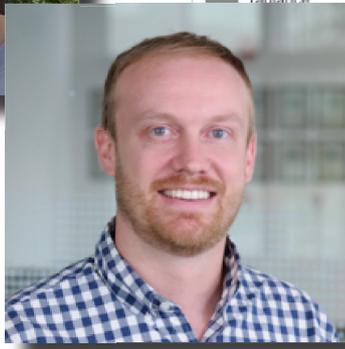


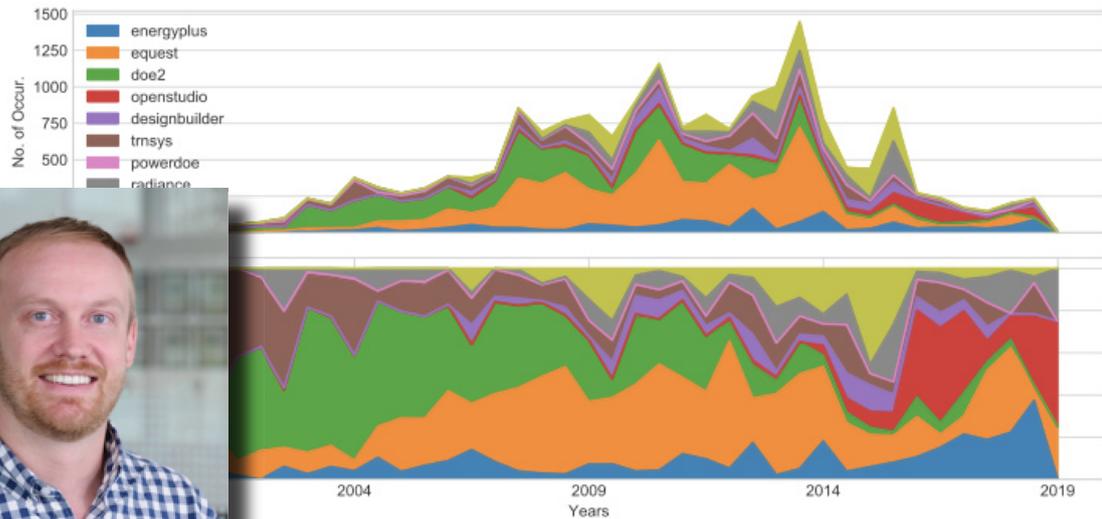
# ibpsaNEWS

volume 29 number 1 www.ibpsa.org

Apr 2019



## Smiles as IBPSA's mailing list Bldg-Sim celebrates 20 years!



## ... and an update on the forthcoming BS 2019 conference in Rome



### FEATURES & INTERVIEWS

features on 20 Years of the BLDG-SIM Email Listserv and on research at the Karlsruhe Institute of Technology (KIT), and an interview with IBPSA-USA's new President

### SOFTWARE NEWS

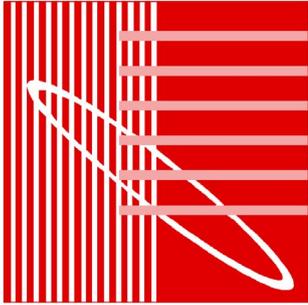
about Climate.OneBuilding.Org, DesignBuilder, EQUA & Hit2Gap

### GLOBAL COMMUNITY NEWS

from IBPSA affiliates in England, Netherlands + Flanders, the Nordic countries & Scotland

### CALENDAR OF EVENTS

12 conferences and other events for your diary



# Contents

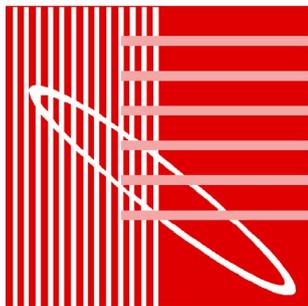
---

<b>President's message</b>	<b>3</b>
<b>Interview with IBPSA-USA's new President</b>	<b>5</b>
<b>Feature articles</b>	<b>7</b>
20 Years of the BLDG-SIM Email Listserv	7
Research at the Karlsruhe Institute of Technology (KIT)	9
<b>Forthcoming events</b>	<b>12</b>
Calendar	12
The Future Envelope 12: Conference on Building Envelopes	13
BSA 2019: 4th IBPSA-Italy Building Simulation Applications Conference	14
<b>BS2019</b>	<b>16</b>
enviBUILD 2019	22
BS Cairo 2019: 2nd IBPSA-Egypt conference	23
<b>Software news</b>	<b>25</b>
Climate.OneBuilding.org: new weather data sets for the Middle East, Russia, Central Asia, East Asia, and Europe	25
DesignBuilder 6.0	26
EQUA releases IDA Indoor Climate and Energy (ICE) training packages	30
The HIT2GAP project	31
<b>IBPSA announcements</b>	<b>36</b>
IBPSA 2019 Student Modelling Competition	36
Special issue of the Journal of Building Performance Simulation	38
Benefits of Supporting Membership	40
<b>Book announcements</b>	<b>41</b>
<i>Building Performance Analysis</i> , by Pieter de Wilde	41
<i>Building Performance Simulation for Design and Operation</i> , by Jan Hensen & Roberto Lamberts	43
<b>News from IBPSA affiliates</b>	<b>44</b>
IBPSA-England	44
IBPSA-Netherlands + Flanders	44
IBPSA-Nordic	45
IBPSA-Scotland	48
<b>About IBPSA</b>	<b>49</b>
Affiliates	49
Committee chairs & contacts	50

**Did you know**  
that the page layout  
and typography of  
ibpsaNEWS have been  
specifically designed  
for reading on-screen  
ever since volume 10  
in 1999, and all the  
items in contents lists,  
and web and email  
addresses, are active  
links? Try it on your  
tablet! - Editor

# President's message

---



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  
Lori McElroy  
BRE Scotland, UK  
Lori.McElroy@bre.co.uk

Vice-President  
Drury Crawley  
Bentley Systems  
Dru.Crawley@bentley.com

Secretary  
Pieter De Wilde  
Plymouth University, UK  
pieter.dewilde@plymouth.ac.uk

Treasurer  
Wangda Zuo  
University of Colorado, USA  
Wangda.Zuo@colorado.edu

Directors-at-Large:

Ian Beausoleil-Morrison  
ian\_beausoleil-morrison@sbes.ca

Andrea Gasparella  
andrea.gasparella@unibz.it

Matthias Haase  
Matthias.Haase@sintef.no

Christina Hopfe  
C.J.Hopfe@lboro.co.uk

Veronica Soebarto  
veronica.soebarto@adelaide.edu.au

Michael Wetter  
mwetter@lbl.gov

Immediate Past President &  
Director-at-Large  
Charles "Chip" Barnaby  
chipbarnaby@gmail.com

Dear IBPSA Colleagues and Friends,

In this our conference year, as we approach Building Simulation 2019, we have to be mindful of our long term goals as well as preparing for what we fully expect to be another excellent opportunity to hear about the latest developments in simulation, meet old friends and colleagues and make new connections in the wonderful and historic city of Rome.

The build-up to a conference can cause other things to slow down, but we are pushing on with our two IBPSA Projects:

**Project 1:** BIM/GIS and Modelica Framework for building and community energy system design and operation (see <https://ibpsa.github.io/project1/>), and

**Project 2:** the development of an IBPSA accreditation in modelling scheme for which we hope to have a beta version in place by Building Simulation 2019.

We are always on the look-out for new IBPSA Project ideas – so if you think that there is a burning issue that IBPSA should be addressing, please contact the IBPSA Project Committee Chair, Matthias Haase ([Matthias.Haase@sintef.no](mailto:Matthias.Haase@sintef.no)), for advice and support on developing the idea.

Our **Educational webinars** continue to be popular with academic and professional audiences. I would recommend these to all IBPSA Members and thank you to all those who have given of their time to produce such high quality lectures. To register or find out more go to [www.ibpsa.org/?page\\_id=695](http://www.ibpsa.org/?page_id=695).

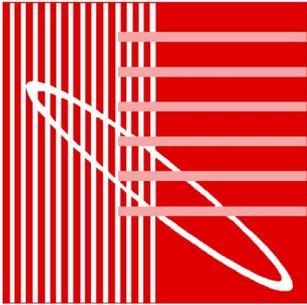
As I said in my last message, for my term of appointment, I would like to make sure that we move forward on a few key issues that have been on the agenda for a while but which we have yet to resolve. Be assured that these things are not forgotten:

**Development of our Supporting Membership scheme:** The Board is currently working to improve the range of membership services, developing new membership benefits and allowing IBPSA to operate more efficiently. For more information see [www.ibpsa.org/?page\\_id=56#\\_Supporting\\_Members](http://www.ibpsa.org/?page_id=56#_Supporting_Members).

**Website:** We have appointed a new Web Team – Roel Loonen and Pieter-Jan Loes from TU Eindhoven, and a website refresh is now underway.

**Equality/inclusivity:** We set up a committee in 2017 at the San Francisco conference to assess the systemic barriers that limit who participates in our field

*President's message*



– determining to develop strategies such as mentoring to overcome those limits. We continue to build on this and have asked Annie Marston of Hurley Palmer Flatt ([annie.marston@hurleypalmerflatt.com](mailto:annie.marston@hurleypalmerflatt.com)) consulting engineers, who has led on similar work for IBPSA USA, to help us progress this. A committee to take this forward is forming; anyone who is interested in becoming involved please contact Annie or anyone on the Board for more information.

I mentioned in my first message that we were concerned about the fact that participation in IBPSA's events and activities is high and inclusive at a student and academic level, but that post-graduation this tends to fall away – especially for those joining the professions.

Please consider getting involved in a committee as a stepping stone to joining the Board – we definitely need younger and more diverse voices! Which brings me back to **Building Simulation 2019**.....



..... this message would not be complete without yet another plug for Building Simulation 2019 (2 – 4 September, [www.buildingsimulation2019.org](http://www.buildingsimulation2019.org)). As you can see from the write-up in this edition of *ibpsaNEWS*, the conference promises to be quite an event. The conference will take place in the heart of the city of Rome, Italy, close to the Forum and the Colosseum. There is so much to see in this wonderful, historic city that it is definitely worth travelling early or staying on beyond the conference if you can! Please make plans to attend, meet colleagues from around the world, and enjoy seeing some of the wonderful sights of the city.



