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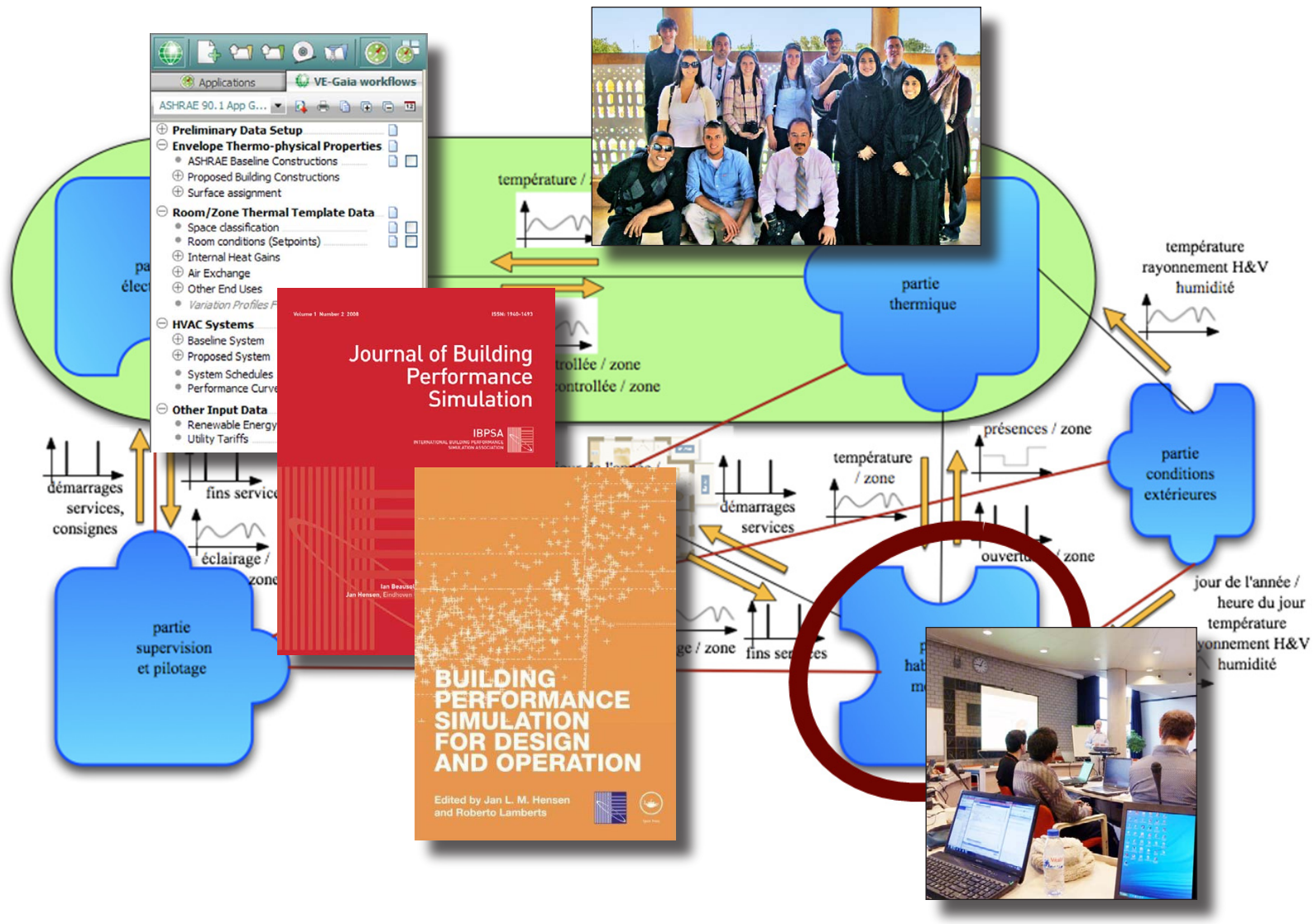


Contents

The International Building Performance Simulation Association exists 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.

President
Ian Beausoleil-Morrison
Carleton University, Canada
ibeausol@mae.carleton.ca

Vice-President
Charles Barnaby
Wrightsoft Corporation, USA
cbarnaby@wrightsoft.com

Secretary
Lori McElroy
Architecture & Design Scotland, UK
lori@sust.org

Treasurer
Michael Wetter
Lawrence Berkeley National Laboratory, USA
MWetter@lbl.gov

Director-at-Large
Drury Crawley
Bentley Systems, Inc., USA
Dru.Crawley@bentley.com

Director-at-Large
Michel Bernier
Ecole Polytechnique de Montreal, Canada
michel.bernier@polymtl.ca

Director-at-Large
Jonathan Wright
Loughborough University, UK
j.a.wright@lboro.ac.uk

Director-at-Large
Christoph van Treeck
Fraunhofer-Institute for Building Physics, Germany
treeck@ibp.fraunhofer.de

Immediate Past President
Jan Hensen
Eindhoven University of Technology, Netherlands
j.hensen@tue.nl

President's message

Dear IBPSA colleagues and friends,

Last October, the IBPSA board held a very productive meeting in Belgrade, Serbia. The annual meeting of the board is an important time for the organization to take stock of its activities, to plan its future, and to make important financial decisions. In odd-numbered years, the board meets in conjunction with the *Building Simulation* conference (e.g. 2009 in Glasgow), as this allows an opportunity for most regional affiliates and elected board members to participate. In even-numbered years, the board chooses a convenient, economical, and/or strategic location to meet. For the 2010 meeting, we chose to meet in Belgrade to help launch a new affiliate, IBPSA-Danube. A successful event was organized by Marija Todorović of the University of Belgrade to launch IBPSA-Danube and an excellent exchange of ideas and information between the new affiliate and the IBPSA board occurred.

A key element in IBPSA's vision is to grow the organization in regions with both mature and emerging building performance simulation expertise and infrastructure. Consequently, we are very pleased to welcome two other new affiliates: IBPSA-Korea and IBPSA-Turkey. This brings to 21 the number of active IBPSA affiliates around the globe. With groups in a number of countries at the formative stages of organization, it is expected that the IBPSA family will experience further growth in the near future.

The last newsletter reported that **Building Simulation 2011** will be held in Sydney, Australia. Since that time, abstracts have been submitted, and the conference's Scientific Committee, headed by Veronica Soebarto, has undertaken the mammoth job of reviewing a record number of submissions. Projections have been taken on conference attendance based upon the number of abstracts submitted and the past history on delegate-to-abstract and paper-to-abstract ratios. Based upon this, **Building Simulation 2011** could well be the largest IBPSA conference ever. The organizing committee, headed by Paul Bannister, has made adjustments to the plans to ensure that an excellent, welcoming, and smooth event awaits us in Sydney.

Although **Building Simulation 2011** papers are only now being written (or yet to be started for the procrastinators amongst us), plans are already being put into place for the 2013 conference. **Building Simulation 2013** will be organized hosted by **IBPSA-France** at the **Université de Savoie**.

IBPSA is not only about conferences. It is also an organization that produces publications that are critically important in the building performance simulation domain. A new book entitled *Performance Simulation for Design and Operation* is hot off the press. Edited by Jan Hensen and Roberto Lamberts, this book is published by Spon Press in collaboration with IBPSA (see **page 39**). Furthermore, the *Journal*

of Building Performance Simulation (JBPS), IBPSA's official journal, continues to flourish. Now in its fourth year of publication, the journal is attracting an increasing number of high quality contributions while subscriptions are growing (See **page 40**). To accommodate this increased interest, JBPS's page allocation has been increased for 2011 although the preferential subscription rate offered to IBPSA members remains unchanged. A special issue was recently published on the role of building performance simulation in the design of health care facilities while an upcoming special issue will focus on occupancy modelling.

All the best for the coming months.

Ian Beausoleil-Morrison

Building Simulation 2011

A message from the conference chair, Dr Paul Bannister

I am very excited to invite all IBPSA members and other members of the international simulation community to Building Simulation 2011 in Sydney. The conference is shaping up really well, with an unprecedented number of abstracts received from all around the world – so many indeed that we have had to move the conference to a larger venue than originally planned.

The conference theme this year is "Driving Better Design through Simulation", covering all aspects of building simulation but with a strong application theme, reflecting the increasing universality of simulation in building design processes. We have accepted abstracts across a wide range of topics, including:

- Advances in building physics
- Application in regulatory process
- Building Services
- Energy capture
- Case Studies of simulation in practice
- Comparing with real world outcomes
- Human aspects
- Limitations of simulation in practice
- New work in simulation development
- Simulation to support commissioning, control
- Validation, calibration, testing
- Use of BIM
- Software issues
- What simulation can do to influence design

So we believe there will be something to interest everyone.

A key part of this year's conference is that it is being co-hosted by the Australian Institute of Refrigeration, Air-conditioning and Heating (AIRAH, **www.airah.org.au)**, providing a very strong linkage between IBPSA and the local practitioner community.

The conference committee consists of:

- Dr Paul Bannister, Conference Chair and IBPSA Australasia President
- Dr Veronica Soebarto, Scientific Committee Chair
- PC Thomas, Conference Vice chair and IPBSA Australia Vice President
- David Leach, AIRAH, Conference Manager

All of whom are working very hard to make this a great conference. We all welcome you to come to Sydney and be part of this exciting event. For more details, read on and visit **www.bs2011.org.**

Abstracts and Papers

A total of 736 abstracts have been accepted, which indicates that this will be the largest Building Simulation series conference to date. Abstracts have been received from all IBPSA affiliates.

The conference will be run with at least five parallel sessions and will include three styles of presentation:

- Full oral presentations (Appx 20 minutes)
- Short oral presentations (Appx 10 minutes, in a workshop format)
- Poster papers

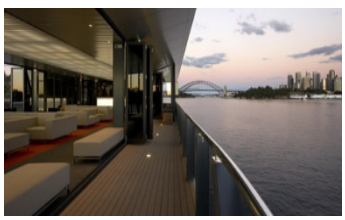
Authors are encouraged to aim for oral presentations unless language is a major problem, as poster space is limited. Dedicated spaces and time slots will be provided for viewing.

Venue

A leading venue for meetings and events, Novotel Sydney Brighton Beach (**www.novotelbrightonbeach.com.au**) is the premier conference facility in southern Sydney. The hotel is located 4 km from Sydney Airport (15 km from the central business district) and directly opposite the beach with spectacular views across Botany Bay. Relax by taking a leisurely walk along the beach or take a stroll around Brighton Le Sands where you will find an array of local shops, cafés and restaurants.

Novotel Sydney Brighton Beach has a range of room types to meet the needs of all guests, including Standard Rooms, Bayview Suites, Bayview Spa Suites, Executive and Penthouse Suites. The hotel offers a variety of facilities including an outdoor swimming pool with spa, restaurant and bar, 24 hour room service, a day spa and health centre with large modern gymnasium, steam room and indoor pool. BS2011 has 200 rooms allocated for the conference, so if you wish to stay at the Novotel we advise booking in soon.

Conference dinner / harbour cruise



The conference dinner will be held on the Starship Sydney, Australia's largest and most contemporary glass cruise boat, giving all guests panoramic uninterrupted views of the harbour. Set over 3 separate levels with 3m high floor to ceiling glass and an open air top deck, Starship Sydney offers guests a unique entertaining experience. Be captivated by the breathtaking scenery as you cruise through the shimmering Sydney Harbour with its mesmerising panorama of bright city lights, Opera House and the famous Harbour Bridge.

For more information about the Conference, please visit: **www.bs2011.org**.

I look forward to greeting you in Sydney in November!!

