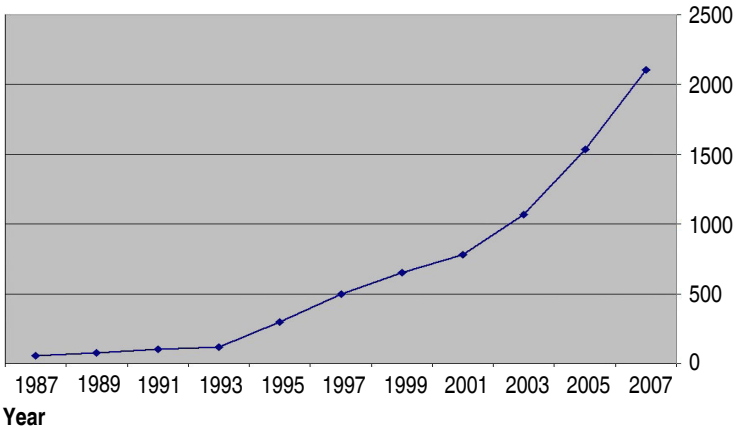
Best wishes, and hoping to see you in Beijing!



Happy 20th Birthday, IBPSA!

The year 2007 marks the 20th anniversary of IBPSA as an international incorporated entity. In its 20-year history, IBPSA has achieved many milestones for which we can be proud. IBPSA has had seven different presidents, conducted nine highly successful international conferences, increased its membership from about 54 to over 2100 members, created 16 worldwide Regional Affiliates, given 17 recognition awards, awarded more than a dozen student travel awards, and published over 1200 technical conference papers (soon to be 1500.) We are all looking forward to the 10th Building Simulation conference that will be held in Beijing later this year.

Estimated IBPSA membership



The beginnings

Though IBPSA didn't become a legally chartered association until 1987, the seeds for the current society were planted as early as 1985 when pioneering researchers involved in building simulation gathered at Lawrence Berkeley National Laboratory to discuss ways to achieve a greater degree of international collaboration. Two ideas emerged: a common modeling environment (subsequently known as the Energy Kernel System) and plans for a formal organization dedicated to building simulation.

This organization was initially christened ABESS (Advanced Building Energy Simulation Society) and the concept of a formally incorporated association was further discussed at an August 1985 simulation conference in Seattle (Building Simulation 1985.) Financial support was obtained from several dedicated private and federal organizations, and the organization was established with Ed Sowell as its first President. The name was changed to IBPSA, a mission statement was developed and incorporation papers were filed in Canada on 26 January 1987. The first Building Simulation conference to be sanctioned under the IBPSA name was held two years later in Vancouver, Canada in June 1989, where 54 technical papers on simulation were presented.

IBPSA's Mission

The International Building Performance Simulation Association (IBPSA) was founded to advance and promote the science of building performance simulation in order to improve the design, construction, operation and maintenance of new and existing buildings worldwide.

IBPSA's leadership and regionalization.

The governing body of IBPSA is a Board of Directors, originally made up of the president, three other officers, and several other elected members at large. Ed Sowell remained as IBPSA's president for its first five years; there have been six more presidents since that time with terms lasting from two to four years each. Though IBPSA has always been an international society, its initial structure was heavily US

oriented and it wasn't until 1993 that Joe Clarke, in a letter written to then President Dan Seth, spawned the idea of getting richer involvement by the international community through the idea of Regionalization. The plan was to make more effective the regional needs and simulation activities on a global basis. Joe Clarke vigilantly pursued this idea throughout his 4-year presidency (1994-1997.) The current structure of Regional Affiliates was in place by a March 1996 board meeting at the beautiful Ross Priory on the southern shore of the Loch Lomond in Scotland. Following that meeting, regions were invited to submit applications for Regional Affiliate designation in IBPSA with similar constitutions and bylaws as the mother organization. By July 1996, six Affiliates were officially in place – Australasia, Canada, Czech Republic, Greece, the U.K., and the U.S. Since that time, a number of other regions have officially become an Affiliate of IBPSA. Today, there are 16 such Regional Affiliates throughout the world, each having its own by-laws, local conferences, regular meetings, and web sites to distribute information unique to each region. IBPSA's current Board of Directors consists of the aforementioned officers, but has added a representative member from each Regional Affiliate; thus, the board size has grown from 9 members to around 25 members.

IBPSA's Presidents

Period	Name
1987-1991	Ed Sowell, USA
1992-1993	Dan Seth, Canada
1994-1997	Joe Clarke, Scotland
1998-1999	Larry Degelman, USA
2000-2001	Roger Pelletret, France
2002-2005	Jeff Spitler, USA
2006-Present	Jan Hensen, Netherlands

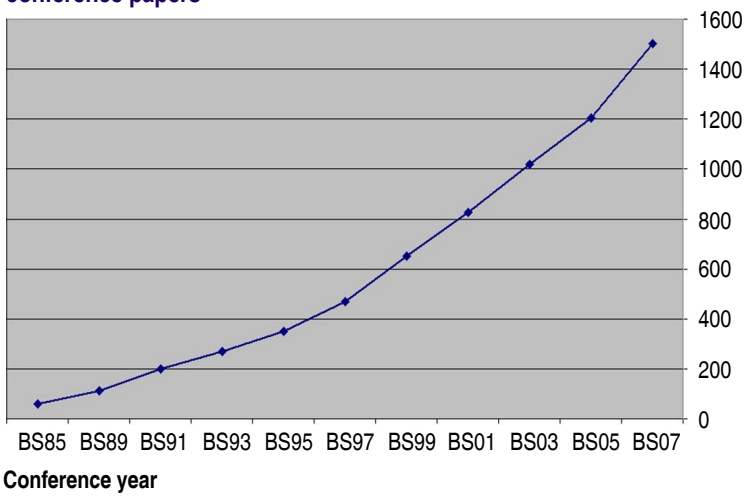
Regional Affiliates 2007

Australasia	Japan
Brazil	Netherlands
Canada	Scotland
China	Slovakia
Czech Republic	Spain
England	Switzerland
France	U.A.E.
Germany	U.S.A.

Conferences and publications

To fulfill one of its goals to inform and educate its members and the public regarding the value and the state-of-the-art of building performance simulation, IBPSA has organized biannual international conferences held in various (and beautiful) venues around the globe. As our 10th official BS conference approaches, our thanks go to the site organizers of these conferences for their endless hours of work in organizing the conference activities and hosting the hundreds of participants in what has always been an enjoyable and enriching experience for everyone. Thanks also go to the countless peer reviewers of the conference papers. It's not difficult to envision the number of hours (and the coordination effort) spent on paper reviews when realizing that the more than 1200 papers presented so far have had the benefit of three to four reviews each. Three-hundred more are under current review for the next conference in

Cumulative number of conference papers



Beijing. Thanks for these valuable contributions go to all these unnamed individuals, without whom the conferences could not take place. As a bonus to members, all of the conference papers are available for free download from the **IBPSA web site**.

Conference	Dates	Location	Papers	Organizers
BS 1985	Aug 21-22	Seattle, Washington, USA	59	???
BS 1989	Jun 23-24	Vancouver, Canada	54	Ed Knipe, Pamela Garland
BS 1991	Aug 20-22	Sofia Antipolis, France	85	Roger Pelletret
BS 1993	Aug 16-18	Adelaide, Australia	71	Terry Williamson
BS 1995	Aug 14-16	Madison, Wisconsin, USA	81	John Mitchell
BS 1997	Sep 8-10	Prague, Czech Republic	119	Frantisek Drkal
BS 1999	Sep 13-15	Kyoto, Japan	183	Nobuo Nakahara, Harunori Yoshida
BS 2001	Aug 13-15	Rio de Janeiro, Brazil	174	Roberto Lamberts
BS 2003	Aug 11-14	Eindhoven, Netherlands	194	Jan Hensen
BS 2005	Aug 15-18	Montréal, Canada	183	Michel Bernier
BS 2007	Sep 3-6	Beijing, China	~300	Yi Jiang

IBPSA awards

In 1991, IBPSA began to make three awards for outstanding work in the building performance simulation field. These awards are made on a biannual basis at each Building Simulation Conference, providing there is a qualified candidate. These awards are:

- IBPSA Award for Distinguished Service to Building Simulation
- IBPSA Outstanding Young Contributor Award
- IBPSA Outstanding Practice Award

Past Recipients of these awards have been:

Year	Distinguished Service	Young Contributor	Practice
1991	Gint Mitalas, Canada	Jeffrey Spitler, USA	n.a.
1993	Tamami Kusuda, USA	James Braun, USA	n.a.
1995	George Walton, USA	Jean-Michel Nataf, France	n.a.
1997	Jean Le Brun, Belgium	Veronica Soebarto, Indonesia	n.a.
1999	Joe Clarke, U.K.	Martin Moeck, USA	n.a.
2001	Ed Sowell, USA	Ian Beausoleil-Morrison, Canada	n.a.
2003	Curt Pedersen, USA	Pieter de Wilde, Netherlands	Michael Holmes – Arup, UK
2005	Fred Winkelmann, USA	Michael Wetter, USA	n.a.

As most of our readers will recall, we were saddened to have lost our first two recipients of the distinguished award – Gint Mitalas in 2005 and Tamami Kusuda in

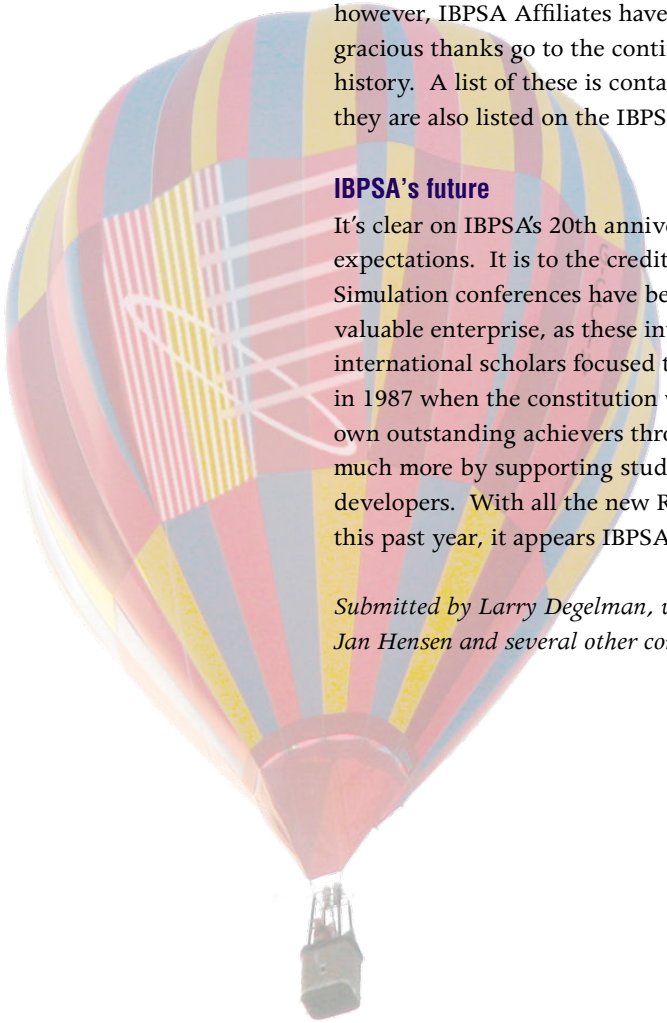
2003. Tributes to their accomplishments can be found in **Vol. 15, No. 2** and **Vol. 14, No. 1** respectively.

What's the history on the IBPSA logo?

The IBPSA logo was designed by one of Terry Williamson's students in Adelaide, Australia in 1993. This logo appears on all the IBPSA publications, IBPSA's and Regional Affiliates's web sites, and has more recently been made into a bronze emblem on award plaques. It has served us well as a unique identity piece in all the information that IBPSA disseminates, and will continue to do so in the future.

IBPSA's supporters

Financial support is always an underlying necessity for all organizations to succeed. Initially, IBPSA collected member dues. Due mainly to sustaining member support, however, IBPSA Affiliates have generally made their memberships dues free. Our gracious thanks go to the continuing supporters that have endured throughout IBPSA's history. A list of these is contained in this and most previous IBPSA News issues, and they are also listed on the IBPSA web site.



IBPSA's future

It's clear on IBPSA's 20th anniversary that the association has outgrown all early expectations. It is to the credit of the early visionaries that the biannual Building Simulation conferences have been such a regular success. This is probably IBPSA's most valuable enterprise, as these international conferences have served as the glue to keep international scholars focused toward those goals that were so prophetically stated back in 1987 when the constitution was written. IBPSA has also done well to recognize its own outstanding achievers throughout its history, and it is undoubtedly achieving much more by supporting students as the next generation of building simulation developers. With all the new Regional Affiliate membership applications received in this past year, it appears IBPSA can have only a bright outlook for its next 20 years.

Submitted by Larry Degelman, with much appreciation for contributions from Joe Clarke, Jan Hensen and several other commentators on this IBPSA history.

IBPSA-UAE formed

The United Arab Emirates (UAE) is a leading country in the Middle East in the area of building construction industry and is considered one of the most important international spots for remarkable architectural projects. The idea of forming the IBPSA-UAE emerged in response to the country's rapid development, especially in the big cities such as Abu Dhabi and Dubai. It was initiated by a small group of scholars and professionals who are advocates of integrating simulation into the building construction industry. In November 2005 during the Big-5 Show, the biggest construction exhibition in the Middle East, several people met in Dubai to discuss the requirements for formation of the IBPSA-UAE. A formal meeting was held immediately afterwards to draft the structure. A president and vice-president were elected, and the secretary and the treasurer nominated.

Pictures from the educational workshop given by Prof. Norbert Lechner and Dr. Khaled Al-Sallal in UAE University

Currently, membership is free for both corporate and individual members. It is expected that the number of registered members will grow toward thirty.

Past and future activities are as follows

- Inviting more members from the private and public sectors.
- Promoting the society in relevant regional conferences/exhibitions.
- Disseminating information about IBPSA-UAE:
  - during the Environment 2007 Conference and Exhibition in Abu Dhabi, in cooperation with UAE University (February 2007)
  - in cooperation with UAE Society of Engineers (June 2007).
- Organizing an educational workshop series to UAEU architectural students given by:
  - Prof. Norbert Lechner (invited guest speaker): Solar Simulation Using Physical Models, February 2007
  - Dr. Khaled A. Al-Sallal: Solar Simulation Using Software, March 2007.
- Organizing a seminar in the UAE Society of Engineers, to propagate the practice of building performance simulation, the role/activities of the IBPSA-World and other chapters and the importance of establishing the local chapter IBPSA-UAE (October 2007).