There is also a great opportunity to become more involved in shaping the future of IBPSA. The IBPSA Board and committees will be holding meetings in conjunction with the conference. The day before proceedings begin (on 1 September 2019) we traditionally hold our Committee Meetings, and our AGM follows on the day after the conference ends. All IBPSA Members are eligible and invited to attend these meetings which give an insight into how IBPSA operates as an organization, and to engage at another level beyond our conferences. A list of all Committees is available on [www.ibpsa.org](http://www.ibpsa.org) and we will ensure that the timetable for all pre-conference meetings is listed on both the IBPSA and the Building Simulation 2019 websites in advance.

I am very much looking forward to seeing you all and meeting members from all of our affiliates in Rome.

# Interview with IBPSA-USA's new President

---



Dru Crawley's contributions to the effective application and advancement of building performance simulation in practice have been numerous, and his contributions to building simulation and climate data form the basis for significant research and industry practice worldwide. Working at the US Department of Energy, Dru initiated and managed the development of the EnergyPlus simulation programme for 15 years; he developed, launched and managed US DOE's Commercial Building Initiative (zero-energy commercial buildings and sector alliances (now Better Buildings); and he managed DOE's building energy software research (apart from EnergyPlus) which also included OpenStudio, Energy-10, and DOE-2. Dru is currently a Bentley Fellow and Director, Building Performance Research focusing on building performance, BIM, net-zero-energy buildings, sustainability, resilience, and smart cities. Prior to being elevated to Bentley Fellow in 2014, he led development of Bentley's suite of building performance software for four years. Most recently, Dru was elected IBPSA's vice president and IBPSA USA's new president.

---

*Christina Hopfe (CJH): Congratulations, Dru! Since the last election of the IBPSA World Board, you have been elected Vice President of IBPSA World. More recently, you became IBPSA US president. I wonder if you could outline your aims for both roles, IBPSA World Vice president and IBPSA US president over the next couple of years?*

Dru Crawley (DC): Thanks Christina! I think that both IBPSA and IBPSA-USA face many of the same challenges – growing membership and serving the simulation community. IBPSA continues to have very successful Building Simulation conferences (looking forward to Rome in September!). We need to work with the affiliates to find more ways to support and help them support their (our) members. IBPSA-USA is facing the same issue – how do we support building simulation and those who use, create and benefit from the modelling we do. After the San Francisco Building Simulation conference in 2017, IBPSA-USA has a broader membership than in the past. We are working to provide more resources that support building modelers directly, but we also need to serve as the voice of building simulation for those who depend on our work—architects, engineers, building owners, researchers, and policymakers.

*CJH: Dru, you have pioneered work on climate data for building performance simulation, providing a free repository at <http://climate.onebuilding.org/> including data in EPW format, offering frequent updates as new weather data sets and design conditions are released and overseeing extensive quality checking procedures to identify and correct data errors and out of normal range values where appropriate. In the last 6 months, Climate.OneBuilding.org has released new climate data (TMYx) for more than 5,700 locations (see Software news, page 25). What are your next steps with this?*

DC: As you said, we've published a lot of data over the past year. Why? Well, my Climate.OneBuilding partner, Linda Lawrie, and I are professed weather data geeks who believe that weather data should be readily available for building simulation. We are methodically going through the worldwide weather data resource, Integrated Surface Data, which includes data for more than 20,000 stations, some of which date back to 1901, to create TMYx for as many locations as possible. With this release, we will have published free TMYx for more than 9,500 locations worldwide – covering all the available data except the United States and Canada (and yes, we're looking to finish those this spring.) After completing this round (with data through 2017), we are planning to look at integrating the meteorological data of ISD through 2018 with satellite and other solar resource data.

*CJH: I wonder if you could tell us what your next project might look like or what projects do you see yourself supporting in the future in your role as Bentley fellow, IBPSA USA president, and IBPSA vice-president?*

DC: Lots of projects under development or discussion. I'm particularly interested in novel means of creating 3D models using drones, photogrammetry, thermography – and looking at city-scale modelling. There have been several advances in this field recently that make it very cost-effective to collect the data and create a model of both the interior and exterior of a building quickly for use in simulation. We're also closing in on a method to define XMY (eXtreme Meteorological Years). We found that the TMY methodology is great for 'typical' and nails that well, but it doesn't cover the range of weather conditions you see over many years. And of course, methods for creating future weather.

*CJH: Thank you Dru!*

*The latest additions to Climate.OneBuilding.Org datasets are detailed in **Software news** on page 25. - Ed. ■*

---

# 20 Years of the BLDG-SIM Email Listserv

Clayton Miller and Jason Glazer

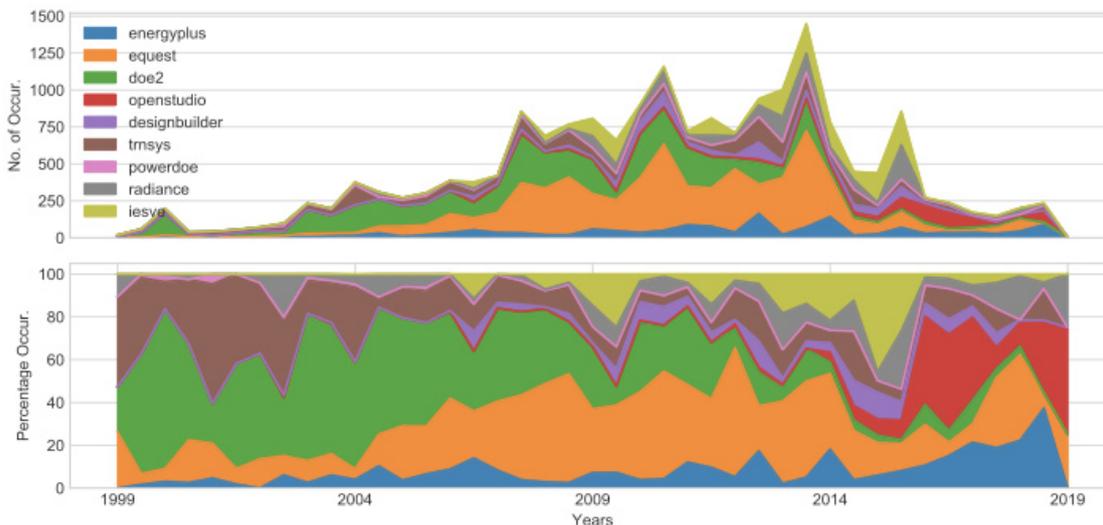
Bill Clinton was president, people were concerned about Y2K, and the first Blackberry had just been released. The date was March 4, 1999, and Jason Glazer posted his first message on the newly created BLDG-SIM mailing list\*. Recently the building simulation community celebrated the 20th anniversary of the BLDG-SIM mailing list\*\*. At the time, Jason invited everyone he knew personally in the building simulation industry and posted some messages to related mailing lists. Word of mouth grew the list to over 300 subscribers a year later and it is now nearly 2400 subscribers. The eQUEST-users, HAP-users, and TRACE-users lists split off in 2008, and in 2014 Trnsys-users moved to the onebuilding.org server.



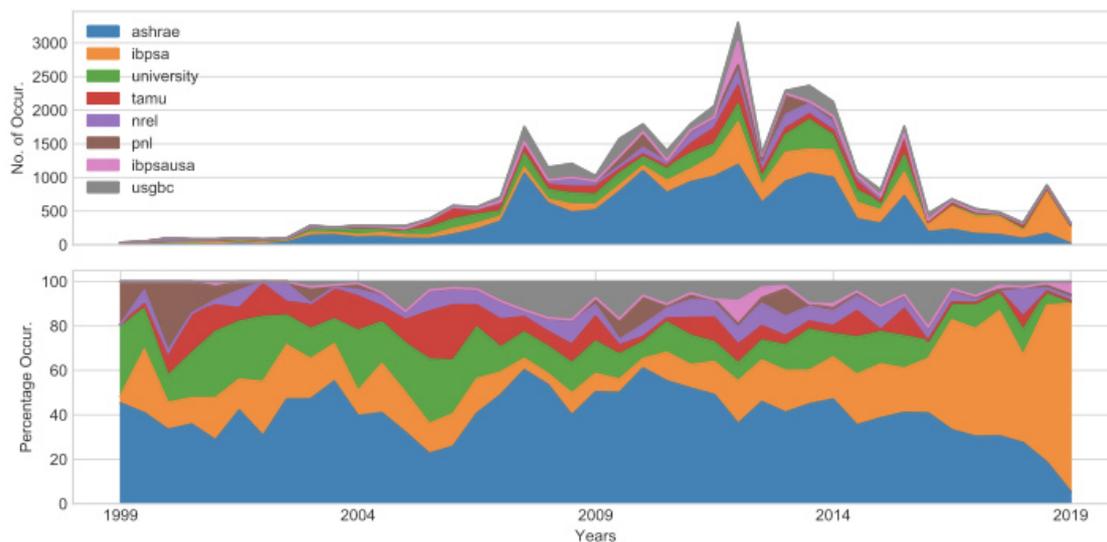
The volume of emails grew rapidly as many of the job and conference postings, building simulation-related questions, and other simulation community-related questions were posted on the listserv. Over the years, more specialized online communication venues such as unmethours.com\*\*\* have helped shoulder the load, but the list remains a key source of news and announcements in our community.



To celebrate, several fun photos have been posted on the listserv and a text mining analysis was conducted to try to extract what trends have occurred over time. This text analysis extracted the most common topics discussed over the course of each year and then extracted the most commonly used words in each of those topics. Several trend charts were created to show the shifts over time.



**Trends in key terms occurring over time on the listserv:** The top area chart is of occurrences of the word in each six month period and the lower area chart is the percentage of the word's occurrence relative to the other words in this particular analysis. In this chart, software tools and engines that were most commonly found in the topic models are shown. It appears that there have been major shifts over the years - the most obvious being from doe2 to openstudio and energyplus. Please note that this trend analysis was likely influenced by the introduction of other more specialized listservs and resources for certain tools.



**Trend analysis of various non-profit and research entities in terms of the frequency that their names are mentioned** shows that IBPSA has slowly grown in popularity as measured by the frequency of mentions and as a percentage of mentions as compared to other similar non-profit organizations.