Paul Bannister

Forthcoming events

Date(s)	Event	Information
2011		
08-13 May 2011	**World Renewable Energy Congress** Linköping, Sweden	**www.wrec2011.com**
29 May - 02 June 2011	**NSB 2011: 9th Nordic Symposium on Building Physics** Tampere, Finland	**www.tut.fi/nsb2011**
05-10 June 2011	**Indoor Air 2011** Austin, Texas, USA	**www.indoorair2011.org**
19-22 June 2011	**Roomvent 2011** Trondheim, Norway	**www.sintef.no/Projectweb/Roomvent-2011**
25-29 June 2011	**ASHRAE Summer Conference** Montreal, Canada	**www.ashrae.org/events/2011-montreal-conference**
10-15 July 2011	**ICWE13: 13th International Conference on Wind Engineering** Amsterdam, Netherlands	**www.icwe13.org**
28 August - 02 September 2011	**ISES 2011** Kassel, Germany	**www.swc2011.org**
14-16 September 2011	**CISBAT 11: CleanTech for Sustainable Buildings** Lausanne, Switzerland	**http://cisbat.epfl.ch**
23-28 October 2011	**SIMUL 2011: Third International Conference on Advances in System Simulation** Barcelona, Spain	**www.iaria.org/conferences2011/SIMUL11.html**
14-16 November 2011	**Building Simulation 2011** Sydney, Australia	**www.bs2011.org**
2012		
08-12 July 2012	**Healthy Buildings 2012** Brisbane, Australia	**http://hb2012.org**

Note that the dates in this calendar may include pre and/or post-conference workshop days

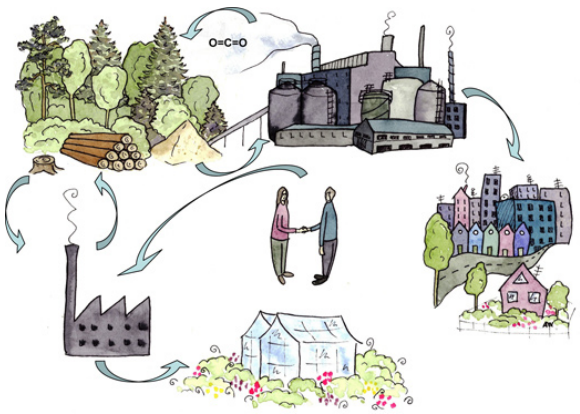
08-13 May 2011
Linköping, Sweden
www.wrec2011.com

World Renewable Energy Congress

The World Renewable Energy Congress (WREC) aims to provide an opportunity for discussion and knowledge exchange for scientists, policy-makers, engineers and other specialists with an interest in issues related to renewable energy. Abstracts have been received from 78 countries. The Congress is hosted by Linköping University in close cooperation with the World Renewable Energy Congress/Network, a non-profit organization affiliated to UNESCO. WREN was established in 1992 during the second World Renewable Energy Congress and aims to promote the use of renewable energy sources that are both environmentally and economically sustainable. WREN has created a worldwide network of scientists, engineers, technicians and managers representing companies and agencies as well as institutions, and it has a unique position in the work of turning large-scale international diffusion of renewable energy technology into reality.

The venue for WREC 2011 is Linköping Konsert & Kongress, one of Sweden's largest venues for conferences and concerts. Situated in the heart of Linköping, it is close to all the main hotels, green parks, shops and historic buildings such as the cathedral and the castle. Based on the theme *Future Trends and Applications in Renewable Energy Technologies and Sustainable Development*, WREC 2011 will cover a wide range of topics related to renewable energy technology, energy efficiency, climate change and sustainable energy systems:

- Climate Change Issues
- Policy Issues
- Energy End-Use Efficiency Issues
- Sustainable Cities and Regions
- Low-Energy Architecture
- Industrial Energy Efficiency
- Sustainable Transport
- Photovoltaic Technology
- Solar Thermal Applications
- Wind Energy Applications
- Bioenergy Technology
- Marine and Ocean Technology
- Geothermal Applications
- Hydropower Applications
- Fuel Cells



Linköping, Sweden's fifth largest city, is located about 200 km southwest of Stockholm, the capital of Sweden. The city and its surroundings are bustling with a vibrant mix of culture, nature, education and world-class high-tech commerce. For the visitor the Linköping region offers a wide range of activities from a tour of the cathedral and the castle, to an excursion to the Göta Canal, or a visit to the Air Force museum. May is one of the best times of year to visit Sweden: the temperatures range from around 10 to up to 20°C, and because of the high northern latitude the days are long, with more than 16 hours of daylight.

29 May-02 June 2011
Tampere, Finland
www.tut.fi/nsb2011

NSB 2011: 9th Nordic Symposium on Building Physics

The 9th Nordic Symposium on Building Physics is being hosted this year by the Department of Civil Engineering of Tampere University of Technology. The venue is Tampere Hall Congress and Concert Centre in the heart of Tampere, Scandinavia's largest Congress and Concert Centre. The symposium language is English.

Topics include:

- Hygrothermal performance of buildings and constructions
- Building material properties
- Building envelope systems
- Air-tightness and air movement
- Energy efficiency
- Low energy and passive energy buildings
- Effects of climate change
- Moisture and mould problems and their repair techniques
- Durability of materials and structures
- Measuring, simulation and modelling techniques
- Experiments and practice

Tampere is the third largest city in Finland, with over 200,000 inhabitants. Established by King Gustav III of Sweden in 1779, on the bank of the Tammerkoski rapids, it has been an industrial pioneer in Finland from its earliest days. Finland's first paper mill started operation in 1783, and a cotton factory established in 1820 became the country's first large-scale industrial establishment — and later the first building lit by electricity in the Nordic countries. Tampere is still the centre of Finnish industry, but it is close to nature, too: there are 200 lakes and ponds within the city and it is sited on an isthmus between two lakes, surrounded by other lakes, ridges and nature reserves; overall, 24 per cent of its surface area is water.

More information about the symposium is available on the symposium web site **www.tut.fi/nsb2011**, and about the city from the tourist office **www.gotampere.fi/eng**.

05-10 June 2011
Austin, Texas, USA
www.indoorair2011.org

Indoor Air 2011

The triennial Indoor Air conference series was started by the International Society of Indoor Air Quality and Climate (ISIAQ) in 1978 to promote the science of indoor air quality and climate, to provide a venue for presentation, collaboration and generation of new ideas related to indoor environmental quality (IEQ). This year's conference will he held in the Austin Convention Centre, in the heart of the capital of Texas, a city with a great environmental conscience: Austin is highly acclaimed for a wide range of green initiatives, including the nation's #1 Green Building Program and the first residential green building rating system.

This year's conferences themes are:

■ Global climate	Low energy and weatherized buildings, climate change effects on IEQ.
■ Sustainable/healthy buildings	IEQ and green buildings, healthy homes.
■ Outdoor Connections	IEQ and regional air quality, persistent pollutants that originate indoors.
■ Human health	Children's health, infectious disease transmission, emerging contaminants.
■ Societal imperatives	IEQ and affordable housing, environmental justice.
■ Developing countries	IEQ, health effects and solutions.
■ Improvement motivators	Regulations, legal action, surveys, cost analysis.
■ Innovative solutions	Source reduction, low-energy air purification, safe building decontamination.
■ Innovations in practice	Field studies, new sampling and technology applications.
■ Fundamentals	Building physics, chemistry, biology, sources, transport, sinks, climate and occupant responses.

For more information, visit the conference web site at **www.indoorair2011.org**.

19-22 June 2011
Trondheim, Norway
www.sintef.no/Projectweb/Roomvent-2011

Roomvent 2011: 12th International Conference on Air Distribution in Rooms

The 12th ROOMVENT Conference will focus on new technology and ventilation strategies for low energy, passive houses and zero emission buildings as well as energy efficient ventilation in the built environment as such. Conference themes include modeling and visualization, strategies for natural, hybrid and mechanical ventilation, and the transport and spread of airborne infections.

ROOMVENT 2011 will offer scientists and academics, policymakers and business professionals such as consultants, engineers and architects an opportunity to interact with each other, exchange scientific knowledge and technical solutions, and see state-of-the-art technologies.

Topics include:

- **New technology for**
  - heating and cooling systems
  - ventilation and air-conditioning systems
  - heat recovery systems
- **Ventilation strategies for**
  - low energy and passive houses

- zero emission buildings
- prevention of airborne infections
- large rooms in historic buildings

- **Strategies for**
  - natural, hybrid and mechanical ventilation
  - demand controlled ventilation

- **Modelling and visualization**
  - analytical, CFD, network models

- **Evaluation, control and measurement of**
  - indoor thermal environment
  - indoor air quality

- **Case Studies**
  - system efficiency, energy, sensors, advanced controls

- **Codes and Regulations**

The conference venue, Trondheim, was Norway´s first capital, and today it is a city of 165,000 inhabitants, the main centre of trade in central Norway, and home to one of the country's leading universities, the Norwegian University of Science and Technology. Although Trondheim is only 500 km from the Polar Circle, the warm Gulf Stream gives it a fairly mild climate.

For more information, visit the conference web site at **www.sintef.no/Projectweb/Roomvent-2011**.

25-29 June 2011
Montréal, Canada
www.ashrae.org/events/2011-montreal-conference

2011 ASHRAE Annual Conference

ASHRAE's 2011 conference will present a mix of papers and applications-oriented sessions. New this year is the Engineering Tools track, which will seek to keep delegates up with the fast pace of development in energy modeling and Building Information Modeling programs. The program also seeks to address alternative technologies and net-zero buildings and balance those programs with HVAC&R fundamentals sessions.

Tracks include:

- Refrigeration
- HVAC Systems
- HVAC Fundamentals and Applications
- Net Zero Energy Buildings

- Professional Skills
- Engineering Tools
- Commissioning
- Alternative Technologies

This year's venue, Montréal, is proud to be "a city that blends cultures, languages and people from all over the world, culminating in a unique and vibrant joie de vivre ... a spirited, bold and complex mix of contrasts that completely defies comparison". It makes an ideal conference venue, offering an eclectic mix of old and new: striking skyscrapers, heritage buildings, sleek cafés, designer boutiques and art galleries, equally famed for its cobblestone streets, 18th- and 19th-century stone buildings, and historic Notre-Dame Basilica, and the striking modern architecture of its Quartier International.

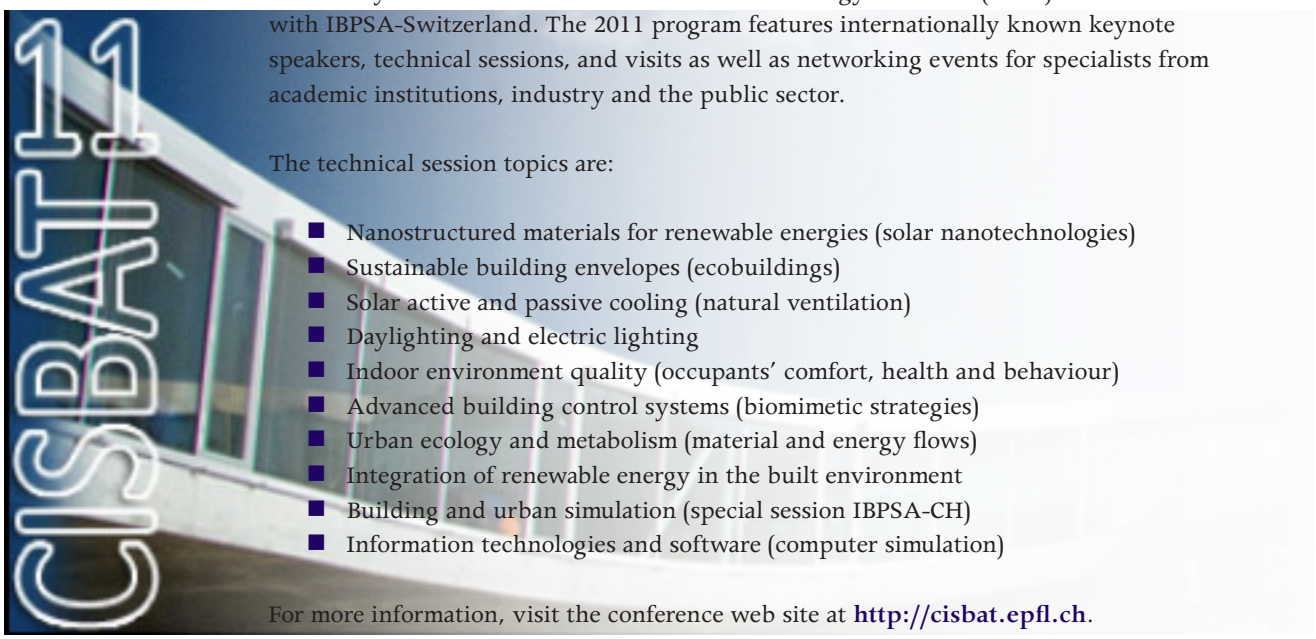
For more information about the conference (including full details of all the conference papers) and about Montréal, visit the conference web site at **www.ashrae.org/events/2011-montreal-conference**.

14-16 September 2011
Lausanne, Switzerland
http://cisbat.epfl.ch

CISBAT 11: CleanTech for Sustainable Buildings

CISBAT 11 invites building scientists from around the world to present their latest research and developments towards a sustainable and sound built environment, in fields ranging from nanostructured materials for renewable energies to studies of urban metabolism.

CISBAT is a biennial conference organised by the Solar Energy and Building Physics Laboratory of the Swiss Federal Institute of Technology Lausanne (EPFL) in association with IBPSA-Switzerland. The 2011 program features internationally known keynote speakers, technical sessions, and visits as well as networking events for specialists from academic institutions, industry and the public sector.



The technical session topics are:

- Nanostructured materials for renewable energies (solar nanotechnologies)
- Sustainable building envelopes (ecobuildings)
- Solar active and passive cooling (natural ventilation)
- Daylighting and electric lighting
- Indoor environment quality (occupants' comfort, health and behaviour)
- Advanced building control systems (biomimetic strategies)
- Urban ecology and metabolism (material and energy flows)
- Integration of renewable energy in the built environment
- Building and urban simulation (special session IBPSA-CH)
- Information technologies and software (computer simulation)

For more information, visit the conference web site at **http://cisbat.epfl.ch**.