IBPSA-UAE Board Members are:

- Khaled A. Al-Sallal, President
- Laila A. Al-Rais, Vice-President
- Maha Al-Nuaimi, Secretary
- Haya Al-Mutawa, Treasurer
- Reza Rabbbani, Board Member
- Ashraf Biddah, Board Member
- Saud Khashan, Board Member

Disseminating information about IBPSA-UAE during the Environment 2007 Conference and Exhibition

IBPSA welcomes IBPSA Spain

Another recent addition to the IBPSA family is IBPSA-Spain, represented on the IBPSA board by David Garcia of Plenum Ingenieros.

IBPSA-Spain has recently begun its organizational meetings. Initial meetings have resulted in several decisions and achievements:

- Planning has started for several activities to promote IBPSA (ATECYR, IDEA, etc).
- IBPSA Spain will review Spain's Building Regulation in the light of the new Building Technical Code, and particularly the software packages Lider (Energy Demand Limitation) and Calener (Building Energy Certification).
- Proposals for the development of a University Degree on *Building Energy Simulation* have been discussed, and some universities are to be contacted to pursue this idea.
- Planning has begun for several articles about IBPSA and Energy Simulation, for publication in the industry magazines.
- IBPSA Spain has agreed to collaborate with air conditioning manufacturers to develop efficiency or behaviour graphs for various equipment such as chillers.
- A project leader has been designated to co-ordinate these tasks.
- IBPSA-Spain will be participating in Building Simulation 2007 in Beijing: a technical paper has been accepted on *Comparison of building energy simulation demand when given by different energy simulation tools related to Lider and Calender.*

IBPSA Spain has also requested some financial support for the development of its website.

Information on progress will appear in future issues of IBPSA News.

Building Simulation 2007

The venue ...

The Academy of Arts & Design Building outside

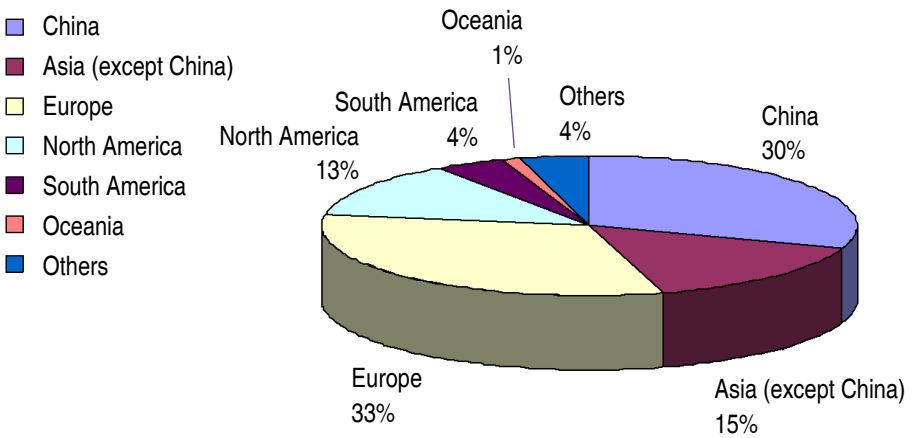
... and inside

The conference room

3-6 September 2007

The 10th International Building Performance Simulation Association Conference and Exhibition - Building Simulation 2007, will be held from September 3-6, 2007 at Tsinghua University, Beijing, China. The exhibition and software demonstration will be held concurrently with Building Simulation 2007. The new Academy of Arts & Design Building will serve as the conference venue for this grand gathering.

Up to March 18, 2007, 300 full papers had been received from almost 30 countries and regions:



Please go to the conference website **www.bs2007.org.cn** for details about registration, hotel information, tours, and visa. Technical programs are expected to be available in June.

Beijing, with its historical heritages and many cultural sites, is a very attractive and dynamic city. It is a blend of ancient attractions with the vitality of a modern metropolis. September is the best season of the year. We are looking forward to welcoming you in Beijing!

Yi Jiang
Chair, Building Simulation 2007 Organizing Committee
Department of Building Science
Tsinghua University
Beijing 100084, P. R. China
email: **bs2007@tsinghua.edu.cn**
web: **www.bs2007.org.cn**

Forthcoming events calendar

Date(s)	Event	Information
2007		
21-24 May 2007	**Building Energy Analysis Workshops** on: eQUEST 21-22 May VisualDOE 23-24 May Chicago, Illinois, USA	**www.iit.edu/~archdoc/energyseminar2.html**
10-14 June 2007	**Clima 2007**, Helsinki, Finland	**www.clima2007.org**
13-15 June 2007	**Roomvent 2007**, Helsinki, Finland	**www.roomvent2007.org**
3-6 September 2007	**Building Simulation 2007**, Beijing, China	**www.bs2007.org.cn**
5-7 September 2007	**ECOSUD 2007**, Coimbra, Portugal	**www.wessex.ac.uk/conferences/2007/eco07/index.html**
16 November 2007	**IBPSA England symposium** on building simulation in the South-West, Plymouth, UK	**www.ibpsa-england.org**

21-24 May 2007
Chicago, USA
www.iit.edu/~archdoc/energyseminar2.html

College of Architecture
ILLINOIS INSTITUTE OF TECHNOLOGY

Building Energy Analysis Workshops on eQuest and VisualDOE

The objective of these two two-day workshops, sponsored by the PhD program at the IIT College of Architecture, is to introduce eQUEST and VisualDOE to architects and engineers. These two programs are easy-to-use graphical CAD and Forms interfaces to the DOE2 energy program.

The classes will be held in the College of Architecture computer laboratory which has 30 workstations. Electrical outlets are located at each work station for those who prefer to bring their own laptops. Class size is limited to 25.

Participants will be issued a certificate from the Dean of College of Architecture, IIT for each seminar, to report the continuing education of your professions. College of Architecture, IIT, is a registered AIA/CES provider. According to AIA/CES guidelines, these seminars are considered to be in the HSW (Health, Safety and Welfare) subject area. The workshops will provide 6 Continuing Education Units Learning Hours per day. Participants may book for single days ($425), either of the two-day workshops ($750), or the two workshops together ($1200) up to 16 May (add $25/seminar/day after 16 May).

eQUEST

eQUEST® is a sophisticated, easy to use, and free building energy use analysis tool approved by several public authorities. eQUEST was designed to allow you to perform detailed comparative analysis of building designs and technologies by applying sophisticated building energy use simulation techniques but without requiring extensive experience in the "art" of building performance modeling. This is accomplished by combining schematic and design development building creation wizards, an energy efficiency measure (EEM) wizard and a graphical results display module with a complete up-to-date DOE. A more complete summary of the features and capabilities of the program is available from the DOE at **www.doe2.com/download/equest/eQUESTv3-Overview.pdf** and the software can be freely downloaded from **www.doe2.com**. (And turn to **page 19** for news about recent eQuest software enhancements.)

The 2-day seminar on eQuest on 21-22 May 2007 will cover:

Day 1:
Overview of eQUEST's Capabilities; Schematic Design Wizard; Energy Efficiency Measures Wizard; Graphical/Parametric Reports; Design Development Wizard; Using DWG files with eQUEST; Intro to Parameters & Expressions; Parametric Run Reporting; Intro to LEED Analysis using eQUEST; DOE-2.2. Documentation Overview.

Day 2:
DOE-2 simulation methodology basics; eQUEST's Detailed Interface Overview; Detailed Interface Basics: constructions, schedules, glass types, geometry, shading, DOE-2 HVAC assignments, parameters, expressions & parametric processing; LEED Analysis issues using eQUEST. Selected Additional Topics (by user preference), e.g., daylighting, HVAC sizing, central plant equipment control, DCV, pipe & duct loss, heat recovery, equipment performance curves, utility tariffs, sub-meters, LCC, etc.; Detailed (DOE-2) Output Reports; Quality Control Procedures.

VisualDOE

VisualDOE is a graphics, forms and reports interface to the industry standard building energy simulation program DOE-2.1E. DOE2 was developed by the U.S. Department of Energy and Lawrence Berkeley National Laboratories and is freeware; VisualDOE is a commercial product from the Architectural Energy Corporation. With VisualDOE, users can quickly create design alternatives with energy conservation measures and evaluate their impacts on building energy use and cost. Powerful and handy features are built into the program to help users quickly create baseline buildings based on energy codes and standards. Special features are included for LEED energy savings calculations and reporting. Detailed information about VisualDOE is available from **www.archenergy.com/products/visualdoe/**.

VisualDOE and DOE-2 together provide a whole building energy simulation tool covering building envelope, lighting and day-lighting, water heating, HVAC systems, and central plant. No experience with DOE-2 is necessary for trainees, but advanced users have the flexibility to modify the input files directly and still run the simulations from within VisualDOE.

A free demo version of VisualDOE 4 can be downloaded at **www.visualdoe.com**. Participants in the seminar will receive a free one-month license for VisualDOE 4, and can purchase a full licence a discount. DOE2.1E is included in the package; it may also be downloaded freely from **www.doe2.com**.

The seminar on VisualDOE on 23-24 May will cover:

Day 1:
Introduction; VisualDOE and DOE-2 Overview; VisualDOE Simulation Preview; Steps for Building Energy Simulations; Hands-on Exercises

Day 2:
Evaluating Design Alternatives; Advanced Topics; LEED NC 2.2 Energy Modeling; Questions & Answers.

BOOKING

For more detailed information about the workshops, please visit **www.iit.edu/~archdoc/energyseminar2.html**.

Fees are $425 for each day separately, $750 each for the two-day eQuest and VisualDOE workshops, and $1,200 for the whole four days. A late fee of $25/day is payable after 16 May. The fees include a workbook containing copies of presentations and training materials, morning and afternoon refreshments, and lunch. To secure a place, register online at **https://payment.iit.edu/item.php?item=334** or download and return the booking form from **www.iit.edu/~archdoc/images/form.pdf**.

10-14 June 2007
Helsinki, Finland
www.clima2007.org

WellBeing Indoors
CLIMA 2007 10-14 JUNE • HELSINKI • FINLAND

Clima 2007 - WellBeing Indoors - the 9th REHVA World Congress

The 9th REHVA World Congress will offer scientists, industry, building owners, end users, consultants, engineers, architects and policy-makers a platform for the exchange of scientific knowledge and technical solutions. The leading international scientific congress in the HVAC area in year 2007, it is being organised jointly by the Finnish Association of HVAC Societies (FINVAC), Finnish Association of Mechanical Building Services Industries (FAMBSI), Finnish Society of Indoor Air Quality and Climate (FiSIAQ) and Helsinki University of Technology (HUT).

The special congress theme is wellbeing of people indoors. The congress will cover all aspects of HVAC technology including building automation in all types of buildings.

The WellBeing Indoors – Clima 2007 congress and web service open a global window to the scientific knowledge and innovative applications of building services. The focus is on improving wellbeing in buildings in a sustainable manner by applying the latest research results and technical innovations into practice.

THEMES AND SCOPE

The scope of the Congress is HVAC and its applications in creating wellbeing in indoor environments in an environmentally sustainable manner. The conference themes are:

Healthy and productive indoor climate

- Energy performance of ventilation
- Modern ventilation technologies
- Maintenance and operation of ventilation systems
- Indoor environment, performance and productivity
- Natural and hybrid ventilation systems
- Developments in regulations and voluntary schemes
- Ventilation technology for special environments

Sustainable energy use of buildings

- Sustainable energy systems
- Energy performance of buildings and HVAC systems
- Commissioning for better performance of buildings
- Life-cycle building services (ESCO etc.)
- Refrigeration and cooling systems
- Renewable energy sources

Intelligent building management

- Building automation and energy performance
- Maximum benefit of building automation systems
- Computer based methods for design, construction and maintenance
- Open building automation systems
- Sensors and methods to control and authenticate indoor environment

Comfort and safety by modern piping systems

- Energy efficient heating and cooling systems
- Energy efficient structures
- Water safety by modern piping technology
- Water and waste conservation methods and technologies
- Sprinkler systems and fire safety in homes

SUBMISSION DEADLINES

The deadlines for submitting papers have now passed.

The full list of topics and subtopics is available at **www.clima2007.org**.

For further information, contact us via email at **info@clima2007.org** or by post at FINVAC, Sitratori 5, FIN-00420 Helsinki, Finland.

13-15 June 2007
Helsinki, Finland
www.roomvent2007.org

Roomvent 2007

The10th Roomvent Conference on Air Distribution in Rooms will offer scientists, industry, consultants, engineers, architects and policy-makers a platform for the exchange of scientific knowledge and technical solutions. Roomvent 2007, the leading event in the area of air distribution in rooms, is a SCANVAC event being organised by the Finnish Association of HVAC Societies (FINVAC), Finnish Association of Mechanical Building Services Industries (FAMBSI), Finnish Society of Indoor Air Quality and Climate (FiSIAQ) and Helsinki University of Technology (HUT).

The special congress theme is air distribution and control techniques for productive room environments. The conference will cover all aspects of room airconditioning technology in all types of buildings.

The Roomvent 2007 conference and web service open a global window to the scientific knowledge and innovative applications of room air-conditioning. The focus is on air distribution and control techniques for productive room environments.

THEMES AND SCOPE

Human to room environment interaction

- Thermal environment
- Contaminant distribution in rooms
- Acoustical and visual environment Room environment and productivity

Plenary lecture: Human interaction with indoor climate – scientific background for comfort criteria

Design of room environment

- Target and design values in specific applications
- Room air conditioning, ventilation and cooling
- Design methods
- Modelling and visualisation
- Validation of designs

Plenary lecture: CFD in design – where are we today?

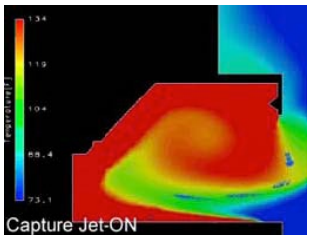
Control techniques

- Air diffusion: jets, plumes, terminal devices
- Zonal control techniques
- Demand based control techniques
- Sensors and control devices

Plenary lecture: Room air conditioning and control strategies

Assessment of room environmental quality

- Commissioning and inspection



- Measurement techniques
- Case studies

Plenary lecture: Assessment of Indoor Climate

For further information, contact the organisers via email at **info@roomvent2007.org** or by post at FINVAC, Sitratori 5, FIN-00420 Helsinki, Finland.