User	Email Count
Nick Caton	309
John Aulbach	289
Jason Glazer	275
Joe Huang	254
Jeff Haberl	251
Vikram Sami	246
Jim Dirkes	205
David Eldridge	192
Drury Crawley	184
Chris Jones	184
Varkie Thomas	183
Karen Walkerman	158
Robert Wichert	138
Brandon Nichols	122
Chris Yates	106
Leen Peeters	99
Ramana Koti	97
Carol Gardner	90
Mike Tillou	85
James Hansen	84

The table on the left shows a simple extraction of the frequency of user postings quantified by emails and after consolidating users who have multiple email addresses on the listserv. We call these the Rock Star Users -- give them a high five the next time you see them around!

Overall, the results show that while topics have shifted slightly over the years, the core simulation objectives haven't changed significantly. Additional graphics and explanations that illustrate all the trends can be found in a publication that is under review for the upcoming IBPSA BS2019 Conference in Rome, Italy on Sept. 2-4, 2019\*\*\*\*.

The BLDG-SIM listserv continues on as a great source of general community-level information managed by Jason. We encourage IBPSA members to continue utilizing the list for all of their announcements, news, and information that is relevant to the building simulation community! Here's to another 20 years!

**About the Authors**

Clayton Miller is an Assistant Professor at the National University of Singapore (NUS) and leads the Building and Urban Data Science (BUDS) Lab (<http://budslab.org>). Jason Glazer is a principal engineer at GARD Analytics, the chair of the ASHRAE 90.1 Energy Cost Budget Subcommittee, and the founder and administrator to the onebuilding.org mailing lists. ■

\* <http://onebuilding.org/archive/bldg-sim-onebuilding.org/1999-March/000229.html>  
 \*\* <http://lists.onebuilding.org/listinfo.cgi/bldg-sim-onebuilding.org>  
 \*\*\* <http://unmethours.com>  
 \*\*\*\* <http://buildingsimulation2019.org>

# Research at the Karlsruhe Institute of Technology (KIT)

## An interview with Petra von Both and Andreas Wagner

---

In this edition of *ibpsaNEWS*, our regular feature describing the work of research institutes, university faculties and other organisations actively involved with IBPSA-related research visits Germany's Karlsruhe Institute of Technology - KIT. Christina Hopfe spoke to Prof Petra von Both, Head of Building Lifecycle Management and Prof Andreas Wagner, Head of the Building Science Group, about the most recent IBPSA Germany conference held at KIT and about KIT's own research.

---

*Christina Hopfe (CJH): the German/Austrian chapter's last biennial conference, BauSIM, was hosted at KIT. Based on your experience of this event and its various submissions, where do you see research in building simulation heading?*

Petra von Both (PvB): Applying simulation and assessment tools early in the design process enables designers to take into account their predictions about the entire life cycle of a building or system. Using IT-based design, optimisation and simulation tools in this way places increasing demands on interdisciplinary networking and the integration of data and business logic. Current approaches to model-based design (BIM), model standards at building and city level, BIM-based interfaces and platforms as well as approaches to co-simulation can make important contributions to a holistic system optimization. To reflect this, BauSIM 2018 focused on BIM-based planning tools and approaches to integration, and particularly on current activities in research, planning practice and standardization.



Andreas Wagner (AW): Integration is also an important aspect of building performance simulation. Germany has begun a fundamental change in its energy systems, with an increasing share of energy being provided from renewable and decentralized sources. Because of this, the grid-reactivity of buildings, the removal of system boundaries between single buildings and whole neighborhoods, and the coupling of internal and external energy supply infrastructures are important topics to address. This requires new models, abstraction and scalability, as well as interfaces between different systems, which could be seen in a number of presentations.



Another topic is occupant behaviour modeling, which was also a main focus of the conference. As it is widely recognized that occupancy and occupant behaviour can have a significant influence on building energy performance, state-of-the-art models are often not suited to represent occupants' needs accurately. Therefore, a new generation of statistical and agent-based models for different interactions of occupants with the building and the HVAC systems, as well as occupancy itself, have been developed during recent years and some of those were presented also at our conference. Interestingly, the contributions which were selected for best paper awards at the conference and which were published in the German journal *Bauphysik*, exactly match the research topics we have mentioned.

*CJH: You led a number of different sessions and workshops at the conference. Tell us about one of these sessions or workshops and the outcome – how do you anticipate taking these discussions forward?*

PvB: The discussions in the sessions and other conference events led to the conclusion that the idea of integration is being reflected more and more in the contributions and discussions. Here, I think, we have come a step closer to the goal of integrated planning. In particular, the growing interaction between simulation and BIM allows a consistent optimisation and a more and more holistic design approach.

One conclusion of our BIM related sessions and BIM workshop is, that the development of IFC-based open-BIM interfaces to simulation tools has to be synchronized better in the future, because there are several parallel approaches under development. Here, we started working very close together with the buildingSMART Initiative to bundle these activities concerning IFC-interfaces and simulation in the area of energy and sustainability within the expert group on BIM and Sustainability.

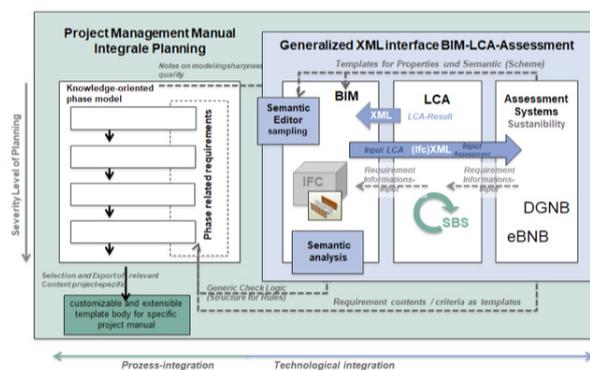
Also, occupant behaviour modelling is gaining more and more attention as an integrated approach, increasingly integrating socio-cultural, planning-methodological as well as psychological topics. We expect the integration of other disciplines in the future, which of course would be a great benefit to the conference series.

AW: I would like to focus on the workshop on occupant behaviour which we held as part of the conference, or more specifically on the question of which kind of models are known and applied in real building design practice. It was interesting to learn that practitioners (architects, HVAC engineers, energy consultants) mostly rely on rather simple assumptions about occupants, e.g. schedules and patterns given in standards and codes, and more sophisticated models are rarely applied. Further, binding information about the occupancy and occupant patterns is often not given by clients or only very generally. This shows that real life is quite different from our academic vision of occupant-centric building design and operation. As a conclusion from this workshop we decided to investigate this topic in more detail and to perform an international survey which will help to decide which types of occupant models are most helpful for which step in the design process and which data have to be collected/provided for modeling as well as for using occupant behaviour models for building operation optimization. The results can also be used to support preparing guidelines for practitioners and recommendations for standards and building codes.

*CJH: Could you provide an example of your current research in the field of modelling and building performance simulation? What is your current focus in this field?*

PvB: As our research unit is dealing with integrated design methodology and digital design like BIM, our focus lies on the enhancement of design processes by integrated methods and tool chains. In particular, the technical integration of digital design processes with simulation and optimisation tools is a great challenge here. Within the IEA EBC Annex 60 *New generation computational tools for building and community energy systems based on the Modelica and Functional Mockup Interface standards* we worked together closely with partners on the development of IFC-based interfaces for SimModel and Modelica. Here the question of data conversion and rule-based quality assurance of BIM-models have been our topics. In the ModelSIM project we are also working together with RWTH Aachen on the further development of urban models like CityGML to enhance them as a base for building performance simulation. We are also involved in the IBPSA Project One.

Another interesting project, together with the German DGNB (German Sustainable Building Council) and the Fraunhofer IBP, is the development of a continuous data and tool chain from BIM to Lifecycle Assessment (LCA) and sustainability assessment (SBA).



One challenge is to develop accounting and calculation methods that can handle high fuzziness and be used in early design stages. Here the partners are developing methods for multiscale building descriptions and benchmark-based assessment tools for these coarse-grained information models.

AW: The focus of our research on building energy performance and comfort has turned towards occupants' thermal and visual adaptation as well as behaviour within the last 5 years. With our indoor climate test facility LOBSTER (photos, right) we are able to perform experiments with human subjects under controllable conditions and at the same time provide different adaptive opportunities. This is also used in ValMoNuI (*Validation and Modeling of Occupants' Interactions and their Implementation in Building Automation*), a joint project with Aachen University (RWTH) and Fraunhofer IBP, and ABB as an industry partner. We have started to look at the combined effects of thermal and visual stimuli on occupants' perception and their interrelation with regard to behaviour.

In a follow-up project which we hope to start this summer together with the same partners, we will extend the scope to all domains of comfort (thermal, visual, olfactory and aural) by addressing aspects of multi-effects with regard to perception and behaviour. This project will also have a strong emphasis on data mining and machine learning methods to model occupant behavior and a digital twin will be developed to test new occupant behaviour models in a realistic context before implementing them in the field.



*CJH: What are the main links nationally and internationally, such as collaborations with other universities and partners? Tell us about ongoing projects in this field.*

PvB: In addition to the cooperative research projects already mentioned, our unit is also engaged in working groups and standardisation committees in the context of BIM, like the GAEB, the SIG3D CityGML working groups or buildingSMART. To enable the transfer of research results to construction practice, we are involved in the current processes at buildingSMART, the standardization body for IFC and related BIM standards. Here, I am the Spokesperson of the bs working group on BIM and Sustainability, that deals with the integration of calculation, simulation and analysis tools by BIM-based interfaces.

AW: One strong national link has already been mentioned above in the context of occupant behaviour research. Together with these institutions we also participated in the IEA EBC Annex 66 on the same topic. This international involvement is now continued through the Annex 79 *Occupant-Centric Building Design and Operation* project where I am one of the Operating Agents. Another continuous international link is to the London-Loughborough Centre of Doctoral Training in Energy Demand where I am a member of the advisory board.

Nationally, we also have an ongoing collaboration with Fraunhofer ISE where I worked before my appointment to KIT; the most recent project here is on low-exergy heating systems as part of refurbishment strategies for apartment houses. Together with the University of Wuppertal and two industry partners we are working on a project which uses ceiling fans to increase thermal comfort in summer in a refurbished administration building. Through Marcel Schweiker, who is responsible for our comfort research, we are connected to the Heidelberg Academy of Sciences which funds another project on thermal comfort. He is also subtask leader in the IEA EBC Annex 69 on adaptive thermal comfort, and in Annex 79.