23-28 October 2011
Barcelona, Spain
www.iaria.org/conferences2011/SIMUL11.html

SIMUL11: Third International Conference on Advances in System Simulation

SIMUL11 is the latest in a series of events focusing on advances in simulation techniques and systems providing new simulation capabilities. The conference will address both the fundamentals of system simulation and its application in all fields, from social policy to buildings and warfare. The main tracks will be:

- Simulation models
- Simulation methodologies
- Sensitivity analysis
- Simulation mechanisms
- Model based system quality prediction
- Distributed simulation
- Human-in simulation
- Simulations in advanced environments
- Practical applications on process simulations
- Case studies on social simulation
- Online social simulation
- Building simulation
- Transport simulation
- Warfare simulation
- Simulation tools and platforms
- Experience report on ready-to-use tools

Papers are invited from both industry and academia. The key dates are:

Submission (full paper)	20 May 2011
Notification	25 June 2011
Registration	10 July 2011
Camera ready	15 July 2011

SIMUL11 welcomes technical papers presenting research and practical results, position papers addressing the pros and cons of specific proposals, such as those being discussed in the standard fora or in industry consortia, survey papers addressing the key problems and solutions on any of the above topics, short papers on work in progress, and panel proposals.

Industrial presentations are not subject to the format and content constraints of regular submissions. Short and long presentations that express industrial position and status are equally welcome.

For more information, visit the conference web site at **www.iaria.org/conferences2011/SIMUL11.html**.

08-12 July 2012
Brisbane, Australia
http://hb2012.org

Healthy Buildings 2012

Since their inception in 1988, the Healthy Buildings conferences have been held in various locations throughout Europe, North America and Asia. Healthy Buildings 2012 will be the first held in the Southern Hemisphere. It is being hosted by the Queensland University of Technology (QUT), which is home to one of the largest academic programs focused on air quality, and in particular indoor air quality, in Australia, the International Laboratory for Air Quality and Health (ILAQH). The ILAQH is a member of the Faculty of Science and Technology (FaST) and the Institute of Health and Biomedical Innovation (IHBI) at QUT, which are the key entities hosting the conference.

The venue is the Brisbane Convention & Exhibition Centre, which is located in the heart of the city of Brisbane, with ample accommodation options, a good climate - pleasant, dry and sunny in July, with an average day time maximum temperature of 21°C (70°F) - and numerous opportunities for recreational activities nearby. The conference will offer a social program with a truly Australian spirit, which would enable plenty of opportunities for interaction between the participants, while at the same time allowing for enjoyment of the subtropical ambience of outdoor Brisbane.

The proposed topics for plenary presentations are:

- Climate change, sustainable development, energy efficiency and IEQ
- Healthy building issues related to modern materials and chemicals used in buildings
- Healthy building issues related to rapid urbanization in communities in both developed and developing countries
- IEQ in developing countries
- Healthy building issues related to spread of respiratory diseases (infectious disease transmission and control)

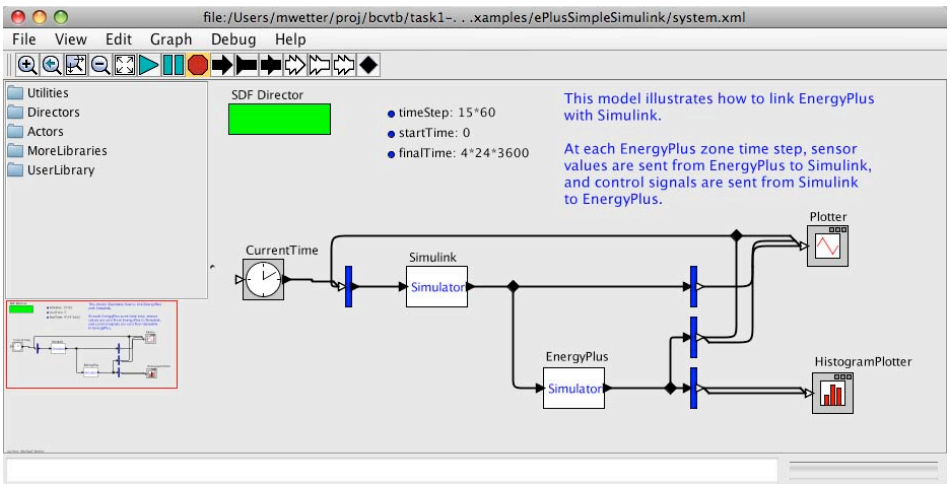
and those for workshops/symposia/fora are:

- Particles
- Air change measurements.
- Procedures for certification of indoor environment in buildings.
- Residential ventilation and indoor air quality.
- How to get from present research to future actions – from science to practice.
- Medical science and practice (i.e. health problems related to buildings)
- Solving old problems, preventing emerging risks
- Effects of extreme weather events (connected or not with climate change)
- IEQ of schools
- Hot topics

For more information about the conference, paper submission, and Brisbane, visit the conference web site at **http://hb2012.org**.

Software news

Building Controls Virtual Test Bed



Building Controls Virtual Testbed, showing a model that links MATLAB/Simulink with EnergyPlus and plotters that plot time trajectories and histograms while the simulation progresses. In this example, control signals are computed by MATLAB/Simulink and sent to EnergyPlus. EnergyPlus computes the building thermal response and simulates the HVAC system. Room temperatures and weather data are then sent from EnergyPlus to MATLAB/Simulink.

LBNL released the first version of the Building Controls Virtual Test Bed (BCVTB). The BCVTB allows expert users to couple different simulation programs for co-simulation, and to couple simulation programs with actual hardware. For example, the BCVTB allows simulating a building in EnergyPlus and the HVAC and control system in Modelica, while exchanging data between the software as they simulate. The BCVTB is based on the Ptolemy II software from the University of California at Berkeley. Ptolemy II provides a graphical modeling environment that can also be used to define system models for physical devices, communication systems or for post processing and real-time visualization.

Programs and hardware that are currently linked to the BCVTB are:

- the EnergyPlus whole building energy simulation program,
- the Modelica modeling and simulation environment Dymola,
- the MATLAB and Simulink tools for scientific computing,
- the Radiance ray-tracing software for lighting analysis,
- the BACnet stack, which allows exchanging data with BACnet compliant Building Automation System (BAS), and
- the analog/digital interface USB-1208LS from Measurement Computing Corporation that can be connected to a USB port.

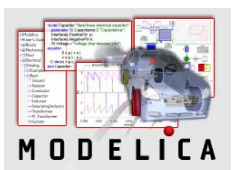
Typical applications include:

- performance assessment of integrated building energy and controls systems,
- development of new controls algorithms, and
- formal verification of controls algorithms prior to deployment in a building in order to reduce commissioning time.

The coupling of Modelica allows using EnergyPlus for modeling the building heat flow and daylight availability and using the Modelica Buildings Library (**http://simulationresearch.lbl.gov/modelica**) to model innovative building energy and control systems. This allows advanced users to:

- define new HVAC components and systems in a modular, hierarchical, object-oriented, equation-based graphical modeling environment and couple them to EnergyPlus,
- innovate new HVAC system and control architectures for which models do not yet exist in off-the-shelf building simulation programs,
- analyze dynamic effects of HVAC systems, modeled in Modelica, and their local and supervisory control loops, modeled in MATLAB/Simulink, Modelica or Ptolemy, and
- simulate virtual experiments prior to full-scale testing in a laboratory or a real building in order to determine the range of required boundary conditions, the type of experiments that need to be conducted and, for example, to improve control logic in simulation where iterations can be made faster than in an actual experiment.

Please see **https://gaia.lbl.gov/bcvtb** for further information.



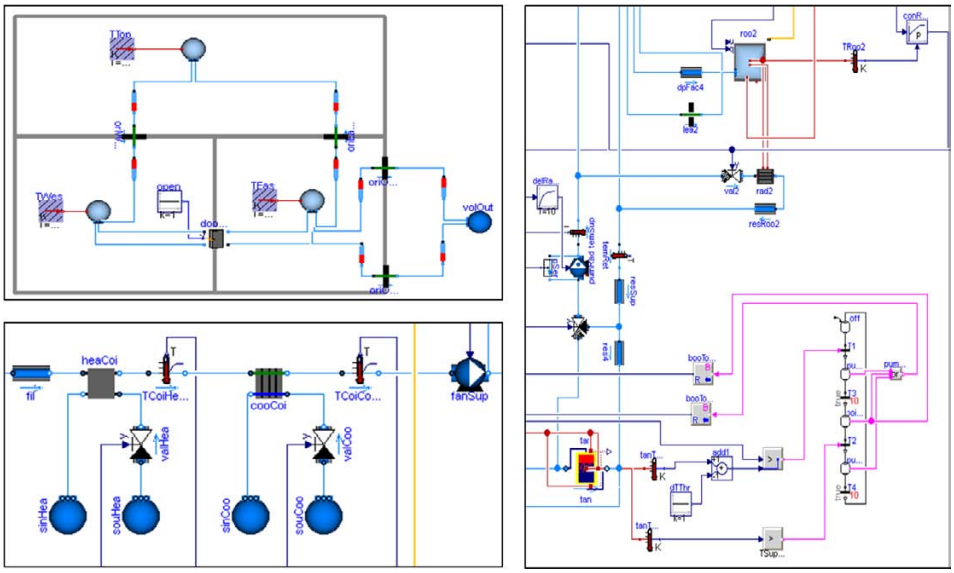
Modelica "Buildings" Library for Building Energy and Control Systems

LBNL's Simulation Research Group started an open-source development of a component library for building energy and control systems in the Modelica language. Modelica is an equation-based, object-oriented language for the modeling of dynamic systems. The intent of this work is to make building system modeling flexible and fast enough so that it accelerates innovation towards Zero Energy Buildings.

The library aims to enable:

- rapid prototyping of new building systems,
- analysis of the operation of existing building systems,
- development and specification of advanced control systems,
- reuse of models during operation for energy-minimizing controls, fault detection and diagnostics, and
- active involvement of simulation users in the development process.

The library development is open-source in order to allow users to participate in the development process, and to provide better feedback that steers further development. The library contains component models for HVAC systems, hydronic heating systems, controls and multizone airflow and contaminant transport. A beta version of a model for building envelope heat transfer, and a detailed window model are also available.



Partial view of the Modelica implementation of a multizone airflow model with three adjacent zones (top left), a central HVAC system with heating coil, cooling coil and fan (bottom left), and a hydronic heating system that is coupled to a thermal model of a room (right).

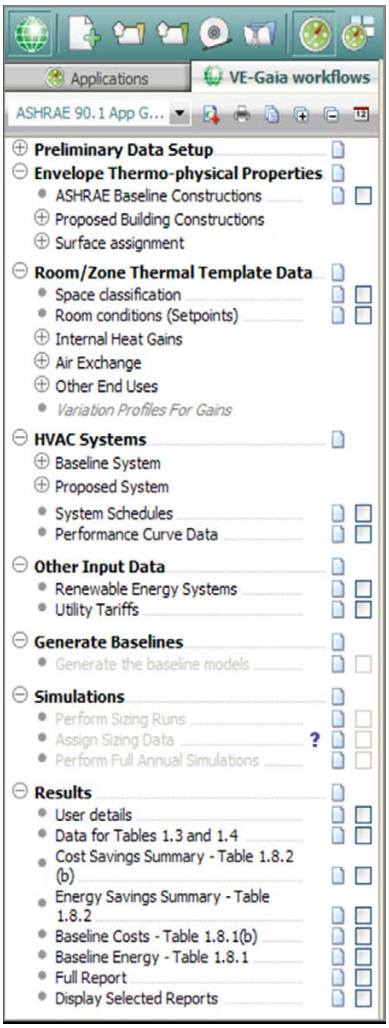
Please see **https://gaia.lbl.gov/bir** for further information.

IES launch ASHRAE 90.1 VE-Navigator

Integrated Environmental Solutions (IES) launched the latest addition to their VE-Pro suite of integrated building performance analysis tools at Greenbuild last November: VE-Navigator for ASHRAE 90.1. This is designed to make LEED Energy Modeling via the ASHRAE 90.1 Appendix G Performance Rating Methodology (PRM) easier, faster and incorporates many quality assurance features for increased accuracy.