5-7 September 2007
Coimbra, Portugal
www.wessex.ac.uk/conferences/2007/eco07/index.html

ECOSUD 2007

ECOSUD 2007 is the Sixth International Conference in the well-established series on Ecosystems and Sustainable Development. Organised by the Wessex Institute of Technology, UK, the University of Coimbra, Portugal and the University of Siena, Italy in collaboration with the International Journal of Ecodynamics, the meetings provide a unique forum for the presentation and discussion of recent work on different aspects of ecosystems and sustainable development, including physical sciences and modeling.

The aim of the conference is to encourage and facilitate the interdisciplinary communication between scientists, engineers and professionals working in ecological systems and sustainable development. Emphasis will be given to those areas that will most benefit from the application of scientific methods for sustainable development, including the conservation of natural systems around the world.

TOPICS

Topics will include:

- Sustainability indicators
- Mathematical and system modeling
- Sustainability development studies
- Conservation and management of ecological areas
- Socio-Economic factors
- Energy conservation and generation
- Environmental and ecological policies
- Environmental management
- Environmental risk
- Recovery of damaged areas
- Remote sensing
- Water resources
- Sustainable waste management
- Air pollution and its effects on ecosystems

Full details are available from the conference website at **www.wessex.ac.uk/conferences/2007/eco07/index.html**.

SUBMISSION DEADLINES

The original abstracts submission deadline has now passed, but late submissions may be considered. Contact the conference manager Rachel Swinburne as soon as possible at **rswinburn@wessex.ac.uk** if you wish to make a late submission.

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16 November 2007
Plymouth, England
www.ibpsa-england.org

IBPSA England symposium on Building Performance

IBPSA-England will be holding a one-day symposium on building performance simulation in the Southwest on Friday, 16 November 2007. The event is jointly organised by the Universities of Plymouth, Exeter, West of England and Bath, and will take place on the campus of the University of Plymouth.

The main topics to be covered are the application of, and education and R&D on, building performance simulation in the region. Papers are invited on the following themes:

- the application of building performance simulation in construction projects in the Southwest, both from an engineering and end-user (client, architect) point of view
- education in building performance simulation in the region
- simulation software development and research furthering the state-of-the art of building performance simulation in or specifically related to the Southwest.

Contributions will be peer-reviewed before acceptance, and will be published on a CD-ROM with symposium proceedings. All accepted papers will be presented orally.

Guest speakers and visitors from other regions will ensure a tie-in with the national state-of-the-art.

For further information, please see the announcement and call for papers **www.ibpsa-england.org/download/announcement-plymouth-event.pdf**.

SUBMISSION DEADLINES

- Notification of the intention to submit a paper: 28 April 2007
- Submission of full paper: 8 June 2007
- Acceptance of papers: 14 September 2007
- Symposium: 16 November 2007

Contributing authors should send an email stating their intention to submit a paper, its preliminary title, authors and affiliation, the stream (application, education or R&D) and a brief outline (~100 words) to **pieter.dewilde@plymouth.ac.uk.**

Software news

Building Energy Tools Directory

Dru Crawley, DOE

The web-based Building Energy Tools Directory at **www.energytoolsdirectory.gov** contains information on more than 345 building-related software tools from more than 20 countries around the world. Haven't visited lately? Over the past 6 months, more than 25 tools have been added including Be06, CHP Capacity Optimizer, Climawin 2005, CompuLyte, Construction R-value Calculator, Diag DPE, DIALux, DIN V 18599, Energy Auditor, Energy Lens, EPB-software, eSankey, FindSolar, I-BEAM, ISOVER Energi, OptoMizer, Pipe-Flo, Psychrometric Analysis, Quick Calc, Quick Est, SBEM, SolarShoeBox, STE, and Visual TTH. (This includes many of the recently introduced programs for the EU Energy Performance in Buildings Directive.)

For each tool in the directory, a short description is provided along with information about technical expertise required, users, audience, input, output, validation, computer platforms, programming language, strengths, weaknesses, technical contact, availability and cost. A link is also provided for directly translating the web pages into more than 8 languages.

If you know of a tool (yours?) that isn't in the directory, send the information shown here: **www.energytoolsdirectory.gov/submit.cfm** in an email message to Dru Crawley at **Drury.Crawley@ee.doe.gov**.

EnergyPlus version 2.0 now available

Dru Crawley, DOE

The next release of the EnergyPlus building energy simulation program, Version 2.0, became available in early April. Two key new features include green roofs and phase change material simulation. We have updated and extended capabilities throughout the existing building envelope, daylighting, and HVAC equipment and systems portions of the program. Some of the new features include:

DATA SETS

- New materials data set based on ASHRAE 2005 HOF replaces legacy DOE-2 and BLAST data

INPUT

- New weather data for 86 locations added: 69 in Australia, 16 in Canada, and 1 in Iran. Weather data for more than 1300 locations are now available worldwide
- Example input files created for all new features (More than 225 example input files now available)

GEOMETRY/WINDOW/WALLS/SHADING

- Phase change materials (PCM) with variable thermal conductivity and a temperature-enthalpy function incorporated in conduction finite difference solution algorithm
- Users can now enter interzone surfaces once and EnergyPlus will automatically create the mirror interzone surface

ZONE MODEL

- Zone Sizing modified to allow standards-type calculation of design outside air flow rates; allows min cooling and max heating limits on design supply air flow rates

NATURAL AND MECHANICAL VENTILATION

- Simple Ventilation object now reports air changes per hour
- New options in UnitVentilator include no coil option and fixed amount for outside air control strategy
- Airflow Network model can now use Zone Exhaust Fan, OnOff supply fan and the DX heating coil objects

HVAC

- Evaporative condenser option added to existing refrigerated case compressor racks including availability schedule and basin heater with controls
- Draw-through fan configuration added for furnaces, unitary system and air-to-air heat pumps
- Different supply air flow rates now allowed for cooling, heating and when no cooling or heating is required in unitary, furnace and air-to-air heat pumps
- Common Pipe for Primary-Secondary systems provides an alternative to the Connection component object to model Primary-Secondary systems
- Desiccant heat exchanger option added for the existing heat exchanger-assisted cooling coil object
- Stratified water heater model added

WATER MANAGER

- Green roof simulation added

ON-SITE ENERGY SUPPLY

- Combustion micro cogeneration model added

OUTPUT

- Report Variables and Meter Variables (rdd and mdd) separately reported and output as IDF

- Meters can now report cumulative value in addition to resetting at reporting time interval

UTILITIES

- New tab in EP-Launch added where users can launch other utilities—Basement, CalcSoilSurfTemp, CoeffCheck, CoeffConv, Slab or WeatherConverter
- IDF Editor now preserves the order of user IDFs and includes a large number of other new features

DOCUMENTATION AND GUIDES

- Input/Output Reference and Engineering Reference updated and extended for all new features and updates. Total documentation now exceeds 3300 pages.

And many other enhancements and speed improvements throughout.

More information on these and other new features in this version is available on the EnergyPlus web site, **www.energyplus.gov**.

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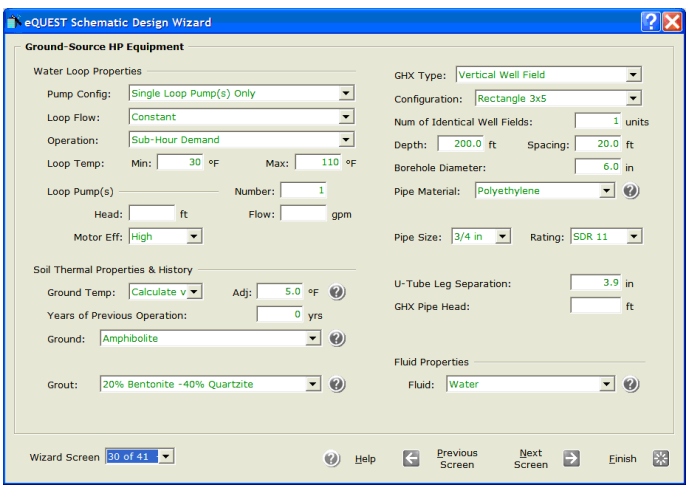
eQuest/DOE-2.2 software enhancements

eQUEST and its DOE-2.2 simulation engine — both freeware — have been recently enhanced in their capabilities for modeling both the airside and waterside of WLHP and GCHP systems. The improvements enable more accurate modeling of WLHP and GCHP systems including variable airflow, staged heating and cooling, and energy recovery including both single and multi-zone air-handler systems.



A new vertical ground loop heat exchanger (VGLHE) model, based upon the widely

accepted g-function algorithm, has been implemented. In addition, interface screens and associated database for specifying GCHP related parameters have also been created and integrated into the Building Creation Wizard and Detailed Data Edit mode of eQUEST.

The newly implemented VGLHE model is capable of simulating the heat transfer performance of borehole fields with various configurations. It accounts for the effects of long-term heat/cool build up in the ground, various grouting materials and heat transfer fluid (including four types of anti-freeze solutions), as well as other parameters important in the modeling of borehole fields.

More information about both eQuest and DOE2 is available at **www.doe2.com**.

To facilitate the selection of various water-to-air heat pumps, an add-on feature is now available in eQUEST wizards to allow user select heat pump from equipment libraries provided by heat pump manufacturers. For additional information, please contact: Xiaobing Liu, Climatemaster, Ltd, **xliu@climatemaster.com.**

See **page 10** *for details of workshops on eQuest and VisualDOE at IIT Chicago in May.*

HEED, Home Energy Efficient Design

Murray Milne, UCLA Department of Architecture and Urban Design

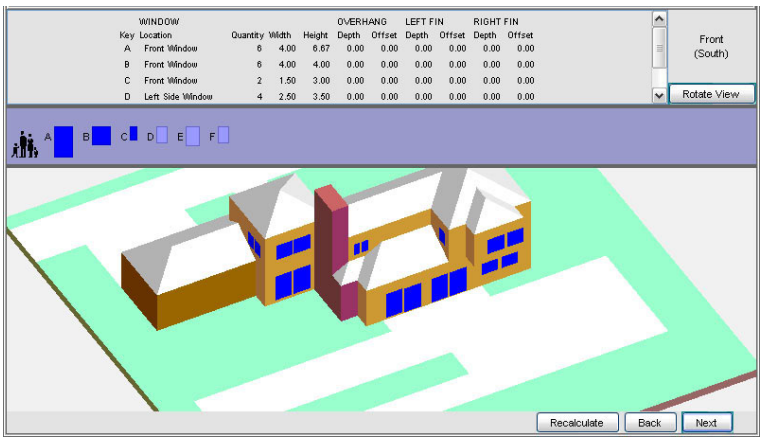
Architects at UCLA have created a free software tool called HEED (Home Energy Efficiency Design) to help users make better design, remodeling, and appliance-purchasing decisions. The latest release was developed under contract to the California Public Utilities Commission is now available at **www.aud.ucla.edu/heed**.

Increasingly users are turning to the internet for help with home improvement decisions. HEED is intended for the millions of do-it-yourselfers, home buyers, homeowners doing major upgrades, custom home builders, remodeling contractors, designers, architects, and energy consultants. These users need a tool that is fast, easy to use, accurate, and that automatically loads local utility rates and climate data. Once they have input their own specific home with its unique floorplan, orientation, window layouts, and construction, HEED will show them the amount of money they will save each year for each different design change or appliance option they test. .

HEED starts by asking you just four questions about your home: its square footage, number of stories, building type, and location. With this HEED creates a home that meets California's 2005 Title-24 Energy Code, and then it creates a second scheme that is about 30% more energy efficient. Next you are prompted to create a new scheme 3 by inputting your own unique floorplan using the simple fill-in-the-squares technique. You can click and drag your windows onto each façade. You can pivot a full 3-D image

of your house around to its correct orientation. Dozens of check-lists let you define your home's construction and equipment. HEED lets you try out all kinds of changes to your home and then calculates the indoor temperature for each every hour of the year. Electricity and gas cost savings are calculated using your local utility rates. Bar charts show you the differences in your annual energy savings for up to 9 different schemes. Dozens of other graphic displays to help you evaluate your home's performance. The Economics screen shows the pay-off of your various energy efficiency investments.

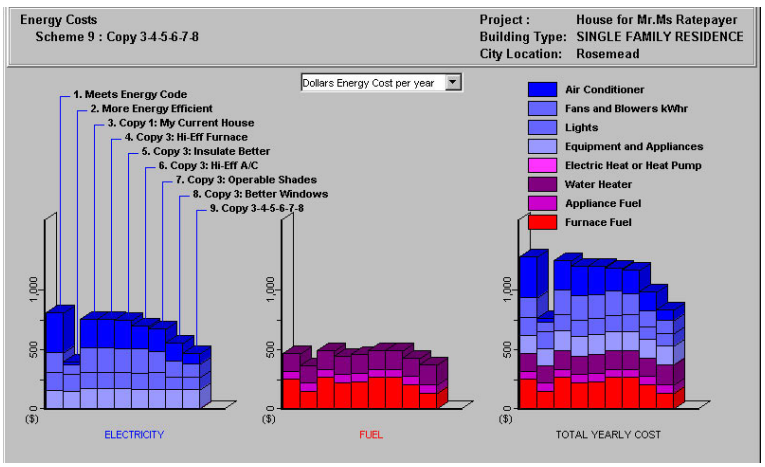
HEED is available at no cost from the UCLA web site **www.aud.ucla.edu/heed**, and is also listed on the State of California's Flex Your Power site **www.fypower.org/res/tools/resources.html**. Over 4500 copies have been downloaded in the past year.



Window Layout screen

The WINDOW LAYOUT screen (above) lets the user click and drag windows into their correct location on each façade. The home was input using HEED's simple fill-in-the-squares technique. An important benefit of this screen is that it helps the homeowner see that no windows have been left out or are the wrong size (this is the most common source of errors in the other non-graphic design tools).