*CJH: Thank you Petra and Andreas!* ■

# Forthcoming events

Date(s)	Event	Web site
<b>2019</b>		
25-26 April 2019	<b>CIBSE ASHRAE Technical Symposium 2019</b> Sheffield, UK	<a href="http://www.cibse.org/technical-symposium-2019">www.cibse.org/technical-symposium-2019</a>
20-21 May 2019	<b>The Future Envelope 12</b> Bolzano, Italy	<a href="https://www.facecamp.it/en/eventi/the-future-envelope-12/">https://www.facecamp.it/en/eventi/the-future-envelope-12/</a>
19-21 June 2019	<b>BSA 2019</b> Bolzano, Italy	<a href="http://bsa.events.unibz.it">http://bsa.events.unibz.it</a> <b>BEWARE: Possible Trojan on website!</b> <i>The conference organisers expect the site will be made safe within a few days of this ibpsaNEWS being published.</i>
22-26 June 2019	<b>ASHRAE Annual Conference</b> Kansas City, Missouri, USA	<a href="http://www.ashrae.org/conferences/annual-conference">www.ashrae.org/conferences/annual-conference</a>
30 June - 03 July 2019	<b>EG-ICE International Workshop on Intelligent Computing in Engineering</b> Leuven, Belgium	<a href="https://eg-ice.org/upcoming-events">https://eg-ice.org/upcoming-events</a>
<b>02-04 September 2019</b>	<b>BS19: Building Simulation 2019</b> Rome, Italy	<a href="http://www.buildingsimulation2019.org">www.buildingsimulation2019.org</a>
05-07 September 2019	<b>X IAQVEC 2019, 10th International conference on Indoor Air Quality, Ventilation &amp; Energy Conservation in buildings</b> Bari, Italy	<a href="http://www.iaqvec2019.org">www.iaqvec2019.org</a>
25-27 September 2019	<b>ASHRAE Building Performance Analysis Conference 2019</b> Denver, Colorado, USA	<a href="http://www.ashrae.org/conferences/topical-conferences/2019-ashrae-building-performance-analysis-conference">www.ashrae.org/conferences/topical-conferences/2019-ashrae-building-performance-analysis-conference</a>
17-18 October 2019	<b>VI South American Congress of Building Performance Simulation</b> Mendoza, Argentina	<a href="http://ibpsa.com.ar">http://ibpsa.com.ar</a>
07 November 2019	<b>enviBUILD 2019, International conference on Buildings and Environment</b> Bratislava, Slovakia	<a href="http://www.cab.sk/be2019/">www.cab.sk/be2019/</a>
28-30 November 2019	<b>BSCairo 2019, 2nd conference of IBPSA-Egypt</b> Cairo, Egypt	<a href="http://bscairo.com">http://bscairo.com</a>
<b>2020</b>		
01-05 February 2020	<b>ASHRAE Winter conference</b> Orlando, Florida, USA	<a href="https://www.ashrae.org/conferences/2020-winter-conference-orlando">https://www.ashrae.org/conferences/2020-winter-conference-orlando</a>

*Note that the dates in this calendar may, but do not necessarily, include pre and/or post-conference workshop days*



**20-21 May 2019**

**Bolzano, Italy**

**[www.facecamp.it/en/eventi/the-future-envelope-12/](http://www.facecamp.it/en/eventi/the-future-envelope-12/)**

## **The Future Envelope 12: Conference on Building Envelopes**

New design tools and approaches and innovative construction methods are enabling architects and engineers to conceive and develop increasingly complex and daring building envelopes. This process is rapidly reshaping our built environment, and transforming the concept of building envelope itself, which is no longer a passive element. In this fast-changing context, one of the major issues is the evaluation of the performances of complex façade systems and their functioning. Designers have to manage this complexity, and need to analyse and ensure the performance of the overall façade system. Computer simulations as well as functional mock-ups play a central role for estimating these performances from the early stages of the design process.

In recognition of these challenges, the FACEcamp project was set up to establish a transnational competence centre on advanced façade systems, to enhance and share knowledge among research organization and enterprises, and to improve existing metrics, modelling and measuring procedures. The Future Envelope 12 is FACEcamp's final conference, and will include presentation of its main results on the themes of:

- architecture
- energy
- comfort
- economics and management

The conference will focus on the shape of innovative envelopes, on their implications for overall building energy consumption, on the comfort experienced by the occupants of the buildings, and on the finances and business models associated with these design solutions. For each topic, three leading experts have been invited from research and academia, design firms, and construction companies respectively to share a wide range of experiences, ideas, and visions. Speakers includes Christina Hopfe (IBPSA Director-at-Large), Sabine Hoffman (Professor at Technische Universität Kaiserslautern), and Darren Woolf (Chair of CIBSE Building Simulation Group).

The conference language will be English.

The Future Envelope 12 will be held in Bolzano, in Italy's South Tyrol on 20-21 May 2019. The event is free of charge, but places are limited. For further information about the conference and the FACEcamp project, and for registration, please visit [www.facecamp.it/eventi/the-future-envelope-12/](http://www.facecamp.it/eventi/the-future-envelope-12/). ■

**eurac**  
research

**IDM**  
SÜDTIROL  
ALTO ADIGE

**universität**  
innsbruck

**H=LLA**  
HUMAN-LEARNING-LOGIC

**Bartenbach**

**iglassAdvisor**

**FRENER**  
**REIFER**  
FASSADEN



**19-21 June 2019**  
**Bolzano, Italy**  
<http://bsa.events.unibz.it>

### **BSA 2019: 4th IBPSA-Italy Building Simulation Applications Conference**

IBPSA-Italy and the Free University of Bozen-Bolzano are pleased to announce the 4th Building Simulation Applications Conference, BSA 2019, to be held in Bolzano, in Italy's scenic South Tyrol, on 19-21 June 2019. The conference will open with workshops for PhD and graduate students on the first morning, followed by an afternoon city tour and evening reception for delegates. There will be parallel technical sessions throughout the second day (with the conference dinner in the evening) and on the morning of the third.

The conference topics will be:

- **Building physics: envelope and system components**
  - Heat and mass transfer modeling in buildings
  - Building envelope systems and facades, and innovative building materials
  - Air flow, natural ventilation and mixed mode cooling
  - HVAC components and systems
  - CHP and Renewables
  - Building control systems
  - Service equipment
- **Overall Performance**
  - Building and room acoustics
  - Lighting and daylighting
  - Thermal comfort
  - Indoor air quality
  - Indoor environmental quality
  - Net-zero energy building
  - Retrofit/refurbishment of existing buildings
  - Commissioning and operation
  - Urban modelling and District analysis
- **Methodologies, regulation, calculation and simulation tools**
  - Model validation, sensitivity analysis, calibration and optimization techniques
  - Building codes and regulations, simplified methods versus detailed simulation
  - New simulation tools and improvements in existing simulation tools
  - Integration, interoperability web-based techniques, software development, open source initiatives
  - BIM
  - Advances in teaching and education, eLearning

### Call for Submissions

Papers are invited on any of the conference themes.

Note that **only extended abstracts will be presented at the conference**. Full papers will be reviewed after the conference, and those accepted will be published in the conference proceedings.

The official language is English, and no other languages are allowed for abstracts or full papers. However, an Italian translation of abstracts will be required for inclusion in the final proceedings together with final papers.

BSA2019 is a conference of the BSA Building Simulation Applications series. BSA2013, BSA2015 and BSA2017 proceedings are now indexed on Scopus.

Papers on acoustic modelling are particularly welcome, dealing with simulations of acoustic performance of buildings and their elements as well as room acoustics and indoor comfort of built environments. This includes:

- Building envelope components
- Service equipment and their elements
- Indoor comfort of occupants
- Room acoustic descriptors and auralization in special environments (schools, hospitals, offices, etc.)
- Annoyance influence on occupants performances

The intent is to produce a special issue of the journal Building Acoustics. Relevant papers from the conference will be reviewed by the journal, and there will be an opportunity to further develop those accepted before publication.

Full details of the submission process are available from the conference website, <http://bsa.events.unibz.it>, or from the conference organisers at [bsa@unibz.it](mailto:bsa@unibz.it).

### Key dates

Extended abstract submission	01 March - 21 April 2019
Extended abstract acceptance	12 May 2019
<b>Conference</b>	19-21 June 2019
Full paper submission	31 August 2019
Full paper review notification	30 September 2019
Final paper submission	31 October 2019 ■

---



**BS**  
**2019**  
**2-4 SEPT**  
**ROME**

16th IBPSA INTERNATIONAL  
CONFERENCE AND EXHIBITION

[www.buildingsimulation2019.org](http://www.buildingsimulation2019.org)

**Conference Venue: *Angelicum Congress Center* seat of the Pontifical University "S. Tommaso d'Aquino"**

**CALL FOR ABSTRACTS STARTED IN APRIL 2018**

**Program:**

- Presentations on research
- Case studies and best practices
- Panel discussions
- Software demos and exhibition
- Simulation competitions
- Technical tours and cultural visits

**Topics:**

Building acoustics  
Building Information Modelling (BIM)  
Building physics  
CFD and air flow  
Commissioning and control  
Daylighting and lighting  
Developments in simulation  
Education  
Energy storage  
Heating, Ventilation and Air Conditioning (HVAC)  
Human behaviour



Indoor Environmental Quality (IEQ)  
New software development  
Optimization  
Simulation at urban scale  
Simulation to support regulations  
Simulation vs reality  
Solar systems  
Validation, calibration and uncertainty  
Weather  
Windows  
Zero Energy Buildings (ZEB)



## BS 2019: News update

### Registration

BS 2019 Chair Professor Vincenzo Corrado and the Co-Chair Professor Andrea Gasparella are pleased to invite you to Building Simulation 2019 Rome, the 16th IBPSA International Conference.

Full information about conference fees and the registration procedure is available at <http://buildingsimulation2019.org/registration/>. Early Bird booking expires on May 31st, 2019. A range of trusted hotels with dedicated rates and distances from the Conference venue is available at <http://buildingsimulation2019.org/hotels/>, and delegates can book an accommodation in Rome through the conference website.

### Sponsorship and endorsements

The organisers also invite commercial and research organisations to sponsor or endorse BS 2019. Exhibitor, Bronze, Silver, Gold or Platinum sponsorship packages are available. For full information about these please download the sponsor and exhibition brochure at <http://buildingsimulation2019.org/sponsorships/>.