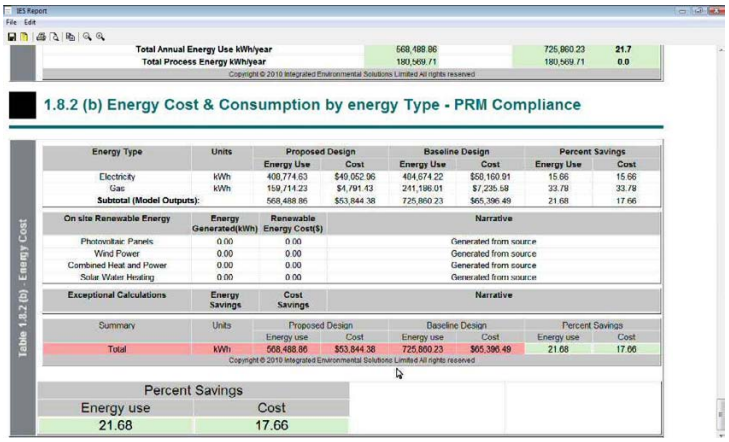
IES claim that the product offers a number of technical, productivity and commercial benefits:

- Drastically reduces the time required to undertake LEED Energy Modeling
  - Instant creation of all 4 baseline models from proposed design
  - Automatically assigns baseline constructions according to climate zone
  - Automatically creates and sizes the HVAC systems
  - Ability to import and amend ASHRAE baseline system prototypes
  - Ability to import room and thermal zone template data
  - Compare proposed and baseline buildings data side-by-side prior to calculation
- Cuts down on unnecessary data input and modeling duplication & reduces error
  - Data for all 5 models managed and edited from one central file
- Enables feedback at early design stages to maximize LEED Energy Credits achieved
  - Offer more competitive services to your clients
- Automatic creation of results and reports which mirror the format required for submission (LEED EAc1)



A core feature is the new VE-Navigator, which provides a detailed step-by-step structured workflow and in-built QA functionality. Integration into the full IES VE-Pro suite allows different aspects of performance to be simulated using the same building model, including solar shading, daylight, thermal comfort and performance against other LEED credits.

The product utilizes VE-Pro modules ApacheSim, ApacheLoads, ApacheHVAC and ModelIT. Models can be built from scratch using IES's ModelIT application, or imported from Google SketchUp, Autodesk Revit, or via gbXML/DXF.

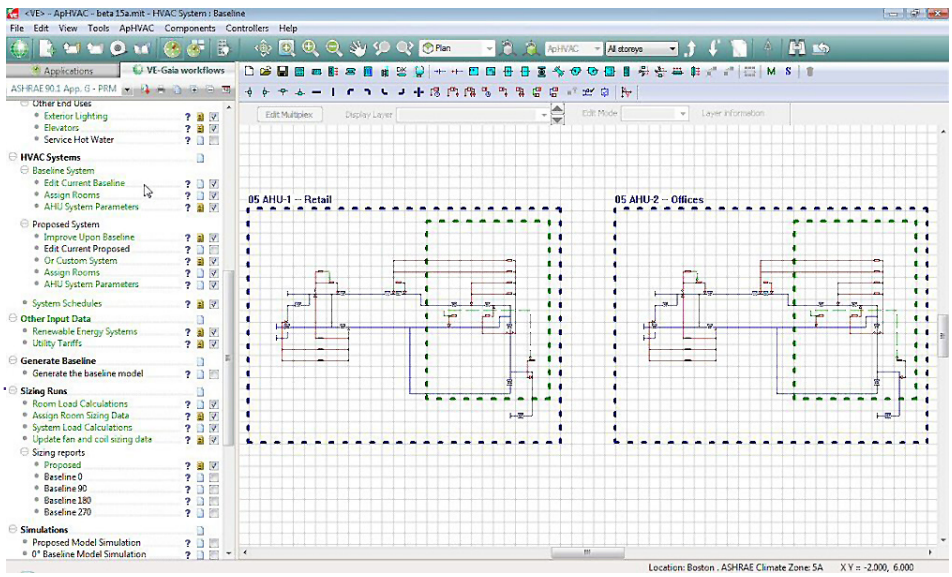


VE-Navigator for ASHRAE 90 has been well-received by users:

"To date we have been using the IES ASHRAE 90.1 VE- Navigator to produce LEED ratings for final LEED models. The PRM process is a complicated one with many rules and specific requirements for whole building simulation. Any tool which simplifies that process by laying out a logical workflow covering all the necessary requirements is of definite interest. [VE- Navigator] has enabled more accurate modeling of the baseline and proposed buildings, and facilitated the reduction of human error." *Chris Flood Cobalt Engineering LLP*

"My initial impression is: it's an amazing interface. It completely takes the intimidation out of modeling for LEED. I'm looking forward to using it on a live LEED Energy model as soon as I get the chance." *Jimmy Stevens Hanbury Evans Wright Vlattas*

"We have currently used the VE-Navigator for ASHRAE 90.1 on 3 projects. The time spent on this has been much less than in the past by approximately 45%. [It] has helped to structure the modeling process by laying out all the steps in a concise format. Both the highlighting feature and the ability to write notes after each step enables the user to leave any given model and come back to it at a later date without the usual time wasted to review what has been completed and where additional work is required. These features have proved very helpful when multiple users are working on the same model."
Steven V. Lembo Kohler Ronan LLC



More information can be found at **www.iesve.com/Software/VE-Pro/ASHRAE90-1**.

News from IBPSA affiliates

IBPSA affiliates are asked to submit a report to the IBPSA Board each year to keep Board members informed about their activities and membership. These are too detailed to include in *ibpsa*NEWS, so affiliates have been asked to make their latest annual report available through their web sites, and this section includes only selected, recent news. Other news from affiliates may be available from their websites; the URLs for these are available on the IBPSA Central web site at **www.ibpsa.org/m_affiliates.asp**.

IBPSA-Danube

Marija Todorović

IBPSA-Danube at the 41st international HVAC Congress in Belgrade

IBPSA-Danube was formed in October 2010 with the aim of gathering together experts from all the relevant fields of engineering to promote the use of dynamic simulation in the design, construction and operation of buildings, and so advance the cause of energy efficiency and sustainability. The new association made its first public appearance just a few weeks later on 1-3 December, at the 41st International HVAC Congress in Belgrade. Organized by the Serbian Union of Mechanical and Electrical Engineering (SMEITS, **www.smeits.rs**) and the Serbian Society for Heating, Refrigerating and Air-Conditioning (KGH, **www.kgh-hvac.org**), this has become one of the most important annual events in the region for architects, designers, scientists and equipment manufacturers, combining a scientific and professional conference with a major trade show of well over 100 exhibitors.

IBPSA-Danube presentations corner (above) and posters (below)

IBPSA-Danube mounted a large stand with an array of posters, a programme of presentations, and a meeting area for informal discussions, all focusing on the theme of 'IT-Green'. This attracted great interest, confirming the construction industry's growing recognition that simulation software and methods are becoming indispensible in the design of energy efficient, environmentally clean and sustainable buildings. Discussions showed, too, that educational programmes, networks and exemplary solutions will all be necessary if the industry is to use simulation tools effectively and produce "totally green buildings".

IBPSA-Danube members and Tehran University Guests (left) and IBPSA-Danube members from Romania and Serbia (right) at the IBPSA stand

A formal meeting of IBPSA-Danube held during the congress was well-attended. The association's program and activities were presented, and the issue of cooperation between mechanical engineers and architects discussed. The outcome of the meeting was very positive and the participants agreed to continue their cooperation and knowledge exchanges in the future.

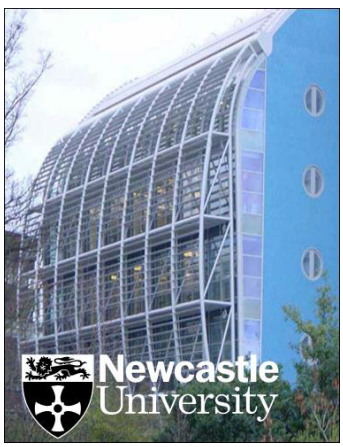
Since the conference, IBPSA-Danube's membership has grown to more than 150.

IBPSA-England

Neveen Hamza

From Newcastle and Beyond: simulation modelling and its role in practice and education

IBPSA-England has organised a number of successful events to engage its members in open debate on issues connected to the use of building performance simulation tools in practice and in academia. These have been held in various locations in England to give as many people as possible the opportunity to attend.



The most recent, on 8 October, was held in Newcastle Upon Tyne in the Newcastle University's BREEAM 'Excellent'-rated Devonshire Building (*right*). This attracted some 40 architects, consultants and academics, and explored how building performance simulation can be introduced into the education of architects in order to equip graduates to use it effectively in practice and improve regulatory compliance. Five invited speakers offered engaging accounts of how building performance simulation and computational fluid dynamics have developed and influenced building form and outdoor and indoor environments:

> *David Lloyd Jones from Studio-E* reflected on how the integrated PV facade and atrium of the Doxford Solar building were designed to take account of building orientation and solar movement. He described how CFD simulation results were translated into design decisions such as how

the BIPV facade height was extended above the height of the roof in order to remove excess heat accumulation in the atrium.

Matthew Kitson of Hilson Moran gave an overview of building simulation over the last 30 years and explained how building simulation has been a key factor in conceiving environmentally progressive buildings such as Swiss RE.

Mark Siddall of Devereaux Architects spoke about lessons learnt from integrating a number of energy efficiency and recycling measures in the Devonshire Building at Newcastle University.

Gordon Hudson of MottMacDonald questioned the need to rely on building simulation as a tool to achieve comfortable buildings and whether designers could depend solely on established knowledge in the field.

Finally, *Patrick Arands of Mecanoo* elaborated on the social and cultural context underpinning the design of the Birmingham Library. Building simulation modelling was instrumental in determining the cylindrical shape of its atrium, and how projections into and recesses in the atrium would work to optimize air movement.

The presentations led to a lively debate among the audience and inspired us to plan similar events for later in 2011.

In the afternoon, Neveen Hamza of Newcastle University and Vice Chair of IBPSA-England chaired a workshop on *Integrating building performance simulation into the architecture curriculum*. Participants came up with a number of interesting points, and it is planned that results of the workshop will be presented as a paper at Building Simulation 2011 in Sydney.

Student Competition for Building Simulation 2011

IBPSA England, in collaboration with IBPSA Australasia, is running a Student Competition for the Building Simulation 2011 conference. For further details see **page 38**.

IBPSA-France

Timea Béjat

IBPSA France will hold a one-day workshop on *Multi-scale ventilation studies applied to buildings* (*Études aérauliques multi-échelles appliquées au bâtiment*) on 3 May 2011, organized by the University of La Rochelle. This workshop will focus on issues such as ventilation, indoor air quality, comfort studies and urban microclimates. In particular ongoing ventilation studies in France will be discussed.

For further information visit **www.ibpsa.fr/index.php?option=com_content&view=category&id=48&Itemid=87**

IBPSA-Korea

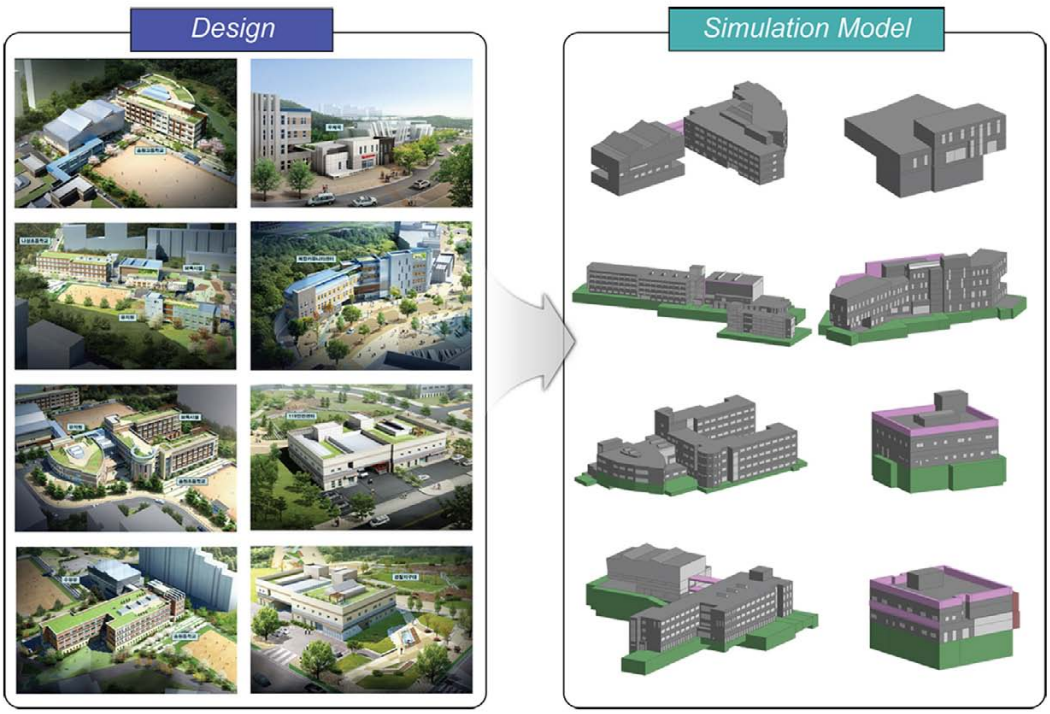
Kwang-Woo Kim

IBPSA-Korea Chapter was formed in October 2010 to provide a forum for the exchange of scientific knowledge and information between researchers, engineers, developers and practitioners in the area of building simulation and related issues in South Korea. The IBPSA-Korea Board, currently of 14 members, has actively promoted IBPSA in Korean research communities and 95 new individual membership applications have already been received. The IBPSA-Korea web site was launched last December at **www.ibpsa.kr**.