The ENERGY COSTS screen (below) is the "bottom line!" It shows the annual cost for

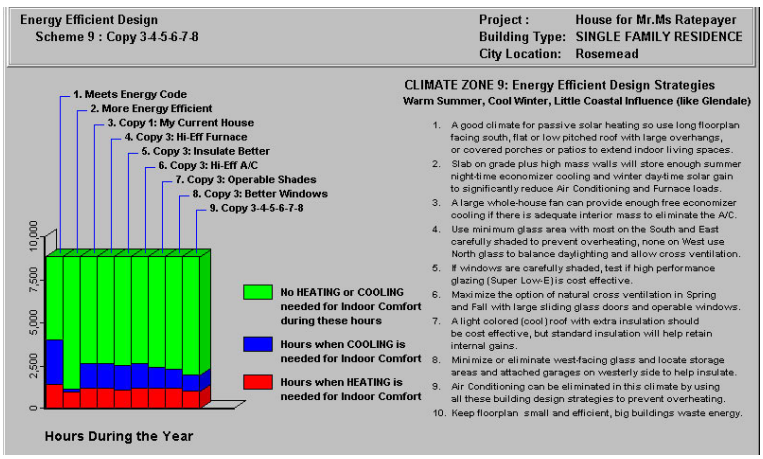


Energy Costs screen

electricity (blue), gas (red), and the total yearly cost (red+blue). Here the user has tried out various design changes:

Scheme 1: Meets Energy Code (designed automatically by the expert system to act a reference)
Scheme 2: More Energy Efficient (also designed automatically to show how good it could be)
Scheme 3: My Current House (they input their own home using the fill-in-the-squares technique)
Scheme 4: Copy 3, adds a High Efficiency Furnace
Scheme 5: Copy 3, adds Better Insulation
Scheme 6: Copy 3, adds a High Efficiency Air Conditioner.
Scheme 7: Copy 3, adds Operable Exterior Shades
Scheme 8: Copy 3, adds Better Windows
Scheme 9: Copy 3+4+5+6+7+8 (combines all of the above options)

Note that some schemes used less electricity while others used less gas, but when they are added together, the best single action is to add better windows (Scheme 8). It is important to emphasize that these conclusions apply only to this particular house. These same options for this same home in a different climate with different utility rates would reach a totally different set of conclusions.

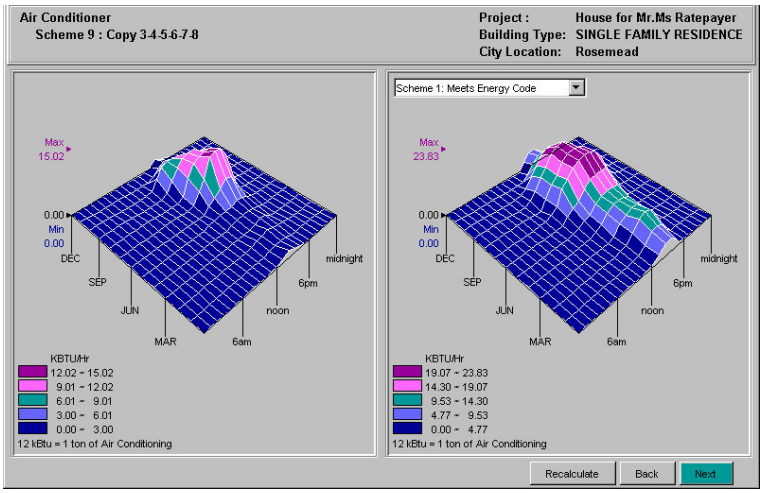


Energy Efficient Design screen

This is the ENERGY EFFICIENT DESIGN screen. It shows the number of hours per year when the house uses no Heating energy (red) or Cooling energy (blue) to maintain indoor comfort conditions (70-75°). Note that Scheme 2 used almost no air conditioning and probably even this could be eliminated by improved design. On the right are a list of Energy Efficiency Design Strategies that would improve a house's performance in this particular climate zone.

The screen below is one of the 28 different ADVANCED DESIGN SCREENs, but most beginning users will never use them. This pair shows air conditioner energy for each hour of the day (see lower right hand scale), and for each month of the year (see lower

left hand scale). The first panel shows that Scheme 9, the Final Design, needs an air conditioner that delivers 15 kBTU on average, while the second panel shows that the original Scheme 1, that just meets the Energy Code, would need a much larger air conditioner that delivers about 23 kBTU on average. Notice that this first design also uses much more air conditioning throughout the entire year.



One of the 28 Advanced Design screens

NEW FEATURES IN HEED

- You can draw in your actual multi-level floorplan of any complexity using the easy fill-in-the-squares technique, and now it will automatically draw in a pitched roof on any shaped building
- Draw in windows with a simple click and drag, then click and drag them to the correct location on each facade
- Rotate the 3-D image of your house around to look at all four sides and the roof, to help you see that all windows and doors are correctly sized and located
- The Appliance screen lets you add and subtract any type of gas or electric appliance, or electronic equipment, using data directly off the Energy Star stickers
- Water heaters can be added using electricity, gas, oil, or propane, whether tank-type and instantaneous
- The new Energy Efficiency screen shows how many hours during the year your building runs without needing heating or cooling energy, in other words how many hours it is a totally passive home
- Design Guidelines are presented for each type of climate
- The size of Furnaces and Air Conditioners or Heat Pumps is calculated using Manual J and by hourly simulation
- Multiple thermal zones can be drawn in with their own HVAC systems, then combined onto one meter
- Basements can now be added automatically
- Economics screen shows the number of years of energy savings that will be needed to pay off each energy efficiency investment, as compared to all other designs

- Bar charts that show how energy costs compare for up to 9 different design schemes, now break down costs for each type of appliance and water heater in addition to air conditioner, furnace, or heat pump
- The Graphic User Interface has been updated so that almost everything you click on will either move or give you additional information.

These are in addition to features inherited from the prior version of HEED, including:

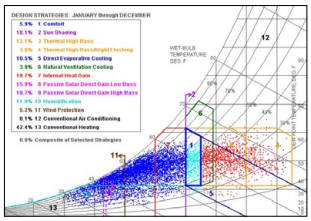
- Simple 4-question Initial Design screen asks only your zipcode, square footage, number of stories, and building type
- With this data the expert system automatically creates two basecase designs: a house that meets California's 2005 Energy Code, and one that is about 30% more Energy Efficient
- Zipcode input automatically pre-loads all your utility rates and climate data
- Climate data for hundreds of stations can be run automatically by visiting the EnergyPlus web site
- Dozens of check-lists let you pick out all your home's construction and equipment options
- Click and rotate the full 3-D image of your house around to its correct compass orientation
- Operable shades (inside or outside) can be scheduled hourly or seasonally.
- The simulation engine calculates an hourly heat balance for all 8760 hours per year and calculates Indoor Air Temperature for each hour of the year
- The Indoor Air Temperature plot shows graphically how a whole-house fan can cool your home by "night flushing", and can show if you can safely eliminate your air conditioner
- Actual electricity cost savings are calculated using rates for your own local utility.

In addition to all the above Basic Design features, there are an equal number of Advanced Design data input screens intended for housing professionals and advanced users who want to input exact numerical values for any aspect of their building's performance.

The HEED web site maintains a list of Frequently Asked Questions with our answers to the most common queries, so if you are having problems email them to the hotline at **heed@aud.ucla.edu**.

HEED is the only whole-home energy design tools that is also available in Spanish.

And HEED is free!



Climate Consultant 3.0: a completely new version of the design tool for visualizing the energy Implications of California's climates

Murray Milne, Robin Liggett, and Rashed Alshaali, UCLA Department of Architecture and Urban Design

We have just released an updated version of a simple, free, easy-to-use, graphic-based computer program called Climate Consultant 3.0. Our objective is to help architects, builders, contractors, and homeowners, etc to understand their local climate and how it impacts their building's energy consumption. Earlier versions of Climate Consultant have already been downloaded over 14,000 of times.

BACKGROUND

The Department of Energy has recently made available at no cost, climate data for over a thousand stations around the world. Climate Consultant 3 translates this raw weather data into meaningful graphic outputs and design guidelines.

The energy consumption of the vast majority of our nations buildings is determined by how well they respond to the local climate. These "envelope dominated" buildings include single family homes, low-rise multi-family homes, small commercial buildings, and schools, etc. The alternative category is "internal-loads dominated" buildings that includes large high-rise offices, hospitals, theaters, and factories, etc. which are relatively indifferent to the exterior environment.

These small envelope-dominated buildings outnumber internal-loads dominated building by a huge margin. For example, Southern California Edison supplies five residential ratepayers for every one non-residential ratepayer, and many of these non-residential ratepayers are also housed in envelope-dominated buildings, like small stores and offices.

Graphic Thinking

The computer may `know' what the climate is like, but the most challenging task is to devise effective ways to communicate this information to the human. At UCLA over the past 30 years we have been working on ways to graphically display complex information that are easy and intuitive to comprehend. For example, we have developed a 3-D plotting technique that shows the state of a variable for every hour of the day for every month of the year. We have found that the general 'gestalt' of the resulting shape is easy to quickly interpret, while at the same time these plots are rich with information at the most detailed level. The beauty and power of these graphic approaches is that they communicate in a way that allows users to see extremely subtle distinctions that would otherwise be lost in a page full of numbers. If 'information' is defined as the recognition of small differences that make a difference, then this technique makes it possible to recognize some very subtle differences, indeed.

Energy Problem Addressed

Designing and remodeling buildings that are truly climate responsive depends first on gaining a detailed accurate understanding of the local climate. This project

developed a new design tool called Climate Consultant 3.0 that is intended primarily for architects, students of architecture, builders, contractors, and knowledgeable homeowners. It automatically reads the local climate data for all 8760 hours per year in EPW (EnergyPlus Weather) format which now is available at no cost for hundreds of stations via the internet (see our web page). For the chosen climate it will display dozens of different graphic images of various attributes of that climate, and can even suggest building design strategies appropriate for the unique characteristics of the local climate. The purpose is not simply to plot climate data, but rather to organize and represent this information in easy-to-understand new ways that shows the subtle attributes of the climate, and its impact on built form. Our goal is to help Californians create more energy efficient, more sustainable buildings, each of which is uniquely suited to its particular spot on this planet.

CONTENT OF THE NEW CLIMATE CONSULTANT 3.0

Climate Consultant 3.0 contains numerous screens of five generic types, each of which can be loaded with a variety of data. The summary below will give some idea of the richness and power of this new energy design tool:

Text Screens

Title Screen: Basic Instructions with information on how to download EPW data

Measurement Units Selection (pop up): Metric or Imperial

Select Weather Station: (two EPW stations are included with download)

Design Criteria Definitions: All the variables in the program including Comfort Range, Design High and Low Temperatures

2-D Plots

Temperature Range Bar Chart: Mean, Records and Design High and Low for 12 Months

Radiation Bar Chart: Beam and Horizontal Recorded and Theoretical Maximums

Sky Cover plus Radiation Bar Chart: Mean and Record High and Low for 12 Months

Wind Speed Timetable for 24 Hours x 365 Days with Comfort Zone Overlay

Relative Humidity vs. Temperature Monthly Plots: 12 Months for 24 Hour Averages

Sun Shading Chart: Hourly Bearing and Altitude, Color Coded for Comfort Temperature

Sky Cover Timetable for 24 Hours x 365 Days with Comfort Zone Overlay

Radiation Timetable for 24 Hours x 365 Days with Comfort Zone Overlay

Sun Chart: Hourly Bearing and Shadow Length, Color Coded for Comfort Temperature

Bio-Climatic Chart: Temperature 24 Hours x 356 Days with Comfort Zone Overlay

3-D Surface Plots (Monthly or Daily)

Dry Bulb Temperature Plot for 24 Hours x 356 Days Color Coded for Comfort Ranges
Wet Bulb Temperature for 24 Hours x 356 Days Color Coded for Comfort Ranges
Wet Bulb Depression: difference below Dry Bulb Color Coded for Evaporative Cooling Feasibility
Relative Humidity for 24 Hours x 356 Days Color Coded for Comfort Ranges
Wind Speed for 24 Hours x 356 Days Color Coded for Comfort Ranges

Psychrometric Charts (with Design Strategies for 13 Zones Overlaid)

With Temperature Color Coded: 8760 Hourly or Daily High/Low Data Points
With Wind Speed Color Coded: 8760 Hourly or Daily High/Low Data Points,
With Radiation Color Coded: 8760 Hourly or Daily High/Low Data Points
With Sky Cover Color Coded: 8760 Hourly or Daily High/Low Data Points
— plus all of the above with user-selected hourly ranges or date ranges

Wind Wheel (Color Coded for Wind Velocity, Humidity, Temperature for Each 10 Degrees)

For Full Year or For Selected Hourly Ranges or Date Ranges
Static or Animated for Daily or Monthly Ranges

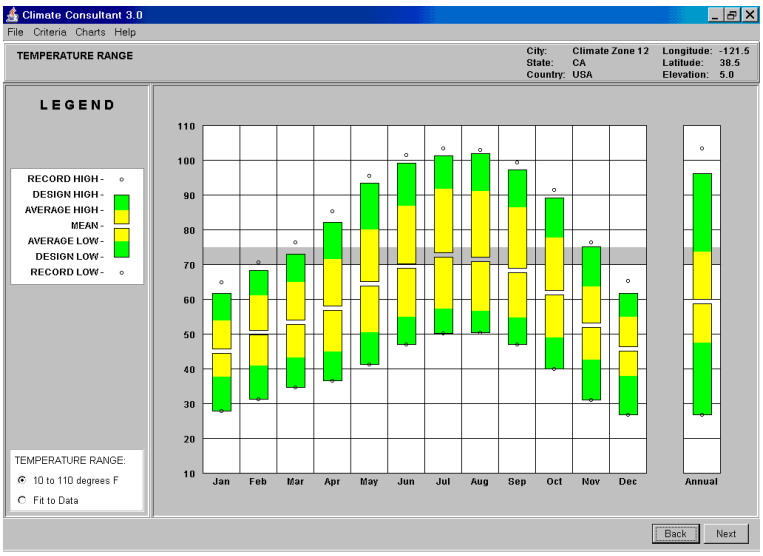
By simply hitting the "Next" button (lower right of screen) the program will go to the next logical screen in the sequence. This is in effect a built-in demonstration sequence that shows the first-time user all the different kinds of information that is available by displaying each screen in order for a selected site. Context specific "Help" is available on each screen to define every term and to explain how this screen's data can be used to shape building design in order to reduce energy consumption.