BS2019 has already been endorsed by numerous prestigious organisations, including the International Energy Agency's Energy in Buildings and Communities Programme (IEA-EBC); the Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA); the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE); the Italian Society of Air Conditioning, Heating, Refrigeration (AiCARR); the Acoustical Society of Italy (AIA); the Italian Illumination Association (AIDI); the Italian National Council of Engineers (CNI); the Italian Thermotechnical Committee Energy & Environment (CTI); the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA); the Construction Technologies Institute of the Italian National Research Council (ITC-CNR); the Italian National Research Council (CNR); Sapienza University of Rome; Tor Vergata University of Rome; and Roma Tre University. More information is available at <http://buildingsimulation2019.org/endorsing-organizations/>.

## Forthcoming events

### Keynote speakers

There will be several plenary sessions each day, either in the usual format of a speech, or as plenary panels. This is intended to facilitate deeper engagement into each of the three topics of the day, and encourage audience participation.

Five keynote speakers have been confirmed so far. In alphabetical order, and pictured left to right, they are:

**Yuguo Li**, Chair Professor of Building Environment, Associate Dean of Engineering, former Head of Department of Mechanical Engineering, and Honorary Professor of School of Public Health, at The University of Hong Kong, led the development of 2009 WHO guidelines on natural ventilation, and currently serves as Editor-in-chief of *Indoor Air*.



**Ardeshir Mahdavi**, Professor, Director of the Department of Building Physics and Building Ecology as well as the Head of the Institute of Architectural Sciences at TU Wien, Austria, has conducted internationally acclaimed research in the fields of Building Physics, Building Performance Simulation, Building Controls, Building Ecology, and Human Ecology.

**Christoph Reinhart**, Professor in Building Technology at MIT, is leading the Sustainable Design Lab (SDL), an inter-disciplinary group with a grounding in architecture that develops design workflows, planning tools and metrics to evaluate the environmental performance of buildings and neighborhoods.



**Susan Ubbelohde**, Associate Dean for Faculty Affairs and Professor of Architecture at UC Berkeley, leads an office of unconventional practice, bringing research methods and physical and computer modeling to a wide range of architectural design solutions, pioneering new methods of energy conservation and production, lighting and daylighting design, natural ventilation, concept design and fabrication of light emitting and controlling elements.

**Fabio Viero**, from Manens-Tifs, is Director of Verona business unit and of Building Physics and Sustainability Division. He is LEED AP and BREEAM Assessor and board member of First Q an European network of leading MEP & Sustainability engineering companies totalling more than 2700 engineers and 250MEuro in turnover.



Yuguo Li and Christoph Reinhart are going to focus on urban simulation potential and applications. Susan Ubbelohde will bring her insight into the topic of simulation and building design for high environmental quality. Ardeshir Mahdavi and Fabio Viero will bring their reflections and expertise on the role of the designer and the use of simulation tools to the improvement of building efficiency and sustainability.

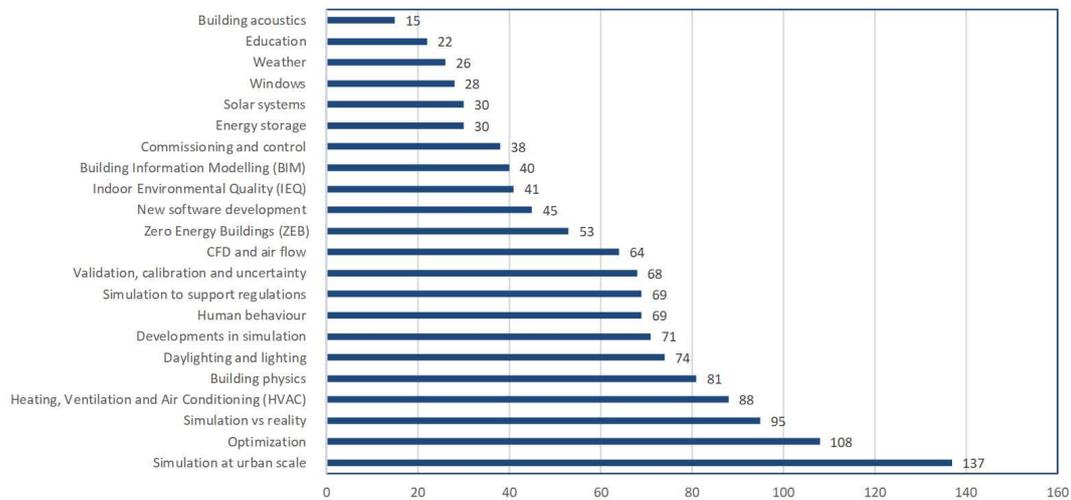
Biographies of keynote speakers are available at <http://buildingsimulation2019.org/keynotes/>.

**Abstract submissions**

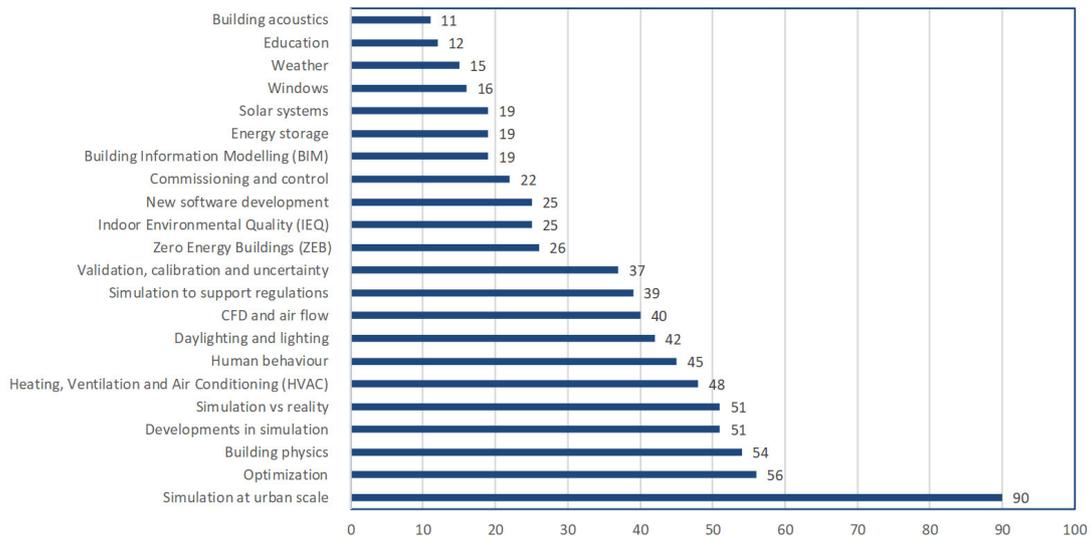
More than 1300 abstracts for research papers, panel discussions and case study have been submitted, and most accepted for development into full papers:

TYPE	ABSTRACTS		RESEARCH PAPERS
	Submitted	Accepted	Submitted
Research papers	1228	1171	762
Case study	63 + 24 (2nd call)	52 + ? (24 under review)	
Panel discussion	11	7	
<b>TOTAL</b>	<b>1326</b>		

Breakdown of BS 2019 submitted abstracts by topic



Breakdown of BS 2019 submitted research papers by topic



**Banquet and events**

A welcome cocktail will be held on Sunday evening (Sept 1st, 2019) at the Angelicum Congress Centre, most probably in the outdoor garden, as an occasion for all participants to meet and interact with each other. This is included in the conference registration fee for all participants and their accompanying persons.

There is an extra fee for other events, including the Conference Dinner. This will be held at Palazzo Brancaccio, a 19th century palace in the centre of the Eternal City, and accompanied by a concert.

Booking is already open through the registration form for Technical Tours:

Sunday 01 September	Thursday 05 September
<p><b>Auditorium Parco della Musica</b></p> <p>The Auditorium Parco della Musica, designed by Renzo Piano, revolves around the main idea of the centrality of music. All spaces, both external and internal, are functional to this idea. Concerts and musical events take place in the three main halls (Santa Cecilia, Sinopoli, Petrassi), but also in the Studio Theatre, in Studies no. 1, no. 2 and no. 3, in the foyer and the cavea. The three main rooms of different size and different functional purpose, can cover all the requested musical needs.</p> <p><b>MAXXI</b></p> <p>With the design of MAXXI, the recently deceased architect Zaha Hadid goes beyond the idea of the museum as building. The complexity of the volumes, the curvilinear walls, the variation and the interweaving of the proportions result in a very complex spatial and functional plot that visitors can cross by following different and always unexpected paths.</p>	<p><b>Fuksas Nuvola Congress Center</b></p> <p>With the construction of the NUVOLA (the Cloud) in the “boxed” space of the outer Teca (display case), the Architect Fuksas highlights the comparison between the freedom of spatial articulation with no rule whatsoever and a geometrically defined form. The NUVOLA is, undoubtedly, the architectural element most characteristic of the entire project: the steel rib structure, creating an extraordinary visual effect, is covered by a transparent sheet of 15,000 square meters.</p> <p><b>Paul VI Audience Hall – Solar Roof</b></p> <p>The Paul VI Audience Hall (Italian: Aula Paolo VI) also known as the Hall of the Pontifical Audiences is a building in Rome with a seating capacity of 6.300, designed in reinforced concrete by the Italian engineer Pier Luigi Nervi and completed in 1971. On 25 May 2007, it was revealed that the roof of the building was to be covered with 2.400 photovoltaic panels, generating sufficient electricity to supply all the heating, cooling and lighting needs of the building throughout the year. The system was donated by SolarWorld, a German manufacturer, and valued at \$1.5 million. It was officially placed into service on 26 November 2008, and was awarded the 2008 European Solar Prize in the category for “Solar architecture and urban development”. From the roof it is possible to have a wonderful view over the square and the dome of St. Peter’s Basilica.</p>

## Forthcoming events

... and for cultural tours and visits for participants and accompanying persons:

The Jewish Ghetto	Foro di Augusto Guided Tour	Foro di Cesare Guided Tour
<p>An accompanied walk from Castel Sant’Angelo, way through Via dei Banchi Vecchi, Campo dei Fiori, Piazza Farnese and Piazzetta Mattei with explanation of the city. This tour will offer the opportunity to visit the Jewish Ghetto with its complex variety of history, architecture and tradition, ending with a typical dinner. The Jewish Ghetto is one of the most fascinating areas of Rome, one with the highest number of examples of Roman and Medieval architecture – out of the very few – that still stand in Rome.</p>	<p>While spacing on various aspects of the Roman world, the story is still anchored to the site of Augustus, creatively using the remains of the Forum to try to let the stones “speak” for themselves. Besides the faithful reconstruction of the area, with special effects of all kinds, the story focuses on the figure of Augustus, whose giant statue, over 12 meters high, dominated the area next to the temple. The spectators will be accompanied by the voice of Piero Angela and by some amazing videos and reconstructions that show places as they looked like at the time of Augustus: a thrilling representation which combines historical and scientific rigor with entertainment.</p>	<p>The visit seeks to evoke the role of the Forum in the life of the Romans but also the figure of Julius Caesar. To accomplish this great work, Caesar had to expropriate and demolish an entire neighborhood. Caesar also wanted that the new headquarters of the Roman Senate, the Curia, was built right next to his court. A building that still exists and that, through a virtual reconstruction, you can review as it appeared at that time. The story narrated by Piero Angela, accompanied by reconstructions and videos, starts from the history of the excavations made for the construction of Via dei Fori Imperiali, when an “army” of 1,500 construction workers were mobilized in an unprecedented work: razing to the ground an entire neighborhood and digging out the area until the level of ancient Rome was reached.</p>

### IBPSA-Italy Award for the best student paper

There is another great opportunity for students at BS 2019: IBPSA-Italy has sponsored an Award for the best student paper. 6 finalists will be notified by the end of May 2019 and will have travel expenses refunded up to 800 Euro, and the winner will receive a prize of 1200 Euro.