IBPSA-Korea holds annual events jointly with the Korean Institute of Architectural Sustainable Environment and Building Systems (KIAEBS), and helps KIAEBS to organize a biannual national conference. The KIAEBS 2011 Spring Conference took place on 25 March (**www.ibpsa.kr/html/meetings.asp**). Thirty eight papers were presented, many of them relevant to dynamic simulation of building energy, daylighting, lighting, airflow in buildings, control and optimization. IBPSA-Korea is preparing to host a special session dedicated to building simulation at the KIAEBS 2011 Fall Conference.

A Board meeting was also held on 25 March. The agenda included members' wishes, ways to better disseminate IBPSA to Korean research communities, and future action plans.

There is a noteworthy new trend in Korea for AEC projects to require whole building energy simulations and performance assessments in the design stage, especially with use of BIM. This is expected to give a strong impetus to the use of building simulation tools in Korea, and it is expected that IBPSA Korea will grow rapidly. The figure below shows recent examples of designs which have benefited from EnergyPlus simulation:



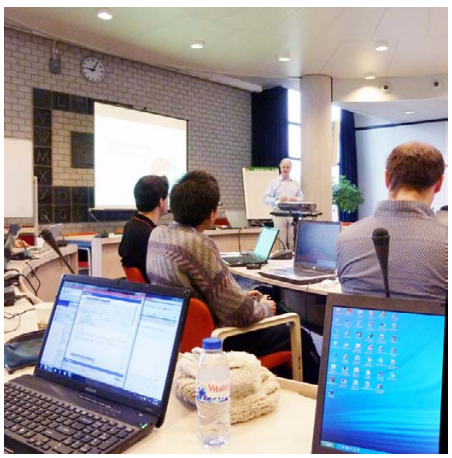
© Deuk-Woo Kim, SeMin Oh, Won-Jun Suh, Cheol-Soo Park at Sungkyunkwan University, Korea

IBPSA-Netherlands+Flanders

IBPSA Netherlands+Flanders organized an EnergyPlus Workshop on 24 February 2011, in co-operation with the Technical University Eindhoven. The one-day workshop, led by Drury Crawley, was a great success: 31 people attended, both from university and companies, and from Belgium and The Netherlands.

The workshop was a mix of presentations and practical exercises, though there was little room for the exercises because the workshop contained the material normally presented in a two-day course. This was especially hard work for the participants who saw EnergyPlus for the first time.

Afterwards, the participants and the workshop leader had an informal chat and recovered with a couple of drinks. Most participants had a good feeling about the workshop, and with all the presented material and the software on an USB stick, and of course some homework, everyone should be able to become an EnergyPlus expert !!



IBPSA-UAE

UAEU Faculty of Engineering

جامعة الإمارات العربية المتحدة
United Arab Emirates University

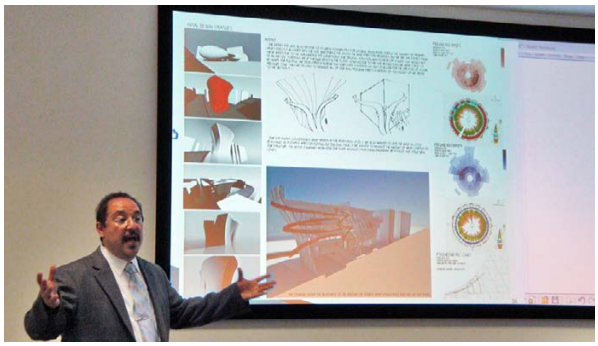
IBPSA-UAE's *Zero Net-Energy Design* Gallery and Seminar event

The Architectural Engineering Department of the UAE University (UAEU-AE) collaborated with College of Architecture and Environmental Design, Kent State University (KSU-CAED), USA and IBPSA-UAE to stage a successful *Zero Net-Energy Design* Gallery and Seminar in the new campus of the UAE University in Al-Ain city.

The event included three major activities: a public lecture and discussion on Zero Net-Energy (ZNE) Design, a gallery of student projects from the two participating universities, and a student tour of historical sites and traditional architecture of Al-Ain city. It also saw the first public appearance of IBPSA-UAE's new Student Chapter, which has been set up by the UAEU architectural engineering students with support from IBPSA-UAE. Dr Adil Sharag-ElDin, an Associate Professor of Architecture & Architectural Sciences at KSU, and nine of his students, were invited, and played a vital role. Dr Sharag-ElDin is also a board member at Green Energy Ohio and a research coordinator. Dr Khaled Al-Sallal, Associate Professor of Architectural Engineering at UAEU and President of IBPSA-UAE, and his students, welcomed the visitors at the Al-Jahili Fort, Al-Ain city's most prestigious historical site.

The main highlight of the event was the lecture on *Zero Net Energy Design: A Didactic Primer* given by the invited speaker Dr Adil Sharag-ElDin; this was attended by more than 60 academic, professional and student delegates. The lecture emphasized the need to take a holistic approach to ZNE design and addressed energy efficiency, healthy environment, and depletion of natural resources. It also discussed how integrated strategies for achieving energy efficiency and sustainable sites can have a major impact on our communities. It gave an insight into the importance of building performance modeling and simulation and the need to shift to performance-oriented design process and tools.

The students' design works gallery was another successful highlight. More than 25 projects were exhibited, and the students of both universities had the chance to explain their projects and learn from each other's



Invited speaker Dr Sharag-ElDin lecturing

... and answering questions

Dr Al-Sallal handing an appreciation plaque to the invited speaker

... and a certificate to a representative of the nine students from Kent State University

experiences. During lunch time and breaks, they were able to exchange opinions and socialize, and the KSU-CAED students had an opportunity to tour the UAEU's new campus and take photographs of its climatic-responsive architecture, designed for the hot arid conditions of the UAE.

The third highlight of the event was the faculty and students' tour of the historical sites and traditional architecture of Al-Ain city. Dr Al-Sallal and the UAEU-AE students took the KSU-CAED visitors to Al-Jahili Fort to tour the building and examine its traditional construction and materials. They also visited the *Dawn of History* exhibition, which was adjacent to the Fort. This displayed ancient archaeological remains, spanning 10,000 years of history, which were excavated in Abu Dhabi by a Danish team between 1958 and 1972. From there, they proceeded to Al-Ain Palace Museum, which was the residence of the former president of the UAE (the late Sheikh Zayed Bin Sultan Al-Nhyan) between 1937 and 1966, and had a glimpse of how people lived at that time.

The gallery exhibiting students' work from both universities

Dr Al-Sallal listening to a student presenting her poster

The Al-Jahili Fort, Al-Ain City

Welcome reception at the Fort

Kent State University students touring the building

... and visiting the Dawn of History *exhibition*

Two groups at the Al-Ain Palace Museum

IBPSA-USA

Michael Wetter

In partnership with IBPSA-USA, ASHRAE, the USGBC and the Institute for Market Transformation, the Rocky Mountain Institute held a two-day Building Energy Modeling (BEM) Innovation Summit in Boulder, Colorado on 10-11 March 2011. The goal of the event was to identify immediately actionable opportunities and to facilitate solutions across several broad categories: methods and processes, software tools, education, training and certification, market drivers, and support and resources. The summit brought together the energy modeling industry to capitalize on the biggest opportunities to drive widespread solutions for low-energy buildings.

Attendees included software developers, government representatives, practitioners, educators, industry and professional organizations, including the ASHRAE President Lynn G Bellenger.

For more information and a forthcoming report, visit **http://rmi.org/rmi/BEMsummit.**

IBPSA-USA Board member and RMI Senior Consultant Ellen Franconi leads attendees in the methods and processes breakout group

Erik Kolderup, Linda Morrison and others speak during a customer needs panel

Simulating inhabitant behaviour to manage energy at home

Xuan Hoa Binh Le[1], Ayesha Kashif[2], Stéphane Ploix[1], Julie Dugdale[2], Maria Di Mascolo[1], Shadi Abras[1]

RESUME

Cet article présente un modèle causal de comportement des habitants à la maison qui prend en compte leur comportement réactif. Ce modèle est indispensable pour le développement d'un nouveau type d'outil de simulation évaluant des solutions possibles de gestion d'énergie, étant donné la diversité et la variation des besoins des habitants.
MOTS-CLÉS : comportement des habitants, modélisation, simulation.

ABSTRACT

This paper presents a causal model of inhabitants' behaviour at home that takes into account their reactive behaviour. This model is necessary to develop a new kind of simulation tool for evaluating possible power management solutions, given the diversity and the variation of inhabitants needs.
KEYWORDS : inhabitants behaviour, modeling, simulation.

1 INTRODUCTION

In France, the residential sector represents the highest sector of primary energy consumption: 39.7% (Observatoire de l'Énergie, 2007). There are four factors that play a role in the energy consumption of a house: its physical properties (e.g. performance of thermal insulation), the appliances dedicated to general usages (the heating, ventilation and air-conditioning system, auxiliary production of electricity systems or hot water boiler), the appliances dedicated to specific usages and the outdoor environment. Up to now, improving home energy performance focuses mainly on improving thermal insulation and on integrating renewable energies (solar photovoltaic, thermal and geothermal). However, inhabitants behaviour determines the energy consumption of two above factors: the appliances dedicated to general usages and the appliances dedicated to specific usages (Seryak et al., 2000; Masoso et al., 2009). Therefore a better management that coordinates and orchestrates the use of all kinds of energy according to inhabitants' needs and comforts, and to current weather, remains an important progress factor. In this perspective, studies on power management in home situations are developed: scheduling the starting time of domestic electric appliances to avoid peak consumption (Ha, 2007; Abras, 2009) or further anticipating the energy demand at home (Lamis et al., 2010). Given the diversity and the variation of inhabitants needs, a new kind of simulation tool for evaluating possible power management solutions is needed: a simulator that takes into account the reactive behaviour of inhabitants (e.g. opening a window, a group of inhabitants congregating in a room, etc). In order to develop this simulator, inhabitants behaviour in real home situations has been analyzed by identifying the context within which their energy-related requests are carried out. A behaviour model related to inhabitant needs at home has been developed. An instance of this model is transformed into a language and simulated to evaluate a possible power management solution. In comparison with the classic "static scenario" of other existing simulators (TRNSYS, COMFIE PLEIADES, ENERGY+, etc.), inhabitants reactive behaviour have been introduced in this simulator.

[1] *GSCOP, Grenoble INP: 46, Av Felix Viallet, 38031 Grenoble, xuan-hoa.le@g-scop.inpg.fr*
[2] *LIG, CNRS: 110, Av de la Chimie, 38400 Saint Martin d'Hères*
This paper was presented at IBPSA-France Congress in November 2010 and is reprinted with permission.

Our current work is a part of a project named SIMINTHEC (SIMulation and INteroperable software tools for the management of THermal and EleCtrical energy in buildings). This project focuses on designing a co-simulation environment to improve energy management in buildings. This simulation environment will provide co-simulations that help to validate and improve the energy-saving policies and programs instead of building expensive platforms. In this simulation environment, there are five modules: two modules with models describing the thermal and electrical aspects within the building, a module dedicated to control algorithms and energy-saving policies, and the module presented here that deals with the simulation of inhabitants behaviour and a fifth module for predicting the outdoor environment. The interoperability between these modules is presented in **Figure 1**.

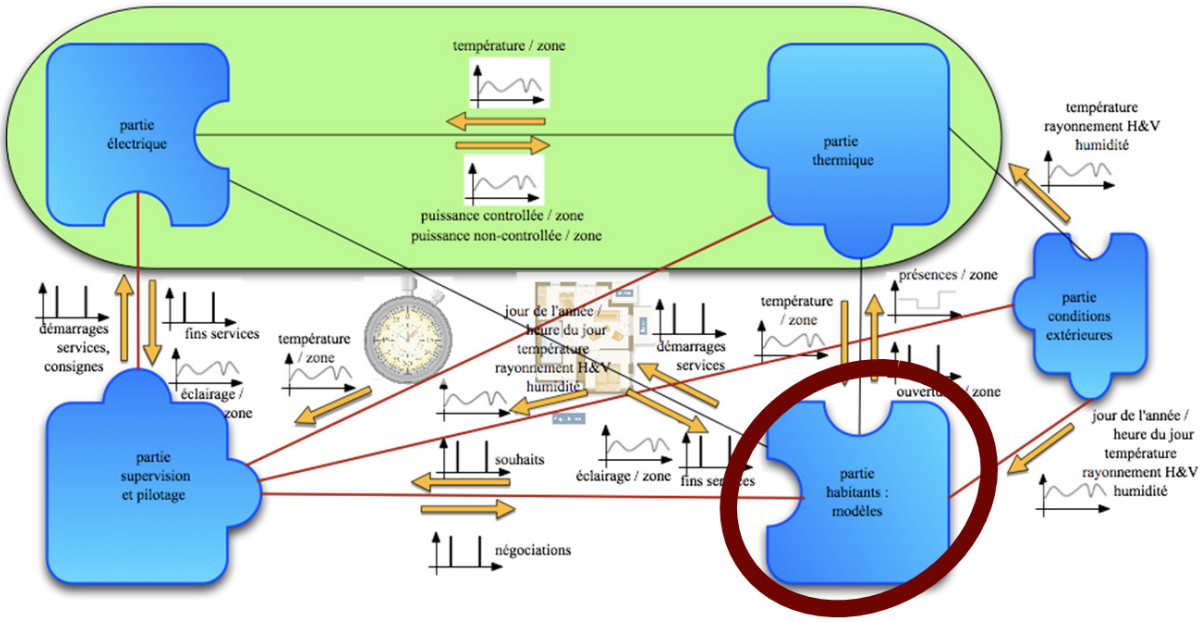


Figure 1: Interoperability between the modules in project SIMINTHEC

In the following parts, this paper continues with the summary of related work on human behaviour modeling and simulation, following by the development of our model of inhabitants behaviour, its simulation with some results and finishes with the conclusion and some perspectives for this study.