However beyond these basic plots are much more sophisticated graphic analysis options-- the kind that begins to show the power of this new design tool. It must be emphasized that the purpose is not simply to plot climate data, but rather to overlay it with various comfort ranges and building design criteria. This will show how comfortable humans could be in indoor spaces with these characteristics, or more importantly how to design buildings that can modify these external conditions to create comfortable indoor environments.

The following screen images from Climate Consultant 3.0 show four typical charts for California's Climate Zone 12, which includes Sacramento and Stockton. They illustrate examples of how climate data plus design criteria can be organized and represented to help show subtle implications of this particular climate on building form.

The TEMPERATURE RANGE BAR CHART is the simplest of all charts and shows for each month the dry bulb temperature ranges enclosing Record Temperatures (round

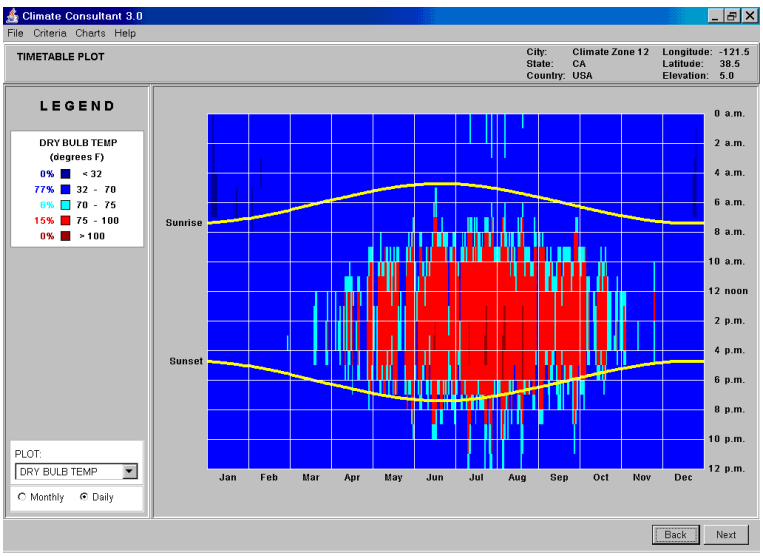
dots) and Design Temperatures (green) from .25% to 100% of the hours which is the range defined in the 2005 California Energy Code (Title 24). The Average High and Low Temperatures (yellow bars), and Monthly Mean (midpoint) are also shown. This



The Temperature Range chart

example shows that for Climate Zone 12 the annual record temperatures (right hand bar) fall between 104 and 27°. The gray bar running from 70 to 75° is the comfort range as defined in the 2005 California Energy Code (Title 24).

BIOCLIMATIC TIMETABLE: Olgyay developed this powerful graphic analysis technique, that he called the Timetable of Bioclimatic Needs. It is like a topographic plot of dry bulb temperatures for every hour of the year. The sunrise and sunset lines

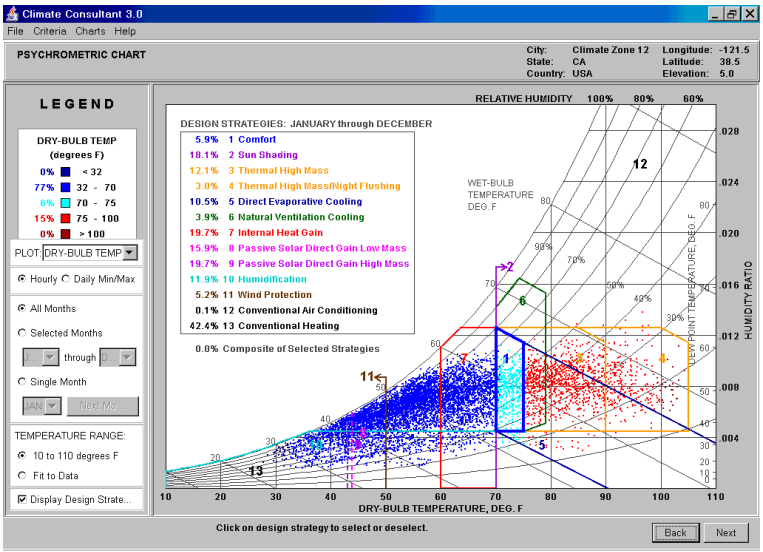


The Bioclimatic Timetable

(orange) bracket the daylight hours when passive solar heating is possible or when

shading may be needed. This example for Climate Zone 12 shows that although many hours are too hot for comfort (red), every day of the year the temperature starts below the comfort range (dark blue) and then on most months rises into the comfort range (light blue), and then quickly on into the red (overheat zone). This small comfort zone is because the 2005 code specifies such a narrow comfort range (70 to 75°). Because on every night temperature falls below the comfort range, it means that passive nighttime cooling is possible if the building has enough internal mass to store this "coolth" through the next hot day. This chart shows the times of day and months of the year when windows need sun protection (the red area plus light blue area). Conversely, the cold regions (all dark blue) indicated on this chart when windows should be fully exposed to maximize passive solar gain.

PSYCHROMETRIC CHART: This is one of the most powerful graphic design tools because it not only shows which building design strategies to use but also quantifies how effective each will be. In Climate Consultant 3.0, data can be plotted on Psychrometric Charts in many different ways, to reveal different phenomenon. In the example here, every hour of the year is plotted with the color indicating whether if it

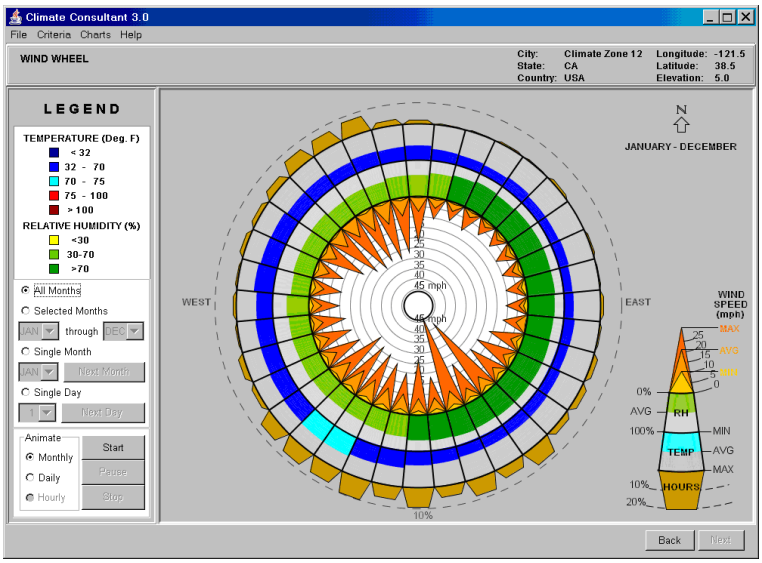


The Psychrometric Chart

above (red) or below (dark blue) the comfort zone. Each of the building design strategy zones are also laid out on the chart. The Table of Effective Design Strategies (upper left) shows that Climate Zone 12 has about 5.9% of the hours per year in the comfort range. Note that High Thermal Mass with Night Flushing (12.1% plus 3.0% of the hours per year) is the best design strategy for hot conditions. An alternative would be Direct Evaporative Cooling (10.5% of the hours). Sun shading of course is the best single cooling strategy, applying to over 22% of the hours On the heating side 19.7% of the hours would be comfortable indoors because of the addition of internal loads like (lights and appliances and people). Passive Solar Direct Gain High Mass (19.7% of the hours) is the most attractive passive heating option. However 42.4% of the hours in a low mass building would require conventional heating.

This graph allows a number of other representations, one of which plots only the daily high and low temperatures for any month or for all twelve months, each in a different color. This is useful to understanding the diurnal temperature range, which gives an indication of how effective passive strategies like thermal mass and evaporative cooling will be on a daily basis.

WIND WHEEL: This is a new kind of graphic added to Climate Consultant 3, showing on one diagram a number of variables of the local climate related to wind direction. This example for climate zone 12 is for a full year (8760 hours), but individual days or



The Wind Wheel

months can also be plotted. The Outermost ring shows the percentage of hours when the wind comes for each direction. On the next ring the height and color of the bars shows the average temperature of the wind coming from that direction (light blue is in the comfort zone and dark blue is cool). The next ring shows average humidity (light green is considered comfortable at 30% to 70%, while dark green is too humid above 70%), which shows that winds from the west are dryer on average. The innermost circle shows the minimum, average, and maximum velocity of the winds from each direction, in this case the fastest wind came from the South Southeast and reached 45 mph.

One of the most interesting options in Wind Wheel is to animate any set of days or months and watch how wind direction and velocity changes.

WEB SITE

Climate Consultant 3.0 is available at no cost from **www.aud.ucla.edu/energy-design-tools**.

Announcements

Job opportunity at SAIC

Building systems engineer/analyst

SAIC, a Fortune 500 company seeks engineer or analyst to review energy analyses, perform analyses and advisory services related to energy conservation measures and incentives for new building projects in its Portland, Oregon office.

Work includes evaluation of energy efficiency improvements in commercial, industrial and institutional buildings (envelope, HVAC, lighting, controls, processes, etc.), system installation verification, surveys, technical screening and reporting, and client communication.

Experience in energy auditing, complex spreadsheet calculations, building energy simulation modeling (DOE-2, eQuest, etc.) and report writing. Also, interface with building owners, design teams and contractors to present energy efficiency programs, assist in identifying energy efficiency opportunities, and manage technical assistance. Experience and/or knowledge of energy codes, building project development, building markets, energy use, design, construction and/or operation of buildings and facilities desirable. Minimum of 2 years experience in the energy industry with commercial buildings, systems, and markets is preferred.

To apply please forward resume to

Anna Johnson
Outreach Program Manager
New Buildings Program - SAIC
Email: **anna.johnson@saic.com**
Tel: 503-243-2642

Feature articles

An analysis of maximum residential energy efficiency in hot and humid climates

Mini Malhotra, Graduate Research Assistant and Jeff Haberl, Ph.D., P.E., Professor/ Associate Director, Energy Systems Laboratory, Texas A&M University, College Station, Texas

ABSTRACT

This article presents the key findings of an analysis[1] performed to determine energy-efficient strategies for maximizing residential energy savings in hot and humid climates. Strategies considered include: efficient building envelope, improved fenestration, and energy-efficient lighting, appliances, HVAC and DHW systems. These strategies were analyzed with a DOE-2 simulation model of a 2000/2001 International Energy Conservation Code (IECC) compliant single-family, detached house in Houston, Texas. The results show that the proper selection of measures can accomplish a 55% total energy savings for a code-compliant house in a hot and humid climate.

INTRODUCTION

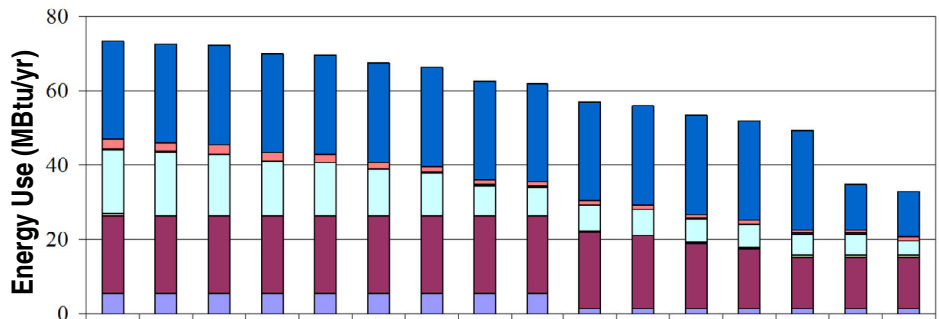
Maximizing the energy-efficiency in buildings requires minimizing the energy use and optimizing the performance of individual building systems and components. This requires that the strategies with the most "combined" energy saving potential are adopted. Many studies have been performed to evaluate strategies for residential energy-efficiency. Some studies are specific to certain building systems and components, while, others have addressed optimal building design by evaluating combined effect of various energy-efficient measures. In most cases, the basecase definition, the measures analyzed and the method of analysis differ among the studies. This makes it difficult to compare or combine those results, for maximizing energy-efficiency. Therefore, this study investigated the individual and combined energy-saving potential of various strategies to determine a combination that could maximize energy savings a single-family, detached house in the hot and humid climate of Houston, TX.

ENERGY ANALYSIS

For this study, a DOE-2.1E simulation model of a 2000/2001 IECC (ICC 1999) code-compliant single-family, detached house in Houston, TX was used as the base case. The house characteristics were modified to simulate scenarios with individual

[1] The complete analysis is presented in Malhotra (2005)

and combined application of various energy-efficient measures. The results of the analysis of individual measures (Malhotra and Haberl 2006a) were used to determine strategies for combined application (Malhotra and Haberl 2006b) that includes: airtight construction with structural insulated panels (SIPs), reflective roof and exterior walls, improved windows, and energy-efficient lighting, appliances, air-conditioner and DHW system. **Figures 1 and 2** show the impact of incremental application of the selected measures on the annual energy use of the house, and demonstrate 55% total energy use reduction. The annual energy end-use in **Figure 1** shows that the because space cooling, domestic water heating and equipment energy use comprised a significant part of the total energy use (24%, 36% and 28%, respectively); whereas, the combined application of the selected measures significantly reduced the contribution of space cooling energy use. **Figure 2** shows the effect on major energy end-uses, which demonstrates the energy use reduction of 78% for space cooling, 53% for domestic water heating, 17% for space heating, and 44% for other end-uses (i.e., lighting, equipment, heating/cooling fans, and pump and miscellaneous). It also includes the simulation results for different building configurations, which shows that the impact of changing the building configuration on the energy use diminished, as high efficiency building systems and components were incorporated in the house.