More than 100 candidates sent nomination letters via a supervisor and have since submitted a paper that is now under review.

### Further news

To keep up to date with future developments, follow the conference on:



[www.facebook.com/BS2019Rome](http://www.facebook.com/BS2019Rome)



[www.linkedin.com/showcase/building-simulation-2019-rome](http://www.linkedin.com/showcase/building-simulation-2019-rome)

or subscribe to the BS 2019 Rome Newsletter at <http://eepurl.com/dC3H9n> ■



**07 November 2019**  
**Bratislava, Slovakia**  
[www.cab.sk/be2019/](http://www.cab.sk/be2019/)

### **enviBUILD 2019**

The 14th International enviBUILD Conference will be held in the historic city of Bratislava, Slovakia, on 7 November 2019. This year's event will be organized by a team of the Department of Building Construction of the Faculty of Civil Engineering at the Slovak University of Technology in Bratislava under the chairmanship of Professor J. Hraška. An overview of past enviBUILD Conferences is available at [www.cab.sk/pastevents.html](http://www.cab.sk/pastevents.html).

The main focus of enviBUILD 2019 will be on building physics and applied technology in architecture, building construction and environmental engineering.

### **Call for Submissions**

The international scientific committee invites contributions of original papers and posters that address the following themes and topics:

- Indoor Environment and its Hygienic Aspects
- Sustainable Buildings and Environmental Assessment
- Building Materials and Components
- Energy Performance of Buildings
- Hygrothermal Performance of Buildings
- Responsive and Adaptive Building Envelopes
- Ventilation of Buildings
- Daylighting
- Building Acoustics
- Energy and Indoor Environmental Simulation

The conference language is English. Papers will be peer-reviewed. The best peer-reviewed original papers will be published in the Slovak Journal of Civil Engineering, a WoS indexed journal. All the other papers accepted will be published in the Conference proceedings, which will be indexed by major indexing services and search engines and their abstracts made available in both electronic and printed versions.

### Key dates

Abstract submission/registration	15 May 2019
Abstract acceptance	30 May 2019
Paper submission	31 August 2019
Paper reviews	30 September 2019
Submission of revised papers	31 October 2019

Details of the registration and submission process, and fees, are available at [www.cab.sk/be2019/](http://www.cab.sk/be2019/). ■



### Building Simulation Cairo 2019: 2nd IBPSA-Egypt conference

**28-30 November  
2019**  
**Cairo, Egypt**  
[www.bscairo.com](http://www.bscairo.com)

IBPSA-Egypt is proud to be holding its second international conference in Cairo during November, building on the success of its first, held six years ago. BS CAIRO 2013 attracted over 300 delegates and about 120 paper submissions, from which about 60 were selected by peer review, providing a forum for researchers, practitioners and educators to present and discuss the most recent innovations, trends, experiences and methods in the broad research field of environmental design, and immediately establishing BS CAIRO as the premier Building Simulation conference in Egypt and the Middle East. BS CAIRO 2019 will be hosted by The American University in Cairo.

The conference themes are:

- Sustainable Construction Materials
- Daylighting & Acoustics
- Energy Efficiency
- Environmental Design Education

## *Forthcoming events*

- Optimization & Parametric Techniques
- Human Behavior
- Urban Environment
- Indoor Environmental Quality
- Simulations in Rating Systems
- Renewable Systems
- CFD and Air Flow
- Building Information Modeling

Selected papers will be submitted for publication in the Journal of Building Performance Simulation (JBPS), and the conference proceedings submitted for indexing by SCOPUS.

### **Key dates**

Deadline for submission of full papers	01 May 2019
Notification	01 August 2019

Further information and a detailed programme will be published soon. ■

---

# Software news

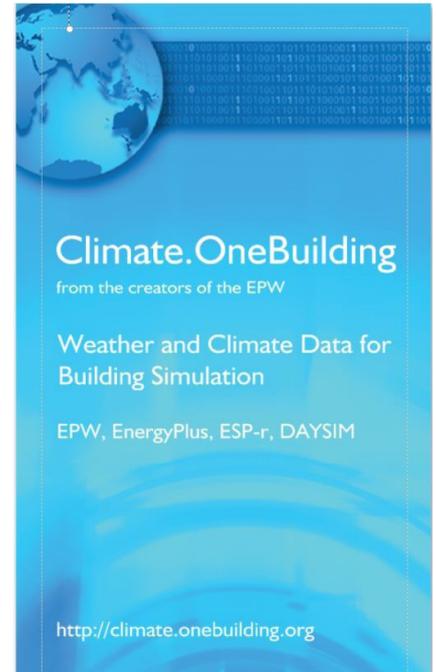
---



## New simulation weather data for for the Middle East, Russia, Central Asia, East Asia, and Europe available from Climate.OneBuilding.Org

Climate.OneBuilding.Org has been busy since the last *ibpsaNEWS*! Since the October 2018 *ibpsaNEWS*, we have added new climate data (TMYx) for more than 5,700 locations for the following countries:

- Middle East: United Arab Emirates, Bahrain, Iran, Iraq, Oman, Qatar, Saudi Arabia, Yemen, Israel, Jordan, Palestine, Syrian Arab Republic
- Russia (both Europe and Asia)
- Central Asia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, Uzbekistan
- East Asia: China, including Hong Kong and Macau (also listed separately), Taiwan, North Korea, South Korea, Japan
- Europe: Aland Islands, Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Denmark, Estonia, Faroe Islands, Finland, France, Germany, Gibraltar, Hungary, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Montenegro, Netherlands, North Macedonia (former YRO Macedonia), Norway, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Svalbard and Jan Mayen, Sweden, Switzerland, Ukraine



TMYx are typical meteorological year data derived from hourly weather data through 2017 in the ISD (US NOAA's Integrated Surface Database) using the TMY2/ISO ISO 15927-4:2005 methodologies. There may be two TMYxs for a location, e.g., Moscow-Sheremetyevo AP, Russia: RUS\_MOS\_Moscow-Sheremetyevo.AP.275155\_TMYx and RUS\_MOS\_Moscow-Sheremetyevo.AP.275155\_TMYx.2003-2017. In these cases, there's a TMY for the entire period of record and a second TMY for the most recent 15 years (2003-2017). Not all locations have recent data.

Adding these data to the earlier (April/October 2018) sets for the Americas, Antarctica, Africa, So Asia, and SW Pacific, Climate.OneBuilding.Org now provides climate TMYx data at no cost for more than 9,900 locations and another 3,200 from other data sources worldwide. This data set completes all worldwide locations except for the USA and Canada – which are next! All data have been through extensive quality checking to

identify and correct data errors and out of normal range values where appropriate. Each climate location .zip contains: EPW (EnergyPlus weather format), CLM (ESP-r weather format), and WEA (Daysim weather format) along with DDY (ASHRAE design conditions in EnergyPlus format), RAIN (hourly precipitation in mm, where available), and STAT (expanded EnergyPlus weather statistics).

For more information or to download any of the weather data (at no cost) go to <http://Climate.OneBuilding.org>. ■

## DesignBuilder v6.0

DesignBuilder v6 has recently been released, adding new features that both extend DesignBuilder’s capabilities and improve modelling workflow and productivity. The main new v6 features and improvements are summarised below, and more detail is available in DesignBuilder’s *What’s New in v6* webpage.

### Modeller and visualisation

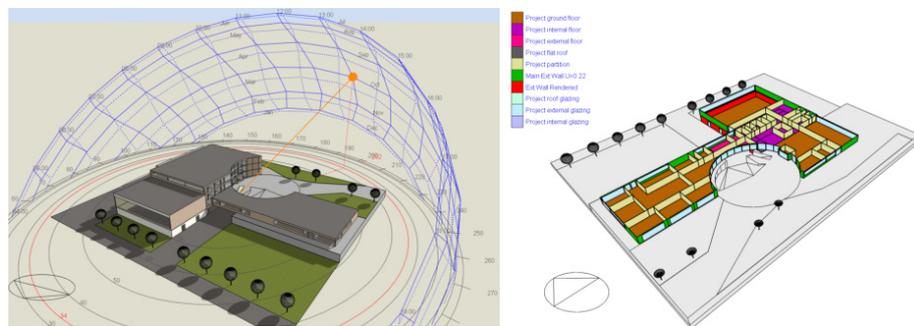


Figure 1: Graphical display of construction and glazing model data

The modeller and visualisation tools sit at the heart of the DesignBuilder workflow, and v6 sees some significant improvements in this area with several new data management and visualisation tools added:

- The Model data grid tool has been updated to allow data to be edited. Designers can also now define their own views on the data and there is an option to export the data to spreadsheet, modify and import back to the model. The tool is ideal for fast bulk editing of data and QA processes.
- Graphical display of all constructions and glazing used in the model allows visual checking and reporting where each construction and glazing system is applied in the model.
- Graphical display of calculated natural ventilation airflows helps designers to view the airflows through internal and external windows, vents, doors etc. at the whole building level and right down to individual surfaces.
- Rendered visualisations now allow lines to be used to more clearly represent surface edges leading to sharper-looking graphical outputs.