2 RELATED WORK

The studies in literature can be classified into two groups:

- modeling and simulation of inhabitants behaviour at home or in building (for the purpose of energy management, home automation, etc.)
- modeling and simulation of human behaviour and human cognition in general

As examples of the first group, (Hunt, 1980; Newsham et al., 1995; Reinhart, 2004) used lighting models to build occupant presence model because they supposed that the use of a lighting appliance is linked to the presence of its user. (Capasso et al., 1994) applied Monte-carlo extraction on average daily availability at home to derive the daily presence profile of inhabitant. (Yamaguchi et al., 2003; Page, 2007) used Markov model to simulate the occupants presence by using weekly profile of the presence probability as input. For modeling and simulation of electric appliances usage at home, (Capasso et al., 1994; Paatero et al., 2006) established daily

usage profile of the most common appliances in a household (a percentage distribution of usage during the day) or daily profile of the activities in which the appliance service is implicated. (Page, 2007) proposed a stochastic model based on occupants level of tolerance towards the concentration of pollutants and level of discomfort (thermal, visual) to model and simulate occupant interaction with building (opening window, using blind, etc.).

In the second group, most of existing human behaviour representation models capture the perceptual, cognitive and psychomotor elements of human behaviour (Wherry, 1976; Card et al., 1983; Corker et al., 1993; Lehman et al., 1996; Kieras et al., 1997; Freed, 1998; Sloman, 2001; Anderson et al., 2002; Sierhuis et al., 2007). Only some of the proposed models take into account multitasking capabilities of human behaviour (Corker et al., 1993; Deutsch et al., 1997; Kieras et al., 1997). Some proposed models use sequential tasks where as may divide tasks into subtasks (Pritsker et al., 1974; Card et al., 1983; Wherry, 1976). Some models cover the emotional aspects of human behaviour (Sloman, 2001) and some others also consider the social aspects of behaviour (Corker et al. 1993; Lehman et al., 1996; Deutsch et al., 1997; Sierhuis et al., 2007).

3 DEVELOPING THE INHABITANT BEHAVIOUR MODEL

In this section, an approach to develop a reactive behaviour model related to inhabitant needs at home is presented.

3.1 INHABITANT CONTEXT AT HOME

The term "context" is defined as any information that can be used to characterize the situation of an entity. Inhabitant context at home is the information that is necessary to characterize the situation of an inhabitant at home. (Ha et al., 2006) identified five elements of inhabitant context at home, which are: inhabitant, time, space, environment and object, presented in **Table 1**:

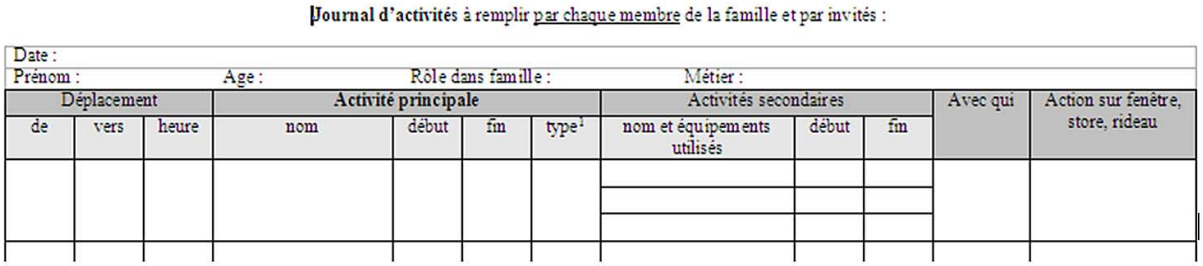
Context element	Definition and classification	Example
Inhabitant	It is person who is present at home. It includes family members and visitors.	Family (father, mother, son, daughter) Visitors (friends, neighbors, relatives) Temporary visitors (distributor, inspector)
Time	It is day/month/year and hour:minute:second. It includes weekday time, weekend time and holiday time.	Meal time, working time, sleeping time
Space	It is home space and includes indoor and outdoor space.	Main hall, kitchen, bedroom, entrance, bathroom, garden, terrace
Environment	It includes indoor and outdoor environment.	Factors of environment : temperature, humidity, lighting, noise
Objects	They are household objects. They include domestic electric appliances and others (furniture, etc.)	Microwave, hot plate, heating system Window, blind

Table 1: Context elements at home

Each context element is described by some characteristics. For example, an inhabitant is described by his identity (name, age, sex, etc.), health state, presence state at home, current location, and current activity. A domestic electric appliance is described by its identity (name, function, average power consumption, etc.), location and functioning state (on, off, etc.).

The context can affect inhabitant behaviour. Inhabitant may not follow the same behaviour as usual when one of the context elements has been changed. For example, because of the presence of visitors, inhabitant can use more time to prepare and eat meals than usual and consume more electricity. In order to develop a reactive behaviour model of inhabitant, the context in which the inhabitant behaviour happened must be identified

and recorded. To collect the context and information of inhabitant behaviour, this study used "5W and 1H" questions (Who and with who – subjects of behaviour, When – time of behaviour, Where – space where behaviour happened, What – household object used in behaviour, Why – purpose and reason of behaviour, and How – way of doing). The questionnaire presented in **Figure 2** is used to collect the context and information of inhabitant behaviour at home.



Journal d'activités à remplir par chaque membre de la famille et par invités :

Date :

Prénom : Age : Rôle dans famille : Métier :

Déplacement			Activité principale				Activités secondaires			Avec qui	Action sur fenêtre, store, rideau
de	vers	heure	nom	début	fin	type[1]	nom et équipements utilisés	début	fin		

Figure 2: Questionnaire for collecting the context and information of inhabitant behaviour at home

3.2 INHABITANT NEEDS AND BEHAVIOUR

The term "behaviour" refers to the actions or reactions of an object, usually in relation to its environment. (Milliken, 1965) deduces human behaviour in terms of physical needs: « There are certain physical needs that people must meet in order to survive. There are other needs that make people more comfortable. In the specific ways they strive to meet these needs, people are different ». Inhabitant behaviour at home is considered to correspond to the inhabitants activities which purpose is to satisfy their needs according to their contexts.

By observing inhabitant behaviour through the above questionnaire, the various types of behaviour and needs of inhabitant and the way inhabitant uses household objects to satisfy a need can be identified. Some physical needs of inhabitant have been identified (e.g. drinking, eating, going to toilet, sleeping, taking a bath, dressing, etc). Each inhabitant tends to repeat the behaviour that has been successful in satisfying these needs. This repetition becomes a behaviour pattern and forms the daily activities of inhabitant with a timetable fairly regular. These behaviours can be modeled and simulated by a stochastic process with an approximated timetable.

However, for evaluating possible power management solutions, not only the time, duration and location of the daily activities are necessary but also the detail informations about which and how domestic electric appliances are used in these activities. For example, an inhabitant wants to have dinner; he goes to the kitchen and prepares the dinner by warming food in microwave for 30 seconds at 500 Watts, cooking food on hot plate for 10 minutes at its maximal power and then he eats the meal in 5 minutes; in all the time, he turns on 100 Watts light in the kitchen. The information about power consumption in each period of this inhabitant behaviour is necessary for evaluating power management solutions.

The inhabitant behaviours for satisfying environmental comfort needs (e.g. thermal comfort, visual comfort, etc.) are also important and have to be considered. These behaviours are not triggered at regular times. They depend solely on the value of some environmental factors, one of the context elements. When the physical state of environment exceeds the inhabitant comfort tolerances, it causes a psychological state (belief) in the inhabitant. This belief induces the inhabitant to desire to have activities to adjust environment around him. For example, inhabitant enters into a room; room's temperature is higher than 30 °C; inhabitant believes that he is feeling hot and wants to open window or turns on ventilator to lower room's temperature. These behaviours can

change power consumption at home hence it is necessary to model and simulate these behaviours for evaluating power management solutions. If there are many inhabitants at home, an inhabitant can demand others to perform activities to satisfy his need. For instance, the inhabitant in the above example can demand the others in the same room to turn on a ventilator. This behaviour has also to be modeled.

For modeling these various types of behaviour and needs of inhabitant, a causal model of inhabitants behaviour is proposed and presented in detail in the next section. A causal model is an abstract model that uses cause and effect logic to describe the behaviour of a system (Anthony, 2006).

3.3 INHABITANT BEHAVIOUR MODEL

An inhabitant living at home has some needs. To satisfy his need, inhabitant can do one or many activities. To do an activity, inhabitant can use one or several household objects. The causal model representing these relations is presented in **Figure 3**.

Figure 3: Causal model of inhabitant behaviour to satisfy a need

The above model shows that an activity can cause other activities. An example of this relation is when an inhabitant prepares a meal, he needs to warm, cut and cook the food. These are actions of inhabitant in relation with household object (e.g. turn on, turn off, open, close, etc.).

In **Figure 4,** two causal inputs of inhabitant need are introduced to the above model: usual time and environmental factors.

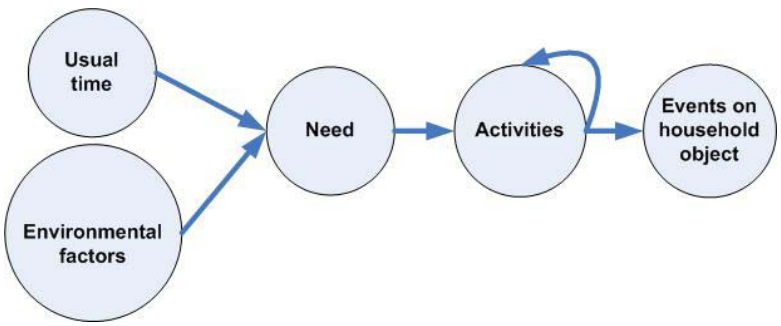


Figure 4: Causal model evolved of inhabitant behaviour

Inhabitant need contains the belief, desire and intention. The notions of belief, desire and intention (BDI architecture) are presented in (Rao et al., 1991). When the usual time comes up, it may cause an inhabitant need (e.g. getting up, going to work, having dinner, sleeping, etc.). When an environmental factor changes and exceeds the inhabitant comfort tolerances, it causes an inhabitant comfort need. Both usual time and environmental factors are elements of inhabitant context at home. The change of other context elements (inhabitant, space and object) can also cause an inhabitant need. For example, when a visitor is present, inhabitant stops working and starts preparing a meal for the visitor.

The context elements and inhabitant psychological state are considered respectively as outside and inside cause of inhabitant need. The complete causal model of inhabitants behaviour is presented in **Figure 5**.