	Base-case	SIP Const	+ ERV	+ Refl. Roof	+ Refl. Walls	+ Ar-fill LowE	+ Vinyl Frame	+ Over-hangs	+ 75% Win. on S	+ CFLs	+ Eff. Ref.	+ Eff. Freeze r	+ Eff. DW	+ Eff. CW	+ Inst. DHW Sys.	+ SEER-15 AC
DHW	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	12.5	12.5
Fans	2.5	2.4	2.4	2.1	2.1	1.8	1.7	1.2	1.1	1	1	0.9	0.9	0.8	0.8	0.8
Pumps	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Cooling	17.3	17.1	16.6	14.7	14.3	12.5	11.5	8.2	7.8	7	6.8	6.4	6.2	5.7	5.7	3.8
Heating	0.6	0.1	0	0	0	0	0	0	0	0.1	0.1	0.3	0.3	0.6	0.5	0.5
Equip.	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	19.7	17.6	16.1	13.8	13.9	13.9
Lights	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	1.4	1.4	1.4	1.4	1.4	1.4	1.4

Fig 1: Annual end-use energy for combined application of measures

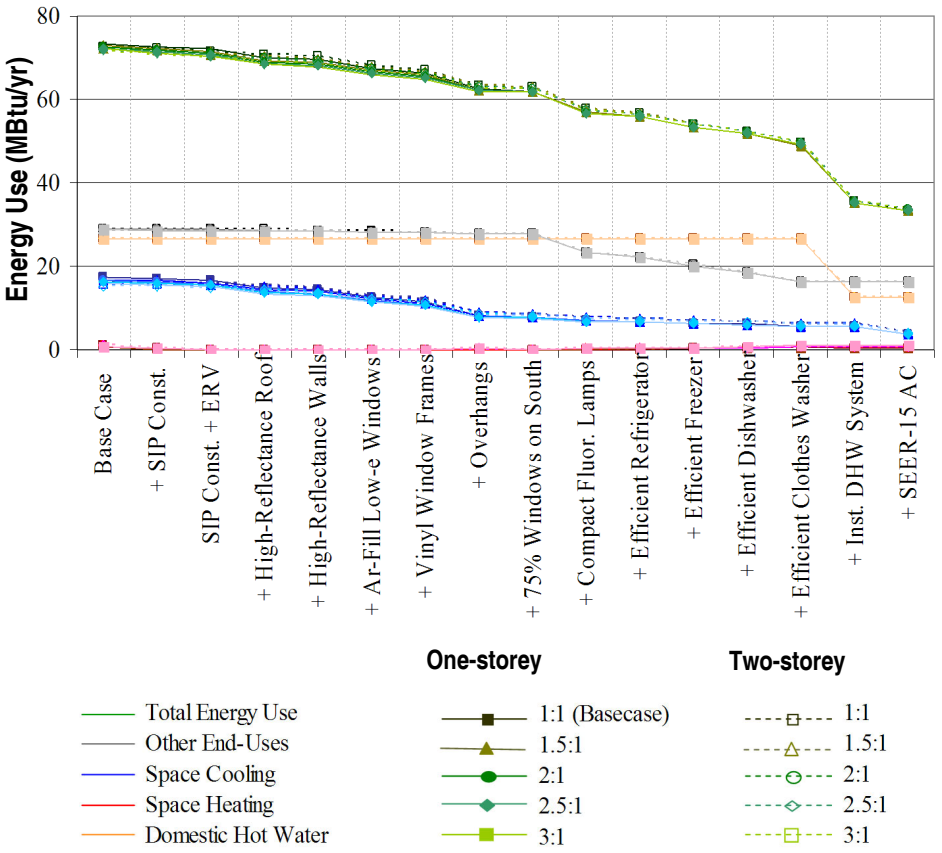


Fig 2: Effect of combined application of measures on annual energy use

ECONOMIC ANALYSIS

The cost-effectiveness of the individual and combined application of the measures was also assessed using an annualized life-cycle cost analysis method (ASHRAE 2003, Haberl 1993). **Figures 3 through 5** show the first year cost, annual energy cost and the annualized life-cycle cost for the incremental application of selected measures. The estimated first year cost of the base-case house was $224,598. The annual energy cost for the basecase house was $1,438. Taking into account all the maintenance and replacement costs, the economic factors such as discount rate, mortgage rate and inflation rate, and periodic costs such as insurance and property tax; the annualized life-cycle cost of the base-case house was $14,252. The cost of combined application of measures was $12,696. These measures decreased the annual energy cost to $635 and the annualized life-cycle cost of the house to $14,206. The complete analysis (Malhotra 2005) showed that the measures that were found cost-effective on individual applications had diminishing returns on combined application.

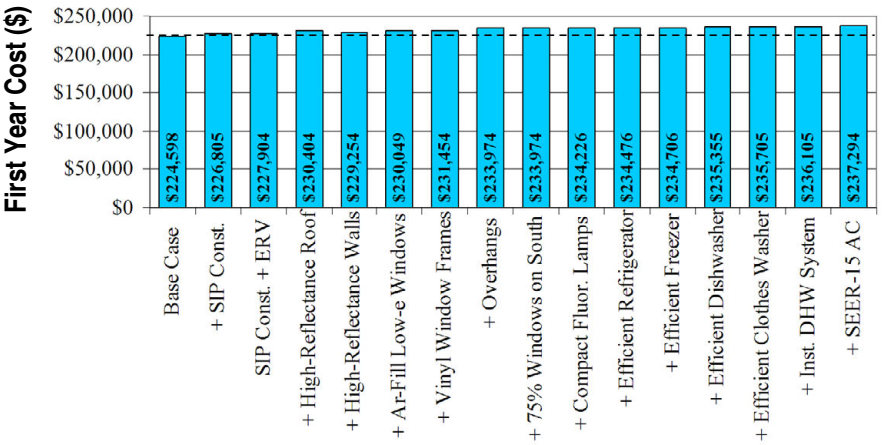


Fig 3: First year costs for combined application of measures

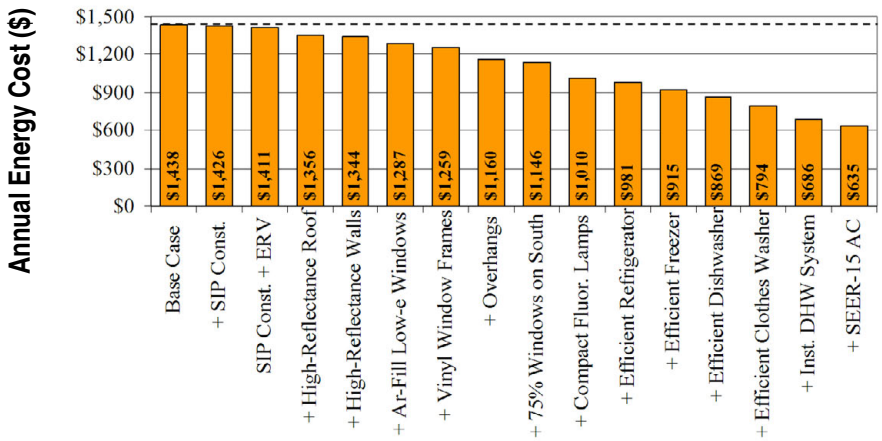


Fig 4: Annual energy costs for combined application of measures

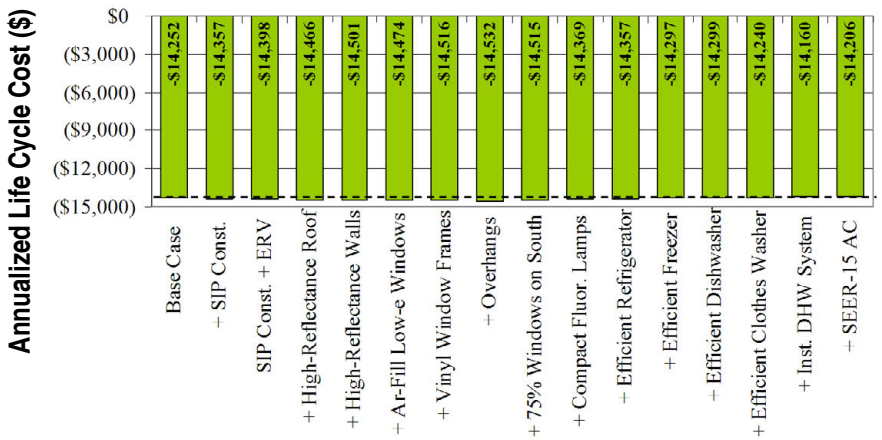


Fig 5: Annualized life-cycle costs for combined application of measures

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SKY LUMINANCE MAPPING FOR COMPUTATIONAL DAYLIGHT MODELING

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ABSTRACT

Building design and control applications can benefit from daylight simulation. Currently, most daylight simulation applications work with simplified sky luminance models. However, reliable prediction of daylight availability in indoor environments via computational simulation requires reasonably detailed and accurate sky luminance models.

As past research has demonstrated, relatively low-cost sky luminance mapping via digital imaging can provide an alternative to high-end research-level sky scanners and thus support the provision of information on sky luminance distribution patterns on a more pervasive basis.

This paper explores the potential of using a digital camera with a fish-eye converter toward real-time derivation of sky luminance distribution maps. To explore the feasibility of this approach, sky luminance data derived from digital images were compared to the corresponding photometric measurements. To further calibrate the process, a correction factor was applied to the digitally gained luminance values. This correction factor was derived as the ratio of the optically measured to the digitally derived horizontal illuminance levels due to the sky dome.

The results show that digital sky imaging calibrated with parallel measurements of overall horizontal illuminance levels can provide a reliable basis for the generation of sky models for daylight prediction tools. Thus, the reliability of daylight simulation may be increased and simulation-based daylight-responsive lighting systems control methods in buildings can be enhanced.

INTRODUCTION

The availability and quality of daylight in indoor environments is amongst the primary concerns of good architectural design. Daylight simulation applications can help designers test and improve alternative daylight solutions. Moreover, daylight simulation can assist model-based building systems control applications (Mahdavi 2001, Mahdavi et al. 1999).

Currently, most daylight simulation applications work with simplified (e.g. uniform, isotropic) sky luminance models. The standard sky models created by using these tools do not represent the actual state of daylight availability accurately (Igawa et al. 1999). Such models are not sensitive to luminance variations in different areas of the sky. But the illuminance level at a point in a room is directly affected by the luminance of the sky area visible from that point, while the other parts of the sky contribute to the indoor illuminance only via reflection (Tregenza and Waters 1983).

Reliable prediction of daylight availability in indoor environments via computational simulation requires reasonably detailed and accurate sky luminance models. Moreover, such models, to be effective for design support purposes must be established for various locations over a statistically representative period of time. Toward this end, sky luminance mapping provides the empirical basis. As past research has demonstrated (Roy et al. 1998), relatively low-cost sky luminance mapping via digital imaging can provide an alternative to high-end research-level sky scanners and thus support the provision of information on sky luminance distribution patterns on a more pervasive basis.

This paper explores the potential of using a digital camera with a fish-eye converter toward real-time derivation of sky luminance distribution maps. Toward this end, sky luminance data derived from digital images were compared to the corresponding photometric measurements.

APPROACH

A fisheye lens makes it possible to capture sky images covering a 180° angle. A *Java* metadata extractor facilitates the extraction of RGB values out of a JPG image as well as camera values like shutter speed, f-stop number and ISO number. These extracted metadata are then used to derive luminance levels of a particular sky patch (Roy et al. 1998).

To examine the reliability of camera-driven sky luminance maps, a digital camera, equipped with a fisheye converter and pointing toward sky zenith, was placed on the roof of a building of the Vienna University of Technology, Vienna, Austria. In the images that have been taken from this point, 95% of the sky dome is unobstructed. Next to the camera, a sky monitoring device was located. The sky monitoring device consists of a box subdivided into 12 black-colored cells arranged in three levels. Each cell hosts an illuminance sensor measuring the horizontal illuminance reaching the sensor through a quadratic aperture. Due to the arrangement of the cells within the box and positioning of the 12 apertures, each sensor is exposed to the light coming from one of the 12 equally-sized (solid angle=π/6) sky hemisphere sectors (Figure 1).

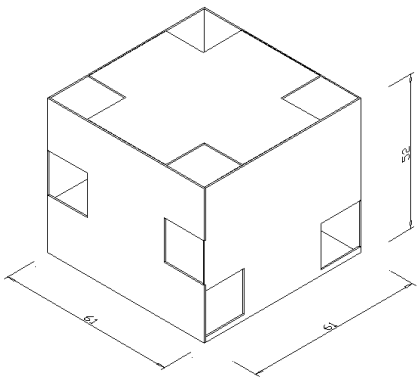

Figure 1 Monitoring device for measuring the illuminance due to 12 sky hemisphere sectors

A total of 170 images were collected using the camera during a week in July 2003. These were taken under sky conditions ranging from partly cloudy with brighter circumsolar region to turbid overcast. Simultaneously, the illuminance due to the 12 equally-sized sky sectors was measured using the aforementioned sky monitoring device. Additionally, the illuminance due to the entire sky dome was measured using a separate precision illuminance meter.

The distortion, occurring in the fisheye images, is caused by the equidistant transformation within the fisheye lens: the ratio of the angular distance of a point on the sky dome from the zenith to the altitude of the zenith (90°) corresponds to the ratio of the radial distance of the point's horizontal projection from the center of the fisheye image to the image radius:

$$\frac{Z}{90°} = \frac{l}{r} \qquad (1)$$

Where:

Z	angular distance of a point on the sky dome from the zenith
l	radial distance of the point's horizontal projection from the center of the fisheye image
r	image radius

Using this basic principle, the twelve sectors of the sky hemisphere, which affect the respective illuminance sensors within the sky monitoring device, were mapped onto the corresponding sectors in the JPG images (see figures 2 to 4).