## Optimisation, uncertainty and sensitivity analysis

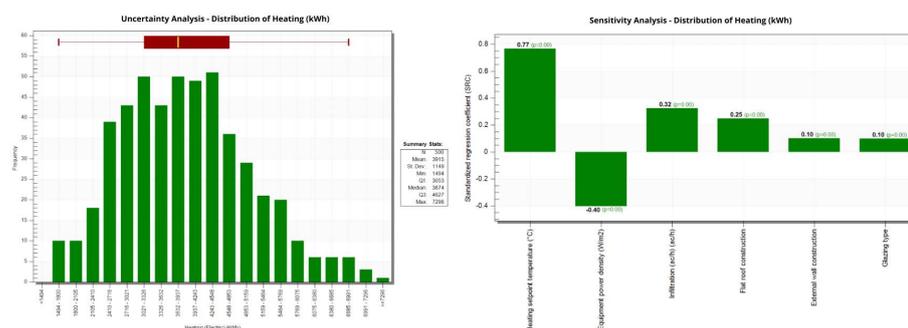


Figure 2: UA/SA histograms with summary statistics

DesignBuilder has released the first commercially-available Sensitivity and Uncertainty Analysis tools. These enable designers to establish which design variables have the greatest and least impact on key simulation results, helping them to quantify confidence levels in simulation outputs. This aids the systematic assessment of design risk and evaluation of those aspects with the greatest influence on building performance.

These tools will be especially useful to those wanting to minimise design risk, especially if involved in higher-risk activities such as Energy Performance Contracting. Some typical example applications for uncertainty and sensitivity analysis are:

- Quantifying the variation in outputs alongside corresponding changes in inputs
- Providing a preliminary risk assessment on meeting design objectives
- Reducing the simulation time in an optimisation study by identifying any unimportant variables and excluding them from the optimisation search space
- Identifying aspects of the building which have a high probability of creating operation stage performance issues, aiding the model calibration process.

By applying a “probabilistic” definition of input design variables, the reports provide a strong support to design and operational decision making. The key features are:

- Uncertainty and Sensitivity analysis results are presented as histograms along with summary statistics. Reports include clear text descriptions to help interpret the results.
- Sensitivity analysis is undertaken using multivariate linear regression, where regression parameters and standardized coefficients (a sensitivity measure) are calculated for every output variable.
- Input design variable sampling based on probability distribution curves. More than 20 discrete and continuous distributions are available for selection and customisation.
- Various input design sampling methods include: Random, Random Walk, Latin-Hypercube, Sobol and Halton.

DesignBuilder v6 also includes 3 powerful new types of custom variable to give complete control of the parametric variations applied to the model as part of optimisation, uncertainty and sensitivity analyses.

## Daylighting

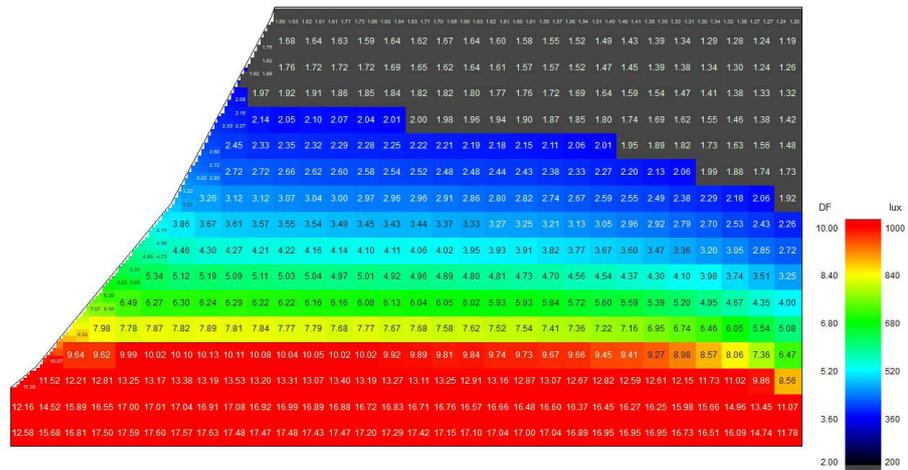


Figure 3: Daylighting maps with grid cell labelling

DesignBuilder has embarked on a major upgrade of our daylighting system. The most important new daylighting features included with v6.0 are:

- Improved daylighting maps can now include numeric text labels for each grid cell and a range of options for colour palettes.
- Radiance illuminance simulations are now run in parallel, significantly reducing wait times for larger models.

## Simulation



Figure 4: EnergyPlus Summary Results displayed graphically by the Results Viewer

Hundreds of improvements have been made to the EnergyPlus simulation tools included with v6. The most important additions include:

- The Results Viewer has been updated to include options to view summary results tables as histograms, and can also display results for multi-year simulations.

- EnergyPlus v8.9 is the target version.
- Latest Phase Change Materials (PCM) with hysteresis allow more accurate modelling of this innovative lightweight solution for adding thermal mass to buildings.
- Simulations can be run for multiple years helping improve accuracy for very high mass cases such as ground domains and ground heat exchangers.

## HVAC

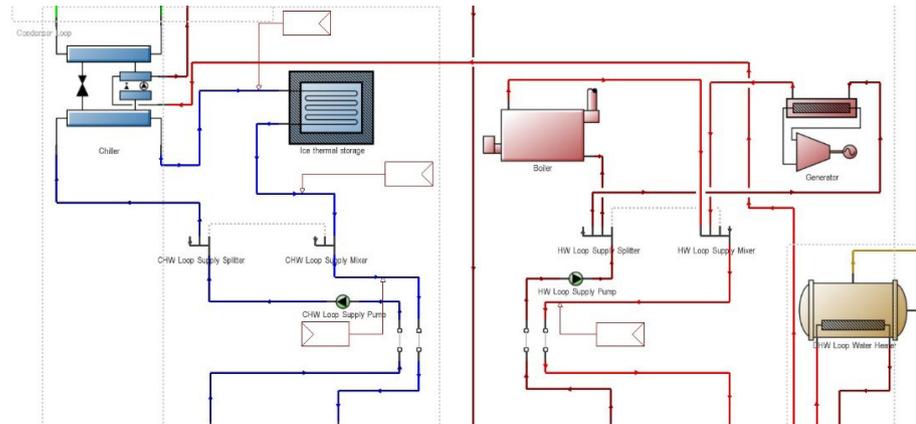


Figure 5: Trigeneration with absorption chillers and ice thermal storage

Several new HVAC components have been added in v6, including:

- Co-generation equipment (CHP) with options for internal combustion engine and micro turbine configurations. Trigeneration is also possible by combining generators with absorption chillers.
- Ice thermal storage and additional plant operation schemes allow off-peak electricity to charge thermal stores.
- Variable speed fan cooling towers.
- Improvements to evaporative coolers.

## Enhanced extensibility

DesignBuilder has always provided a relatively open platform with full access to simulation inputs, outputs, EMS runtime scripting tools and EnergyPlus source code. The new release opens things up even further with new API and Python scripting tools:

- An API for plugins and scripts linking to the full DesignBuilder object model and allowing an unlimited range of custom calculations, reports and model processing to be added by users and 3rd party developers.
- Python scripting enabling simulation inputs and outputs to be further processed before and after simulations based on scripts that you write.

DesignBuilder would be very interested to hear from designers how they have used these extensibility tools to customise the software to meet their exact needs!

```

from eppy import modeeditor
from eppy.modeeditor import IDF
IDF.setidname(iddfilename)
idf1 = IDF(idffile)

# List all the "People" objects
people_objects = idf1.idfobjects['PEOPLE']

# Loop through the list of "People" objects and
# override "Clothing_Insulation_Calculation_Method" field
for people in people_objects:
    if "DynamicClothing" in people.Name:
        people.Clothing_Insulation_Calculation_Method = "DynamicClothingModelASHRAE55"

# Add a new output to be reported in the eso file
idf1.newidfobject("OUTPUT:VARIABLE",
                 Key_Value="*",
                 Variable_Name="Zone Thermal Comfort Clothing Value",
                 Reporting_Frequency="Hourly")

idf1.save()

```

Figure 6: New Python scripting tools

### Webinar on new v6 features

DesignBuilder ran a live webinar to illustrate the most important new features described above. You can still register to watch that recording here: <https://register.gotowebinar.com/register/5125148449966579212> ■

### EQUA releases IDA Indoor Climate and Energy (ICE) training packages



EQUA has released a series of IDA Indoor Climate and Energy (IDA ICE) training packages, targeted at university teaching in (for example) energy systems, building physics, HVAC and building performance. The new packages include ready-made IDA ICE lectures and exercises, making it easy to get started quickly, even for educators with no prior experience in teaching IDA ICE.



Three packages are available, at Basic, Intermediate and Advanced levels. Each level consists of several courses, and each course contains several lesson modules. As the material is module based, it is possible to customize the content and tailor the training so that it fits any course plan and any time schedule. Examples include:

- Getting started
- Room
- Ventilation
- Heating and cooling
- Windows
- Geometry
- Building envelope
- Daylight
- Air handling units
- Controls
- Plant modelling

IDA ICE Educational Classroom and Department licenses allow use for both teaching and research purposes. Students can also use the licenses on their own computers for home assignments and thesis work.

For more information about these packages and educational licenses, visit [www.equa.se/en/educational](http://www.equa.se/en/educational). For questions, contact EQUA at [info@equa.se](mailto:info@equa.se) ■

## The HIT2GAP project



### Background

HIT2GAP is a four-year project which began in September 2015 and will run to September 2019. Its aim is to reduce the gap between the theoretical energy performance of buildings and the actual consumption in use.

A typical office building will use much more energy than the design team and client expected at the design and construction phases. HIT2GAP is seeking to reduce the gap between the anticipated energy use and what actually happens once a building is occupied. The reasons for 'the gap' are multifarious, ranging from compromises at the design and construction stages, to construction/ detailing and commissioning issues and unexpected user behaviours. Furthermore, renewable energy devices and other building services do not always work well with each other, and this can reduce the overall impact of devices installed to save energy.

HIT2GAP cannot solve all of these problems, and while the project is focused specifically on eliminating energy profligacy in buildings, it also aims to identify other contributory factors.

The main objectives of the project are to:

- reduce the energy performance gap, by focusing on the operational phase of buildings;
- propose a new paradigm for the development of energy management platforms in buildings, integrating simulation modelling, monitoring and behaviour impacts; and to
- provide a marketable, smart platform that can be adopted in any building or group of buildings.

The project was funded through the H2020 EU programme in 2015 and is now in its final year.