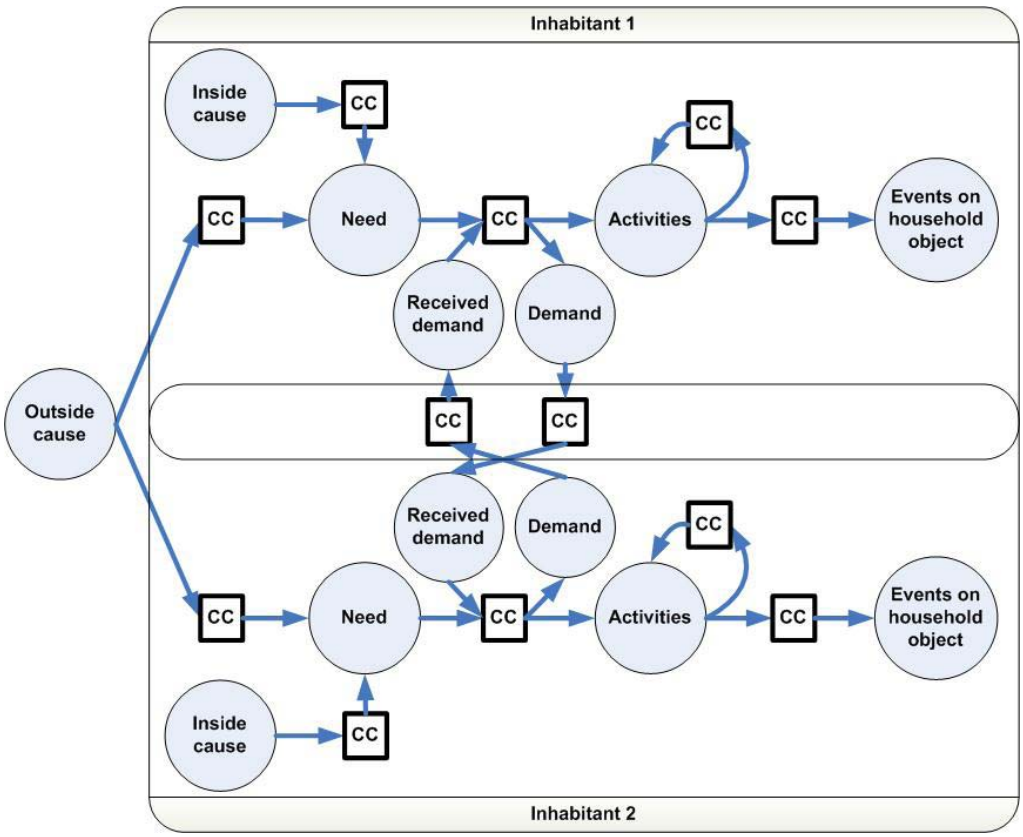


Figure 5: Complete causal model of inhabitants behaviour at home

In the above figure, CC stands for the causal condition: if a cause is satisfied, an effect is created. In the case of many inhabitants, a need of an inhabitant can cause not only personal activities but also activities of other inhabitants. For instance, in a family the parent demands their children to go to the table to take dinner all together.

4 SIMULATION AND SOME RESULTS

The schema of inputs and output of the behaviour simulator is presented in **Figure 6**.

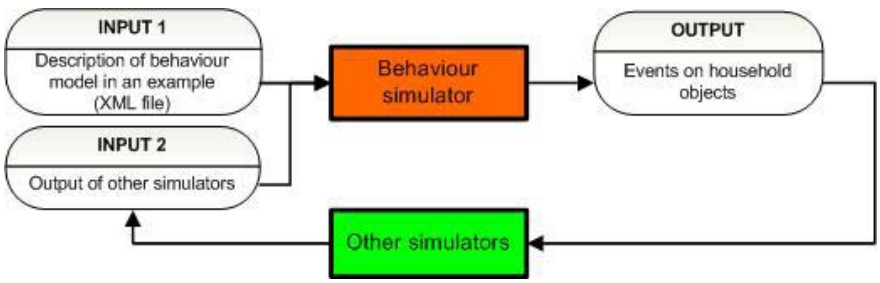


Figure 6: Schema of inputs and outputs of behaviour simulator

The behaviour simulator exchanges data with other simulators (e.g. thermal simulator, electrical simulator, etc.) to make a co-simulation environment. In one hand, it sends time of some events such as turning on/off electric appliances, opening/closing a window, etc. In the other hand, it receives the value of some environmental factors such as temperature or humidity. (cf. **Figure 1**).

A descriptive language to record causal relations of inhabitant behaviour is needed to simulate the causal model of inhabitants behaviour at home. Brahms language (Sierhuis et al., 2009) is compatible with our requirements. It is a full-fledged multi-agent, rule-based, activity programming language. It has similarities to belief-desire-and-intention (BDI) architectures and other agent-oriented languages, but is based on a theory of work practice and situated cognition. It has an activity subsumption architecture which can model an activity that causes other activities. It supports also multi-agents paradigm which makes it possible to define the communication of need between inhabitants. For all these reasons, Brahms language is chosen to describe our causal model. Its corresponding simulator is also used to interpret the model in each concrete example. **Figure 7** presents the transformation of the causal model into Brahms language.

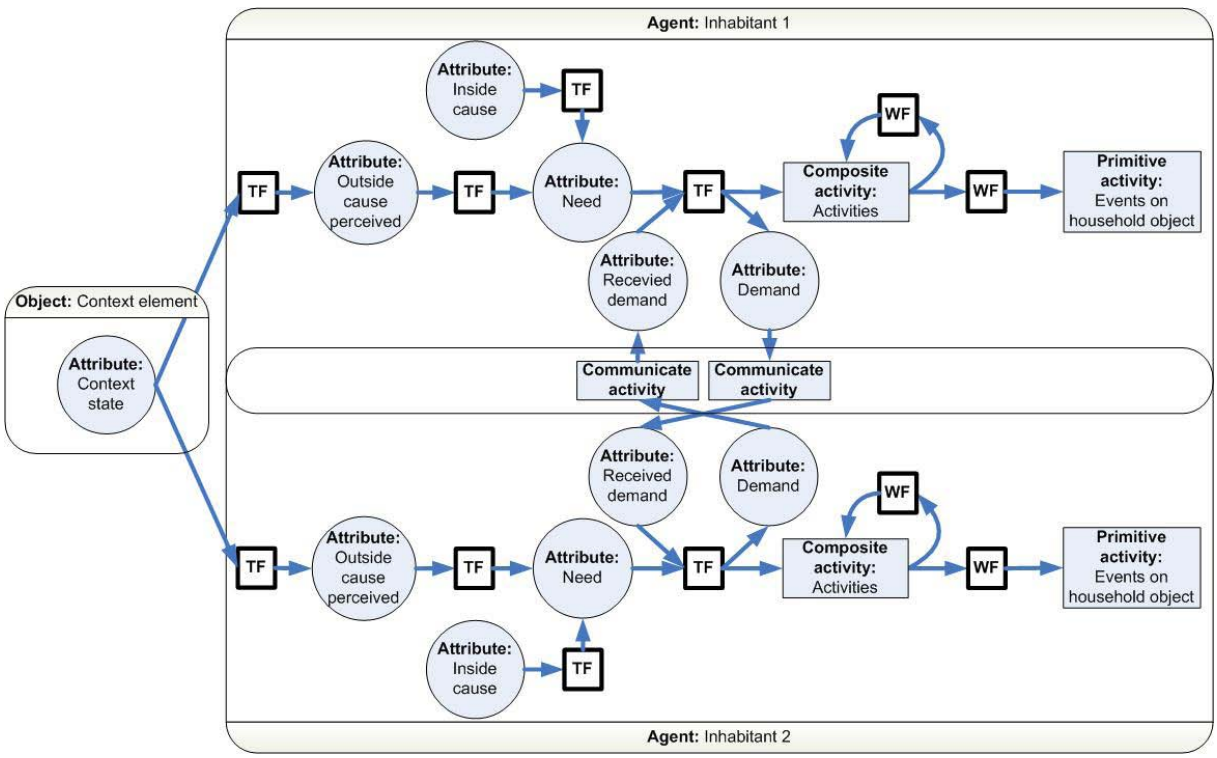


Figure 7: Transformation of the causal model into Brahms language

In the above figure, TF and WF correspond respectively to the thoughtframe and workframe in Brahms language. **Figure 8 (next page)** presents the simulation results of a simple example of inhabitants behaviour.

This example introduces two inhabitant behaviours: in the first one, when the temperature rises up, one inhabitant communicates with the other to have an agreement before opening the window; in the second one, when the dinner time comes up, one inhabitant ask the other to have dinner together, they take dinner while watching TV in the living room.

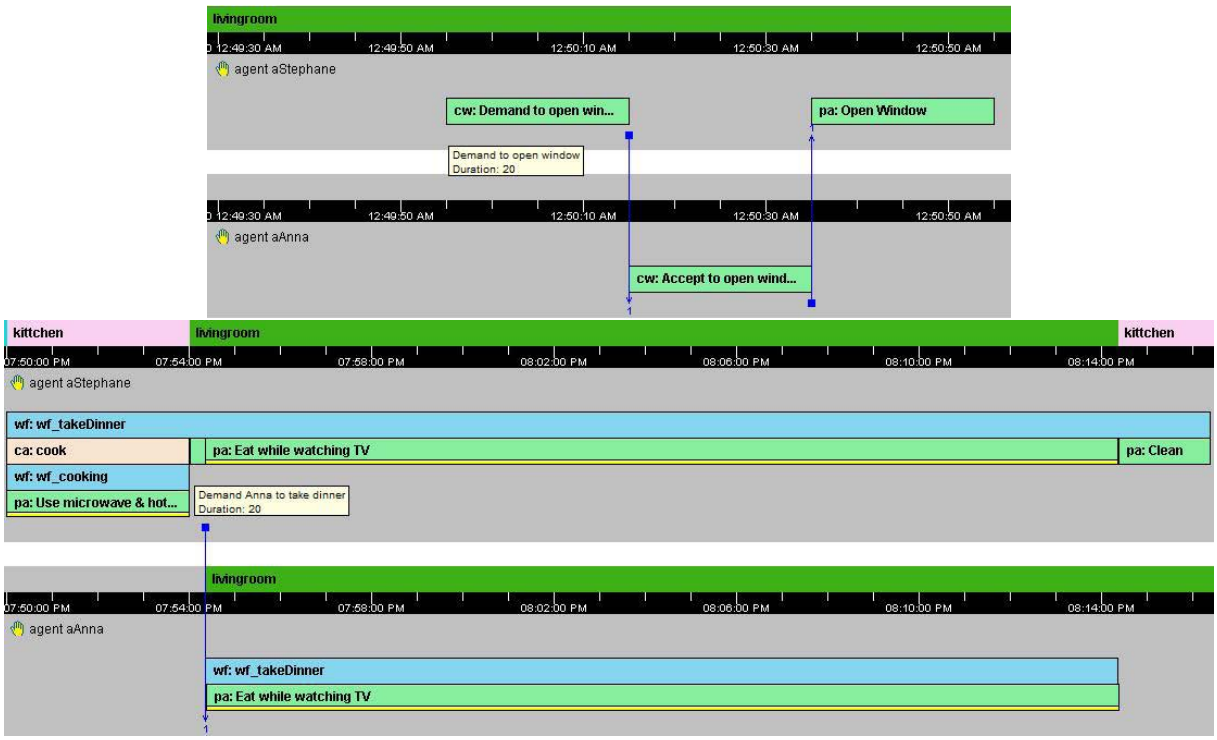


Figure 8: Simulation result of an example of inhabitants behaviour

5 CONCLUSION AND PERSPECTIVES

The proposed causal model of inhabitants behaviour makes it possible to reproduce the usual behaviours of inhabitants at home. The behaviour simulator can connect to other simulators to have a co-simulation. The use of the Brahms language leads to a similar declarative language to Modelica in physics. It means that a simulation of building with occupants reactive to their environment can be managed with one global declarative file and two co-simulators like Brahms and JModelica. The next step of this work is to determine a set of typical reactive characters and typical reactive families like "the sims" from the game holding the same name that could be used to validate the global efficiency of control strategies without requiring any experimentation.

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IBPSA announcements

Student Travel Awards – Supporting students to attend BS2011

Travel to IBPSA Conferences can be an expensive business – especially for students. In order to assist as many students as possible to participate in Building Simulation Conference 2011 in Sydney, IBPSA will grant travel awards of up to US$1,000 to students presenting papers. The number of places is limited to a maximum of 5 grants and as a result these awards are highly competitive. The Selection Committee bases its decisions upon the following selection criteria:

- overall quality of the paper,
- relevance of contribution to the field of, and/or furthering the effective application of, building simulation, and
- need for financial assistance, evidenced in a letter of recommendation from the student's supervisor/ advisor of studies (must be on university letterhead).

To be eligible, the student must be:

- enrolled in a graduate programme related to building simulation at the time of the conference AND
- the thesis project must be directly related to building simulation.

Applications MUST be supported by a letter of recommendation from the student's supervisor/ advisor of studies.

Applications for the award MUST be made by 9 May 2011 via e-mail to lori@sust.org. The subject heading of the e-mail should be "Student Travel Award - paper XXX" where XXX is the three-digit reference number for your paper.

The e-mail application must include the following:

The student's name;
The name of the programme, department, faculty, and university;
The title of the PhD or Master's research;
The name of the student's supervisor(s)/ advisor(s);
A scanned version of the faculty recommendation letter on university letterhead in PDF format. (Note that the original letter must be presented to the Conference Secretariat at the conference).

The selection committee will base its decision upon a review of the final manuscripts. Therefore, to be eligible the student MUST submit the paper by the full paper deadline of 9 May 2011.

Payment will be made either to the academic department before the conference or directly to the student at the conference.