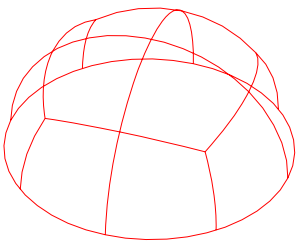

Figure 2 Twelve sectors of the sky dome

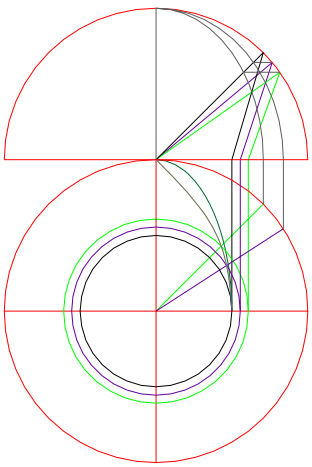

Figure 3 Equidistant transformation

Figure 4 Projection of 12 sectors on a fisheye image

The following algorithm (see equations 2 to 4, Roy et al. 1998) was used to derive the luminance of the particular sky portions from the extracted RGB values for each pixel and camera metadata values,

$$E_v = 0.895 \cdot \pi \cdot S \cdot T \cdot f^{-2} \quad (2)$$

$$V = 0.2125 \cdot R + 0.7154 \cdot G + 0.0721 \cdot B \quad (3)$$

$$L = 344.6 \cdot 10^{-6} \cdot V^{2.4} \cdot E_v^{-1} \quad (4)$$

Where:

R, G, B	RGB values for each pixel [0-255]
E_v	exposure value *L*
V	luminance related function
L	luminance of the sky patch [cd·m^{-2}]
S	ISO number
T	shutter speed [s]
f	f-stop number

Contribution of the luminance of a certain part of the sky hemisphere to the horizontal illuminance on a point in the center of the hemisphere (cp. Figure 5) depends on the altitude of a sky patch and differential solid angle subtended by that sky patch (Ashdown 1998):

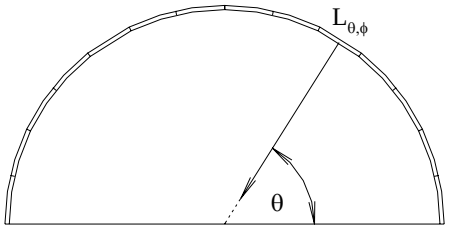

Figure 5 Sky patch luminance contribution to the global horizontal illuminance

$$E_i = L_i \cdot \sin\theta_i \cdot \Delta\Omega_i \quad (5)$$

The differential solid angle can be expressed in terms of angular size of the sky patch in altitudinal and azimuth direction (Szirmay-Kalos 1999):

$$\Delta\Omega_i = \cos\theta_i \cdot \Delta\varphi_i \cdot \Delta\theta_i \quad (6)$$

Where:

E_i	illuminance on a horizontal plane due to a particular sky patch
L_i	luminance of a sky patch
θ_i	altitude of the sky patch center
$\Delta\Omega_i$	differential solid angle of a sky patch
$\Delta\varphi_i$	angular size of a patch in azimuth direction
$\Delta\theta_i$	angular size of a patch in altitudinal direction

Combining the above equations, we obtain:

$$E_i = L_i \cdot \sin\theta_i \cdot \cos\theta_i \cdot \Delta\theta_i \cdot \Delta\varphi_i \quad (7)$$

Respectively, the total horizontal illuminance on a point in the center of the hemisphere consisting of the patches with known luminances can be calculated as follows (Tregenza and Waters 1983):

$$E = \int_0^{2\pi} \int_0^{\pi/2} L_{\theta,\varphi} \cdot \sin\theta \cdot \cos\theta \, d\varphi \, d\theta \quad (8)$$

Where:

E	global illuminance on a horizontal plane
$L_{\theta,\varphi}$	luminance of a sky patch with altitude θ and azimuth φ

As such, smaller patch sizes can increase the precision of the integration. In the present contribution, the sky dome was subdivided into 256 patches as per Figure 6.

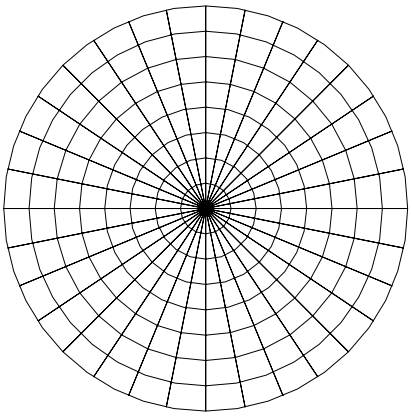

Figure 6 Segmentation pattern used for derivation of patch luminance values from digital sky images

To compare camera-based and photometric data, the camera-based illuminance values due to these 256 patches were aggregated in terms of the 12 aforementioned sky sectors (see Figure 2 and 4).

RESULTS

Figure 7 shows the relationship between illuminances due to the 12 aforementioned sky sectors as:

a) extracted from 170 camera-images (horizontal axis)
b) obtained, simultaneously, via photometric measurements (vertical axis) using the sky monitoring device (Figure 2).

Various factors (e.g. patch size and orientation, number of sky patches considered, distortion of the fisheye images in the lower areas of the sky hemisphere, errors in calculating the illuminance due to the sky areas closer to the horizon) can affect the accuracy of the camera-based horizontal illuminance due to a particular sky sector. Still, the correlation coefficient (r^2) of the corresponding linear regression amounts to 0.92.

To further calibrate the process, a correction factor was applied to the digitally gained illuminance values. This correction factor was derived as the ratio of the optically measured horizontal illuminance level due to the entire sky dome (E_{total}) to the sum of the 12 camera-based horizontal illuminance levels due to the 12 previously mentioned sky dome sectors (E_1 to E_{12}):

$$CF = \frac{E_{total}}{(E_1 + E_2 + ... + E_{12})} \quad (9)$$

Figure 8 shows the relationship between illuminances due to the 12 sky patches as:

a) corrected camera-based values (horizontal axis) and
b) photometric measurements (vertical axis).

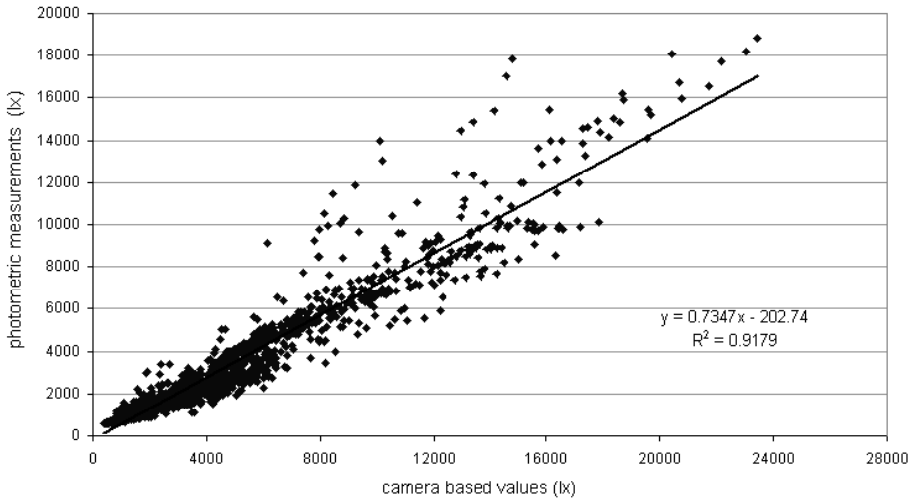

Figure 7 Photometrically measured versus camera-based illuminance values

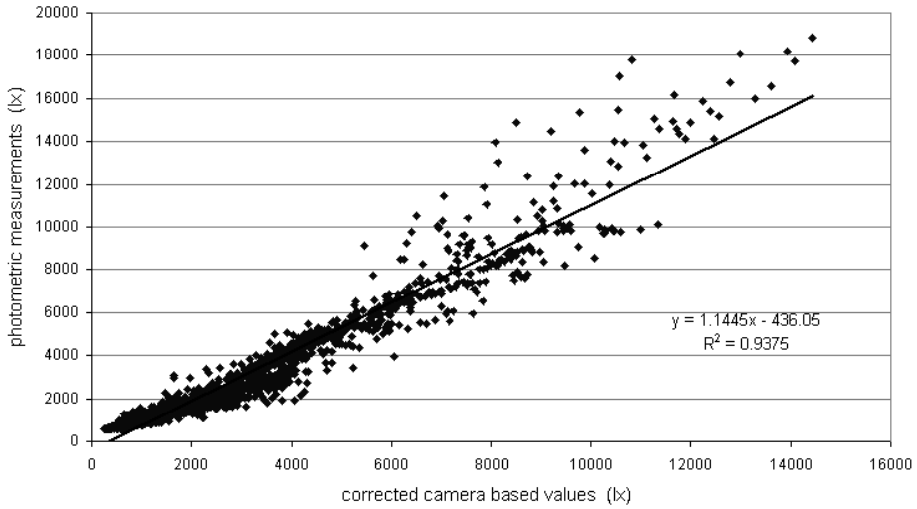

Figure 8 Photometrically measured versus corrected camera-based illuminance values

The correlation coefficient (r^2) of the corresponding linear regression amounts in this case to 0.94. Such a correction factor can be thus applied to the data gained through digital photography in order to provide more accurate patch luminance values for daylight simulation applications.

DISCUSSION

Digital imaging, combined with parallel photometric calibration, appears to provide a valuable means for a real-time generation of sky luminance maps. Such maps can be used as an input for a lighting simulation program to predict the indoor light levels for building design and control purposes. To illustrate the potential of this approach toward improved indoor light level simulation, we present the results of a comparison between two sets of lighting simulations to predict indoor illuminance levels in a test space under overcast sky conditions. As the test space, we selected an office in a university building (Vienna University of Technology) with two casement windows facing south-east (Figure 9).

The first set of simulations was conducted using the CIE standard overcast sky (Hopkinson et al. 1966, Moon and Spencer 1942) as the underlying sky model. In the second set, camera-based sky luminance data (from the prevailing – overcast – sky conditions at the time of indoor illuminance measurements) were used. In both cases, sky luminance data were normalized based on the measured global illuminance level due to the sky hemisphere. All other simulation model assumptions (e.g. room, surface reflectance, glazing transmittance, room furniture, measurement points) were identical.

Simulations were performed using lighting simulation program *LUMINA* (Pal and Mahdavi 1999), for ten measurement points and five different times. Corresponding indoor illuminance measurements (for the same measurement points and time instances) were performed using a set of 10 illuminance sensors.

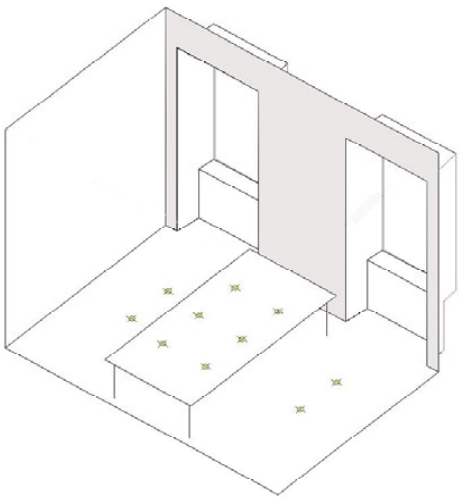

Figure 9 Illustration of the test space at the Vienna University of Technology with the measurement points

Figure 10 illustrates the linear regression between simulated illuminance values (horizontal axis) and measured indoor illuminance values (vertical axis) based on the CIE standard overcast sky. The correlation factor (r^2) amounts to 0.65.

The comparison between the simulation results with the application of the camera-based sky luminance mapping and simultaneously measured indoor illuminance values resulted in correlation factor (r^2) of 0.89 for the corresponding linear regression (Figure 11).

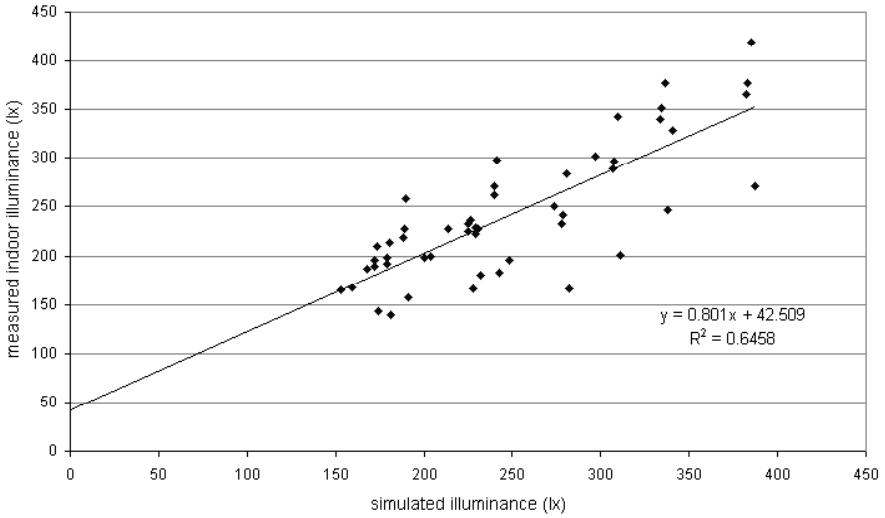

Figure 10 Measured versus simulated indoor illuminance values (sky luminance data based on CIE overcast sky model)

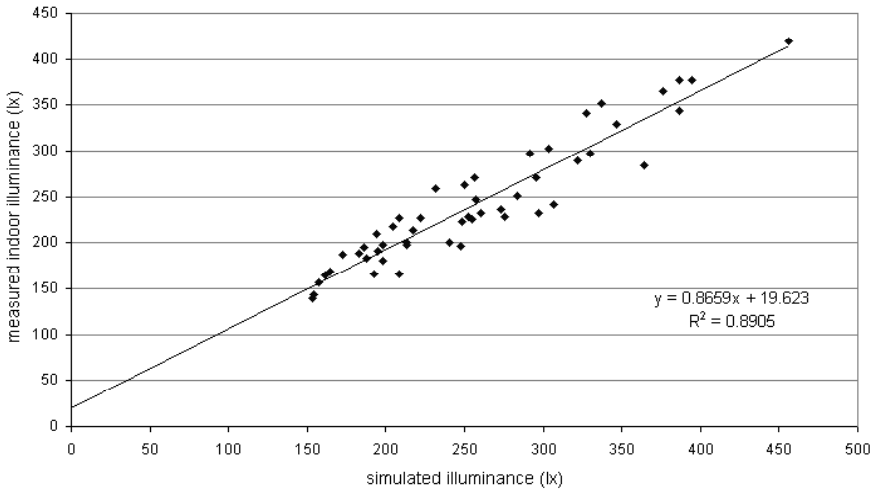

Figure 11 Measured versus simulated indoor illuminance values (sky luminance data based on digital imaging)

CONCLUSION

The results of the research presented in this paper imply that digital sky imaging calibrated with parallel measurements of overall horizontal illuminance levels, can provide an efficient basis for the generation of detailed sky luminance models. The application of such sky luminance models increases the predictive accuracy of the computational daylight prediction tools. Thus, the reliability of daylight simulation can be increased toward supporting the design and operation of daylighting systems in buildings.