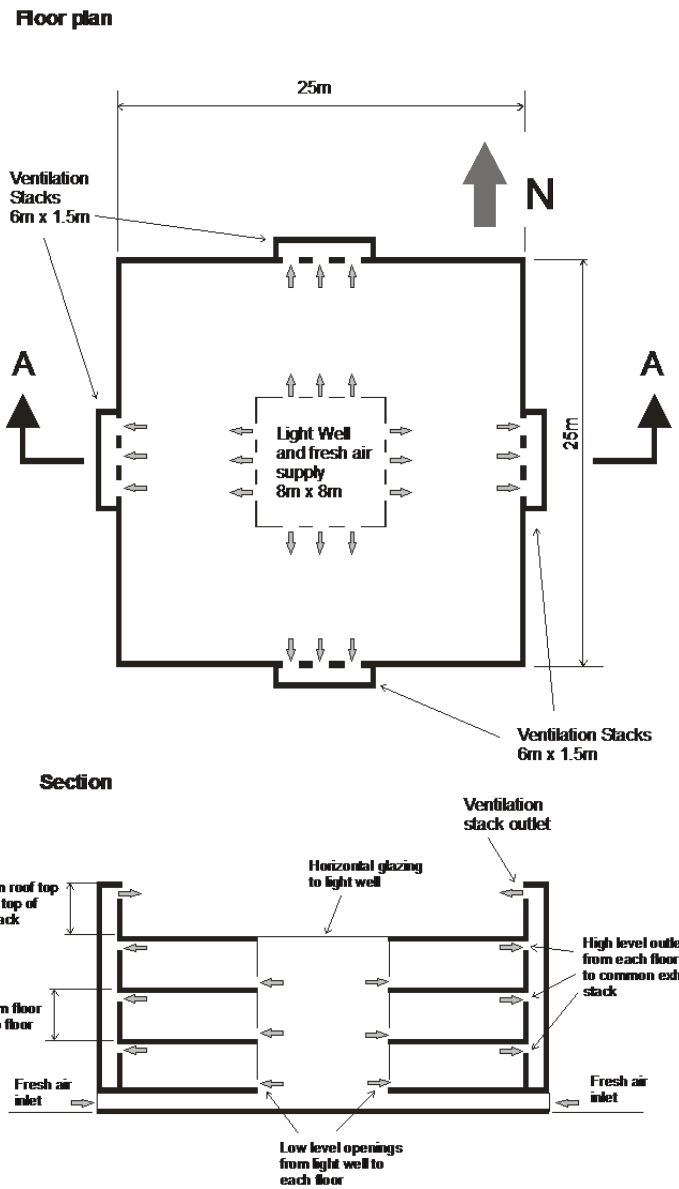
Building Simulation 2011 Student Competition

Following the success of the Student Competition in Building Simulation 2009, as part of the Building Simulation Conference 2011 (**www.bs2011.org.au**) IBPSA are running a student modelling competition organized by IBPSA England in collaboration with IBPSA Australia. The aim is to facilitate wider participation in the conference and to provide a competitive forum for student members of the building simulation community. It is expected that several tutors of relevant courses in universities around the world will use this as part of their teaching material. The main aim of the project is to use computer simulation to model the control of a hybrid ventilation system with the plan and section below:

Key Dates:

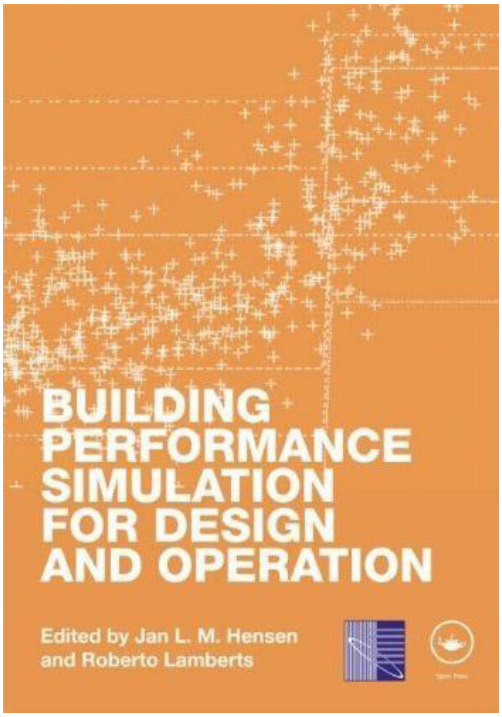
2 May 2011:	entrants to notify Malcolm Cook (**malcolm.cook@lboro.ac.uk**) of their intention to submit an entry
5 August 2011:	deadline for completed entries to be sent via email to Malcolm Cook
2 September 2011:	winners announced

For further information visit **www.bs2011.org.au/student.html**. Full details of the competition tasks, the building and its occupancy are available in **www.bs2011.org.au/Student%20Competition%20BS2011%20Sydney.pdf**



New book: "Building Performance Simulation for Design and Operation"

ISBN-10: 0415474140; ISBN-13: 978-0415474146



In cooperation with IBPSA, Spon Press has recently published a book on building performance simulation, written by internationally recognized experts in the field, and edited by Jan L.M. Hensen and Roberto Lamberts. The book aims to give the reader a thorough understanding of the recent progress made in building simulation and the key challenges that still need to be overcome.

As it says in the Preface, "[t]he main motivation for developing this book is that at the time of writing no comprehensive text book on the subject was available even though building performance simulation has become an essential technology for architectural and engineering design and consultancy practices, which aim to provide innovative solutions for their clients. This book sets out to fill this gap by providing unique insight into the techniques of building performance modelling and simulation and their application to performance based design and operation of buildings and the systems which service them. It provides readers with the essential concepts of computational support of performance based design and operation – all in one book. It provides examples of how to use building simulation techniques for practical design, management and operation, and highlights their limitations and suggests future research directions." The book is therefore useful for students (at the postgraduate levels), researchers, academics and government agencies as well as practitioners including architects, engineers, and building operators, and any others who are interested in building performance simulation.

The book begins with an introduction to the concepts of performance indicators and targets, followed by a discussion on the role of building simulation in performance-based building design and operation. This sets the ground for in-depth discussion of performance prediction for energy demand, indoor environmental quality (including thermal, visual, indoor air quality and moisture phenomena), HVAC and renewable system performance, urban level modelling, building operational optimization and automation. The book concludes with a view on future building system modeling.

The first Editor, Jan Hensen, is a professor in computational building performance simulation at the Department of Architecture, Building and Planning, Technische Universiteit Eindhoven, Netherlands. He is IBPSA Immediate Past President (2006-2010). The second Editor, Roberto Lambert, is a Professor in Construction at the Department of Civil Engineering of the Federal University of Santa Catarina, Brazil. He is also currently a board member of IBPSA and the Vice-President of the Brazilian Section and Counselor of the Brazilian Council for Sustainable Buildings. Other authors include Fried Augenbroe, Chip Barnaby, Dru Crawley, Ardeshir Mahdevi, Jeffrey Spitler, Jelena Srebric, Christoph van Treeck, Christoph Reinhart, Jan Carmeliet, Bert Blocken, Thijs Defraeye, Dominique Derome, Jonathan Wright, Ian Beausoleil-Morrison, David Claridge, Gregor Henze, Christian Neumann, Darren Robinson, and Michael Wetter. The book is introduced by Joe Clarke (IBPSA President in 1994-1997).

Journal of Building Performance Simulation update

Volume 4 Issue 1 (2011) of Journal of Building Performance Simulation, the official journal of IBPSA, has been published. This issue contains the following papers:

M. Y. Haller; J. Paavilainen; L. Konersmann; R. Haberl; A. Dröscher; E. Frank; C. Bales; W. Streicher. A unified model for the simulation of oil, gas and biomass space heating boilers for energy estimating purposes. Part I: Model development, Journal of Building Performance Simulation, 4 (1), 1 – 18

M. Y. Haller; J. Paavilainen; L. Konersmann; R. Haberl; A. Dröscher; E. Frank; C. Bales; W. Streicher. A unified model for the simulation of oil, gas and biomass space heating boilers for energy estimating purposes. Part II: Parameterization and comparison with measurements , Model development, Journal of Building Performance Simulation, 4 (1), 19 – 36

Y. Pan; M. Zuo; Gang Wu. Whole building energy simulation and energy saving potential analysis of a large public building. Journal of Building Performance Simulation, 4 (1), 37 – 47

I. M. Budaiwi. Envelope thermal design for energy savings in mosques in hot-humid climate, Journal of Building Performance Simulation, 4 (1), 49 – 61

K. Orehounig; A. Mahdavi. Performance evaluation of traditional bath buildings via empirically tested simulation models, Journal of Building Performance Simulation, 4 (1), 63 – 74

G. B. Murphy; M. Kummert; B. R. Anderson; J. Counsell . A comparison of the UK Standard Assessment Procedure and detailed simulation of solar energy systems for dwellings, Journal of Building Performance Simulation, 4 (1), 75 – 90

IBPSA Corporate membership

The International Building Performance Simulation Association (IBPSA), is a non-profit international society of building performance simulation researchers, developers and practitioners, dedicated to improving the performance of the built environment. It is IBPSA's mission to advance the science and application of building performance simulation in order to improve the design, construction, operation, and maintenance of new and existing buildings worldwide.

IBPSA disseminates information through a semi-annual newsletter, central and regional websites, and through a biennial conference, this to-date having been held in the USA, China, Brazil and Japan, among other countries.

IBPSA has a worldwide membership of over 2000, the membership being supported through 21 regional affiliates located in countries spanning 5 continents. Corporate members are companies or organisations that have an interest in the research, development, or application of building performance simulation.

Corporate Membership

Corporate members of IBPSA have the benefit of:

- The company (or organisation) logo on the IBPSA website (**www.IBPSA.org**), with a link to the company's own website.
- The company logo, contact information, and a half-page advertisement in the IBPSA newsletter, which is published twice a year and distributed to the 2000 members worldwide. The newsletter is freely available on the IBPSA Central website.
- A free copy of the biennial conference CD.

There are two categories of Corporate membership, standard and gold. Fees are US$750 per annum for standard corporate membership and US$5,000 per annum for gold corporate membership. Gold corporate members have the benefit of the company logo and contact details being placed in a prominent position on the IBPSA website, and are offered a full-page rather than half-page advertisement in the IBPSA newsletter. Free corporate membership may also be granted to sponsors of the biennial conference.

An application form can be downloaded from the IBPSA Central website at **www.ibpsa.org/m_membership.asp#_Corporate_Members**.

For further information please contact:

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Full details of corporate membership are given on **page 41**.

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For additional information about IBPSA, please visit the Association's web site at **www.ibpsa.org**. For information on joining, contact your nearest regional affiliate.

IBPSA's mailing list has been consolidated into another listserver known as BLDG-SIM, which is a mailing list for users of building energy simulation programs worldwide, including weather data and other software support resources. To **subscribe** to BLDG-SIM, to unsubscribe or to change your subscriber details, use the online forms at **http://lists.onebuilding.org/listinfo.cgi/bldg-sim-onebuilding.org**.

To post a message to all members, send email to **bldg-sim@lists.onebuilding.org**.

The BLDG-SIM list is provided by GARD Analytics. If you have any questions, please contact the list owner Jason Glazer at **jglazer@gard.com** or +1 847 698 5686.

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.

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New to Taylor & Francis for 2008

Journal of Building Performance Simulation

Official journal of the International Building Performance Simulation Association (IBPSA)

EDITORS:
Ian Beausoleil-Morrison, *Carleton University, Canada*
Jan Hensen, *Eindhoven University of Technology, The Netherlands*

Taylor & Francis would like to invite you to submit your article to *Journal of Building Performance Simulation*

The ***Journal of Building Performance Simulation*** (***JBPS***) is the official journal of the International Building Performance Simulation Association (IBPSA). IBPSA is a non-profit international society of computational building performance simulation researchers, developers, practitioners and users, dedicated to improving the design, construction, operation and maintenance of new and existing buildings worldwide.

The ***JBPS*** is an international refereed journal, publishing only articles of the highest quality that are original, cutting-edge, well-researched and of significance to the international community. The journal also publishes original review papers and researched case studies of international significance.

The wide scope of ***JBPS*** embraces research, technology and tool development related to building performance modelling and simulation, as well as their applications to design, operation and management of the built environment. This includes modelling and simulation aspects of building performance in relation to other research areas such as building physics, environmental engineering, mechanical engineering, control engineering, facility management, architecture, ergonomics, psychology, physiology, computational engineering, information technology and education. The scope of topics includes the following:

- Theoretical aspects of building performance modelling and simulation.
- Methodology and application of building performance simulation for any stage of design, construction, commissioning, operation or management of buildings and the systems which service them.
- Uncertainty, sensitivity analysis, calibration, and optimization.
- Methods and algorithms for performance optimization of building and the systems which service them.
- Methods and algorithms for software design, validation, verification and solution methods.

Submissions

Manuscripts will be considered on the condition that they have been submitted only to ***Journal of Building Performance Simulation***, that they have not been published already, and that they are not under consideration for publication or in press elsewhere. All submissions should be in English. Papers for submission should be sent to the Editors at j.hensen@tue.nl. For full submission details, please see the journal's homepage www.informaworld.com/jbps and click on the "Instructions for Authors" tab.

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