ACKNOWLEDGMENT

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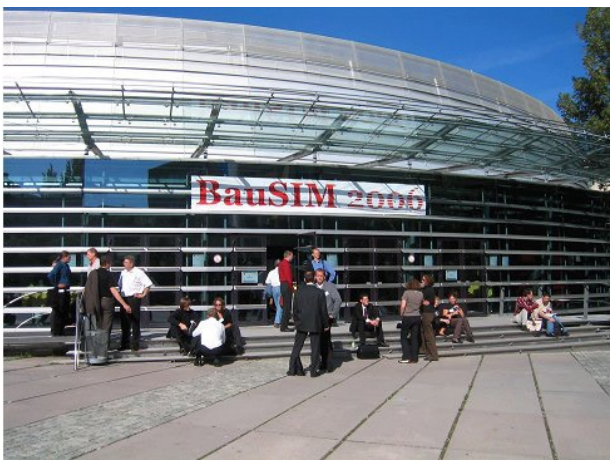
News from IBPSA affiliates

IBPSA Germany

BauSIM2006 conference, October 2006

The first German-Austrian IBPSA conference, BauSIM2006, was held at the Technische Universität München in October 2006 with "Energy Efficiency in Building Design and Thermal Comfort in Rooms" as its main theme.

About 90 papers from 9 contributing countries were presented in three plenary sessions, eight parallel sessions and one poster session. The majority of these came from Germany, Austria and Switzerland. Thirteen papers were selected by the scientific committee for publication in *Bauphysik* (issue 29, Feburary 2007). The keynote speakers were Lori McElroy (The Lighthouse Trust, Scotland), Jürgen Royar (Saint Gobain Isover G+H, Germany) and Gerd Hauser (TUM and Fraunhofer-Institute for Building Physics, Germany). The conference was chaired by Christoph van Treeck, IBPSA Germany's representative on the IBPSA Board.



The conference venue: Audimax at the Technical University of Munich

Lori McElroy from IBPSA Scotland presenting one of the keynote lectures

An exhibition held in conjunction with the conference gave 14 institutions and companies an opportunity to demonstrate products and services connected with building simulation. We received financial support from four main sponsors.

The conferences was a great success and will be held in future in a bi-annual cycle (even year numbers), that is in the years in between IBPSA's international conferences.

Simupedia – the new IBPSA-Germany MediaWiki

Christoph van Treeck, Martin Egger and Gunter Pültz

After testing other CMS systems such as the Zope based Plone system, the German/Austrian community has decided to use a platform based on the MediaWiki system (with some local site specific modifications) as the basis for its new web site **www.ibpsa-germany.org**. We agreed at the last IBPSA-Germany member meeting that we should collaboratively develop some kind of online guide book in building performance simulation — to be called Simupedia — and the success of the Wikipedia system led to the idea of using the same general wiki concept as the basis. Using a wiki will give all members read and write access to the guide. In order to build wider support, we decided to start work first on a German language version, as there are many participating practitioners in the country. The platform, of course, provides a bi-lingual structure and documents will be translated progressively into English within the next few weeks.

Reasons for the decision to use a wiki — and MediaWiki in particular — as the basis for Simupedia included:

- the possibility of creating a restricted members-only area, with built-in support for different roles (guest, author, member, editor, ...) and — most importantly — easy implementation of these features without need for detailed knowledge of the entire structure.
- the use of an SQL database server, allowing for content to be transferred to other systems via script later if needed. (The absence of this feature in Zope/Plone based system was one of the reasons for preferring MediaWiki.)
- easy content editing without HTML/PHP programming, and integral file upload facilities
- multi language support and discussion functionality
- ease of installation and and updating, and a reproducible configuration (a particularly valuable feature when the site administrator changes in the future).

At present all (local) members have been provided with individual logins via email. External viewers can only see the official documents; the system provides no public access to past conference proceedings or write access to the Simupedia system, creating an incentive for people to join IBPSA Germany. However, as discussed by the international IBPSA board at its recent meetings, our long-term intention is to link the platform to an IBPSA-World wide login mechanism in order to give members of all IBPSA affiliates access in the future. If other affiliates are interested in joining this project, please contact us.

Simupedia is hierarchically structured into layers, where the top-most general layer provides different starting points into technical documents. The layout also provides different views for building owners, planning teams, practitioners and simulation experts as well as for software developers and researchers. It is therefore not a purely academic platform.

The initial objective of the guide is to explain why simulations are relevant for sustainable concepts in energy efficient building design, and which type of simulation is appropriate for a different kinds of design task. It will show why simulation supported engineering is superior to traditional design calculations in a practice context. Simupedia will also outline several different simulation types, and explain their limitations and the circumstances in which they are appropriate. Ultimately, we aim to make Simupedia a decision tool for choosing which simulation method is appropriate for different situations, and explain what "added value" simulation can offer in each case. The guide will also refer to standards and topics related to accuracy and quality management.

The project has just started in January 2007, and any contributions will be highly appreciated!

IBPSA Japan

Yasuo UTSUMI, Institutes of National Colleges of Technology, Japan

Recent activities of IBPSA-Japan have included:

1. The annual conference in Tokyo, held on February 15th 2007.
2. Several collaborative meetings with other organizations, including meetings with the Heat Transfer WG of the Architectural Institute of Japan (AIJ) and with the Heat Load and Capacity Simulation group of the Society of Heating, Air-conditioning and Sanitary Engineers (SHASE).
3. Production of three issues of IBPSA Japan's newletter (Vol. 5, nos 1, 2 and 3 — November 2006 to April 2007)

IBPSA-Japan's annual conference was held at the AIJ hall in Tokyo on 15 February 2007 on the theme of 'Environment Simulation of Architecture and Cities'. 22 people participated and a total of 40 papers (of which 27 were reviewed) were presented, 31 as posters and nine orally.

The nine papers presented orally were:

- Application as Commissioning Tool of Simulation Programs and Visual Tools
  Mingjie Zheng & Song Pan
- Driving Force and Diffusivity of Heat and Mass Transfer in Porous Materials
  Akihito Ozaki & Harumi Kagawa
- Driving Force and Diffusivity of Heat and Mass Transfer in Porous Materials (2)
  Akihito Ozaki & Harumi Kagawa
- Study on performance evaluation and thermal comfort with airflow of ceiling

fans *Kitarou Mizuide, Hisaya Ishino, Kimiko Kohri, Akihiro Nagata, Tatsuo Nagai*

- The Meteorological Observation System by Short Time Interval and Effects of Integrating Times for Solar Irradiance *Satoshi Nakayama & Hisaya Ishino*
- Thermal Insulating Value of Clothing and Thermal Comfort for Energy Conservation *Ryoko Okuma & Hisaya Ishino*
- Measurement Survey for Distribution of Outdoor Air Temperature in Tokyo Metropolitan Area *Mie Ohyama, Hisaya Ishino, Kimiko Kohri, Takashi Inoue, Satoshi Nakayama and Masayuki Ichinose*
- Establishment of Quasi Optimum Strategies for Dynamic HVAC Control by Use of Building Thermal Mass *Kosuke Shima & Tatsuo Nagai*
- The Development and Applying of Heat Simulation Tool in EU and USA *Yasuo Utsumi*

The papers and records of the discussion have been published in the conference Proceedings.

An administrative session approved the statement of accounts, the budget and plans for future activities.

IBPSA Scotland

ESP-r developers conference, Glasgow, 22-23 March 2007

A two day ESP-r developers conference was held in Glasgow, Scotland on 22 and 23 March, with participants and presentations from the UK, Canada, Korea, Germany, France, The Netherlands and Switzerland. The weather was brilliant as was the pub and dinner conversation after the sessions.

The conference began with a review of the current state of the software suite and work underway at various development sites. This included the results of last years decision to move to a single global source code repository under source code control and feedback from users of the native Windows version.

A policy workshop drew up a list of critical issues to bring more 'new blood' into the developer and user community, approach to standards compliance and validation efforts in various countries around the world, as well as how to consolidate the facilities offered by the suite.

The conference was timely in that there are several groups actively working on advances in the treatment of blinds and the tracking of solar radiation through multiple rooms (e.g. Atria and double skin facades) and the presentations and discussions clarified a number of issues and found ways for cooperation.

The conference identified a number of existing features to mainstream (e.g. adaptive convective regimes, controls based on multiple sensors) as well as points where consolidation was needed (example models, documentation) and options for supporting users (a Wiki will be started by several participants) and country specific databases will be generated.

There are a number of approaches used in the ESP-r community to deliver assessment results such as the in-built results recovery and analysis tool, user customisable meters generating XML output and a new Java tool that allows reviewing a matrix of performance metrics within a matrix of models. A decision was made to explore further how the XML output could become more accessible to non-geeks.

A workshop was held outlining the organisation of the source code repository, how the design of the repository has responded to over 900 submissions during the year. There was an extended 'svn for the less-geeky' session from which participants emerged rather less confused. Several sites which had been working in isolation agreed to link more tightly with the core developers. A decision was also made to include several of the BESTEST and CEN test suites within the automated testing regime.

For additional information, please contact Jon Hand at **jon@esru.strath.ac.uk.**

Building Simulation Activities in Poland

Miroslaw Zukowski

Several papers have been published recently based on building simulation studies in Poland. These include:

A new formula for determining a minimum recommended value of inlet air velocity from UFAD system to prevent occupants from draught risk, *Building and Environment* Vol. 42, Issue 1 (2007) pp 171-179, Elsevier (published online at Science Direct: Nov 2006)

Modeling and Designing Heating and Ventilation System with Underfloor Air Distribution, *Energy and Buildings*, Vol. 38, Issue 6, (2006) pp. 600–609, Elsevier.

Experimental study of a short term thermal energy storage unit based on enclosed phase change material in polyethylene film bag, *Energy Conversion and Management* Vol. 48, Issue 1 (2007) pp 166-173, Elsevier (published online at Science Direct: Nov 2006)

Mathematical modeling and numerical simulation of a short term thermal energy storage system using phase change material for heating applications, *Energy Conversion and Management* Vol. 48, Issue 1 (2007) pp 155-165, Elsevier (published online at Science Direct: Nov 2006)

For additional information on these studies and other activities in Poland, contact Dr. Zukowski at:

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IBPSA Sustaining Members

Sustaining members of IBPSA are those individuals or organizations that provide financial support to IBPSA at the level of US$500 or more per year. To learn about sustaining membership, please contact one of the IBPSA officers shown in this newsletter.

US - DOE United States Department of Energy **1985-2007**	ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers **2003-2007**
REHVA Federation of European Heating and Air-Conditioning Associations **2003-2007**	Agence de l'efficacité énergétique Québec Vous économisez. L'environnement y gagne aussi. **2005-2007**
Montréal Chapter **2005-2007**	CMHC SCHL **2005-2007**
Concordia UNIVERSITY Real education for the real world **2005-2007**	ÉCOLE POLYTECHNIQUE MONTRÉAL **2005-2007**
Université du Québec École de technologie supérieure **2005-2007**	Natural Resources Canada / Ressources naturelles Canada **2005-2007**
IRC Institute for Research in Construction **2005-2007**	Itron **2005-2007**
International Energy Agency Energy Conservation in Buildings and Community Systems Programme **2005-2007**	

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IBPSA Building Simulation conferences

For information about IBPSA Building Simulation conferences:
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IBPSA Website (www.ibpsa.org)

For full information about IBPSA activities and organisation:
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Lori McElroy chair
Members: Ian Beausoleil-Morrison, Jonathan Wright, Wim Plokker, Gerhard Zweifel

Web sub-committee

Roberto Lamberts chair
Members: Chip Barnaby, Christoph van Treeck, Karel Kabele, Dru Crawley

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To register yourself on the IBPSA mailing list go to the IBPSA home page **www.ibpsa.org** and click on Mailing Lists for instructions, or go directly to **www.ibpsa.org/m_lists.asp**. For additional information about IBPSA, visit:

- About IBPSA: **www.ibpsa.org/m_about.asp**
- Conferences and papers online: **www.ibpsa.org/m_events.asp**
- Regional affiliate web sites and contact persons: **www.ibpsa.org/m_affiliates.asp**
- Downloads/links: **www.ibpsa.org/m_downloads.asp**

For information on joining IBPSA please contact your nearest regional affiliate.

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(continued on next page)

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Past Presidents of IBPSA:
1987-1991 (5 years) Ed Sowell, USA

1992-1993 (2 years) Dan Seth, Canada

1994-1997 (4 years) Joe Clarke, Scotland

1998-1999 (2 years) Larry Degelman, USA

2000-2001 (2 years) Roger Pelletret, France

2002-2005 (4 years) Jeff Spitler, USA

Privileges and Obligations of IBPSA Members and Affiliates

All members are encouraged and entitled to take part in the activities of IBPSA, subject to constitutional or special provisions by the management of IBPSA. The aims of the activities are to disseminate information and aid the progress of IBPSA's efforts and image.

All members have the right to participate in meetings of IBPSA, but the right to vote is subject to the provisions for voting as contained in the present By-Laws. Members holding their membership through an Affiliate are not eligible to vote if the Affiliate has not submitted its membership roster to the Secretary of IBPSA. Affiliates, therefore, need to keep their membership rosters up to date and communicate them to the Secretary.

All members joining IBPSA must undertake to observe the IBPSA constitution and By-Laws and all obligations arising from them. They must also accept the obligation to contribute to the accomplishment of the activities of IBPSA according to their particular competence.

Any member may submit any communication for consideration at a General or Special Meeting of IBPSA or the Board of Directors. The Board will indicate its decision on the proposals within a reasonable timeframe that allows for an IBPSA Board meeting, either in person or by e-mail.

Affiliates are entitled to appoint one representative to the Board and take part in activities of IBPSA. Affiliates, upon joining IBPSA, must undertake to observe the IBPSA constitution and By-Laws and all obligations arising from them. Special obligations of Affiliates include annual notification to the Secretary of IBPSA of the following items:

1 the name of the Affiliate's board representative
2 the Affiliate's membership roster
3 reports of meetings and/or conferences held by the Affiliate, and
4 other information or reports requested by the Board.

Resignation and Termination

Affiliates wishing to terminate their affiliation may do so at any time subject to 90 days notice. Notice of termination must be transmitted in writing to the Secretary. If all communications from an Affiliate to the Board have ceased for a period of two years prior to any Board meeting, that Affiliate will be considered to have resigned.