### The Project

The 21 HIT2GAP partners (commercial and academic) are working to create a new kind of smart energy management platform (an integrated technology concept), which is

both generic, modular, and interoperable and which could be used for a wide variety of buildings and groups of buildings. The approach taken is to build an open, 'plug and play' application-based platform to support a new generation of Building Management Systems (BMS). By this mechanism, it is intended to support user requirements in buildings that are widely diverse. The approach will allow the platform to evolve and remain up-to-date as new and emerging technologies emerge.

The hope is that the results generated by the HIT2GAP project in terms of the reduction in differences between modelled and actual building behaviour may also be of value to the design and construction phases of future buildings.

HIT2GAP aims to build a new generation of building monitoring and control tools based on advanced data treatment techniques, allowing new approaches to assess energy performance, in order to gain a better understanding of the building's behaviour and the role of occupants, ultimately leading to better performance.

HIT2GAP will enhance current BMS functionalities by:

- using alternative sensors and meters (e.g., smart phones, laptops, tablets, smart watches, etc.) to allow the monitoring of spaces without traditional sensors or to extract additional information beyond existing data sources (i.e. disaggregation);
- integrating Data Mining techniques for Knowledge Discovery (DMKD) as a core module for building performance assessment and understanding, and associated predictive maintenance services;
- adding occupants' behaviour to the equation. Taking into account that users play a significant role in building performance, it will be possible to better understand building performance, enhance predictions and control and optimise energy consumption and occupants' comfort, health and well-being;
- providing continuous performance evaluation and improvement based on measured, historical and simulated data coming from a new generation of simulation services;
- integrating demand/supply management tools for building-integrated and community renewable energy sources; and
- adapting the available visualisation interfaces to specific user needs (technical and non-technical profiles) to deliver the information effectively.

### **Core Platform and Data Collection**

The basic H2G structure is as outlined below:

- a **generic, open information platform** (the HIT2GAP Core) that allows connection and communication with HIT2GAP modules, external devices and user interfaces - to collect and store information about a building;
- as well as data storage, the **platform** also provides basic functionalities such as data structuring, data pre-processing (consolidation and alerts, conversion, arithmetic functions, detection of outliers and missing data, extrapolation).

- **simulation modelling**, to establish energy consumption benchmarks (forecasting, benchmarking);
- a variety of **modules** to inform users, energy managers and engineers, presented in a user-friendly format; plus
- **third-party modules** – by providing a smart open platform, external developers will be able to offer up new modules to the core.

The solution will provide:

- a free and open source approach to allow continued development and maintenance of the core HIT2GAP platform;
- a minimum viable product definition of the core platform; plus
- modules that enable the platform to perform value added tasks.

To this end, a core data exchange platform is being established to collect and store data from disparate sources, and deliver subsets of these data to a range of applications (services) intended to support facilities management. The ultimate aim is to identify physical interventions that will alleviate operational problems and so reduce the performance gap.

At the core of the approach is a cloud-based data platform that supports an open solution to the integration of third party services addressing building facilities management: ranging from the extraction of performance indications from monitored data, through HVAC system fault detection & diagnosis, to energy use forecasting and options for change appraisal – all aimed at improving operational performance and thereby moving closer to the original design intent. By simplifying the procedure for new service connection, the platform will support initiatives by small and medium sized companies, who face major challenges to penetrate a market dominated by large providers of building energy management systems.

**Figure 1: Elements of the Hit2Gap platform**

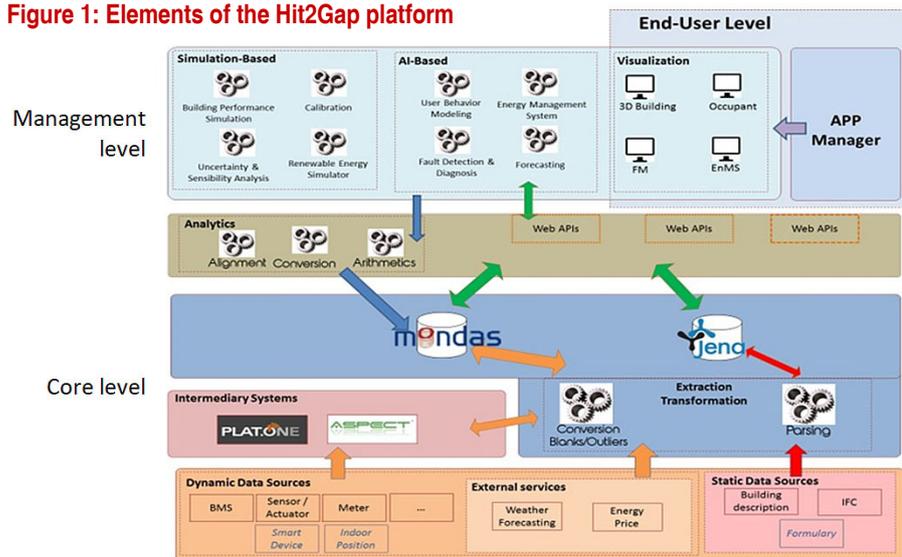


Figure 1 depicts the elements of the Hit2Gap platform and the services that may be invoked on the basis of data ‘mash-ups’ delivered on request to a particular service. The platform comprises three distinct levels:

- **field level**, encapsulating sensors and systems for data acquisition, with support for a variety of data acquisition protocols;
- **core level**, handling data exchange between modules, storing data from measurements and providing basic functionalities (e.g. data anonymization and pre-processing); and
- **management level**, comprising services that help to improve operational performance.

There are two approaches to collection and uploading of data to the platform. These are also outlined in Figure 1. The first approach is to use a ‘middleware platform’ to provide a wide set of data services and a set of Application Programming Interfaces (API) that guarantee the necessary access points for the application to access and use collected data. This has been achieved by using a commercial IoT Enterprise Grade platform (Plat. One) which provides the necessary data connector to each building. By this means, users of HIT2GAP transfer data from their system to the platform, whether they are using existing or new protocols. The second approach is by direct connection from a BMS to HIT2GAP whereby the platform provides all the necessary tools to integrate directly with a BMS system or other data sources, avoiding any intermediate level.

### Conclusions

The Hit2Gap project is in its final year and this paper has presented developments to date regarding the connection of cloud-based simulation and other services to a core data. The workflow defined for these simulations (i.e. model acquisition, calibration, performance assessment) proved to be adequate to support the development of decision support systems for building operation.

The use of a new model calibration tool, Calibro, provides an automated approach to BPS model calibration. This feature represents a major shift from current practice in the field and provides a contribution to the use of simulation in the operational stage of buildings.

The use of automatic performance assessment provides access to sophisticated simulation scenarios with minimum user input. The approach does however pose new challenges as it requires the embedding of domain knowledge alongside simulation procedures to facilitate analysis that supports decision-making. Service users can concentrate on building performance issues rather than expending effort and resources on complex ad hoc model calibration and simulation process control.

The openness of the Hit2Gap platform supports the deployment of new simulation services, fostering the development of functionalities and applications tailored to address challenges in the improvement of the operation performance of large estates.

### Acknowledgement

The authors are indebted to colleagues participating in the simulation sub-group of Hit2Gap for their inputs into the design of the simulation capabilities of the system. The Hit2Gap project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 680708.

This paper was compiled from text from the following sources and reference materials from various HIT2GAP project and review meetings:

1. HIT2GAP website – [www.hit2gap.eu](http://www.hit2gap.eu)
2. Hit2Gap Project: Highly Innovative building control Tools, Tackling the energy performance gap, R2M - Andrea Costa, Marco Pietrobon, and Thomas Messervey – paper submitted to CLIMA 2019 – Bucharest (May 26 – 29) currently under review.
3. A 'big data' approach to the application of building performance simulation to improve the operational performance of large estates - Energy Systems Research Unit, University of Strathclyde - Joe Clarke, Daniel Costola, Andrew Cowie, Jon Hand, Nick Kelly, Filippo Monari – Proceedings of the 15th IBPSA Conference San Francisco, CA, USA, Aug. 7-9, 2017, pp 2430-2437, ISBN: 978-1-7750520-0-5

### References

1. International Organization for Standardization, SO 50001 - Energy management (2018)

The Hit2GAP Partners are:



For more detailed information about HIT2GAP visit [www.hit2gap.eu](http://www.hit2gap.eu). ■

# IBPSA announcements

---

## IBPSA 2019 Student Modelling Competition: SIMULATION PENTATHLON

Dear simulators - this is your challenge!

As part of the 16th IBPSA International Conference and Exhibition ([www.buildingsimulation2019.org](http://www.buildingsimulation2019.org)), IBPSA has organized a student modelling competition. 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 the brief of this competition as part of their teaching material.

The 2019 Modelling Competition is set up as a SIMULATION PENTATHLON. Nowadays simulation is used in many fields to control different aspects of building design, such as limitation of energy demand, improvement of indoor environmental quality, or optimization of building management and controls. Moreover, simulation can be applied to support not only the design of new buildings but also the refurbishment of existing ones. This is especially important for European Countries because in Europe, about 35% of buildings are over 50 years old and almost 75% of the building stock is energy inefficient. In relation to retrofit design, building performance simulation can help designers to compare the effects of intervention alternatives on different parameters, i.e. cost, energy savings and indoor environmental quality. In this framework, the modelling competition will be organized in five sections: energy simulation, thermal comfort, daylighting and visual comfort, multi-objective optimization and retrofit design.

The object of the competition is the simulation of a seventeenth-century palace in Rome, Italy, now hosting classrooms and offices.

If you are a team of simulators with different competencies, this is your chance to test these competencies in our five sections of the pentathlon.

Two finalists will be notified by 1 June 2019 and will receive free registration to the conference plus up to EUR2000 in reimbursed travel expenses. Both will be expected to attend the Building Simulation 2019 conference and to prepare a short presentation and produce a poster for display. Poster requirements and travel/registration information for the finalists will be provided at that time. An overall winner will be selected based on the conference presentation and poster, and announced at the conference.



More information is available at <http://buildingsimulation2019.org/competitions>.

### Key dates

Announcement of brief	1 November 2018 <i>date already passed</i>
Entrants notify their intent to submit an entry	31 January 2019 <i>date already passed</i>
Deadline for completed entries	<del>28 April 2019</del> <i>now extended to 12 May 2019</i>
Finalists notification	1 June 2019
Winner announced at BS2019 Conference in Rome, Italy	2-4 September 2019

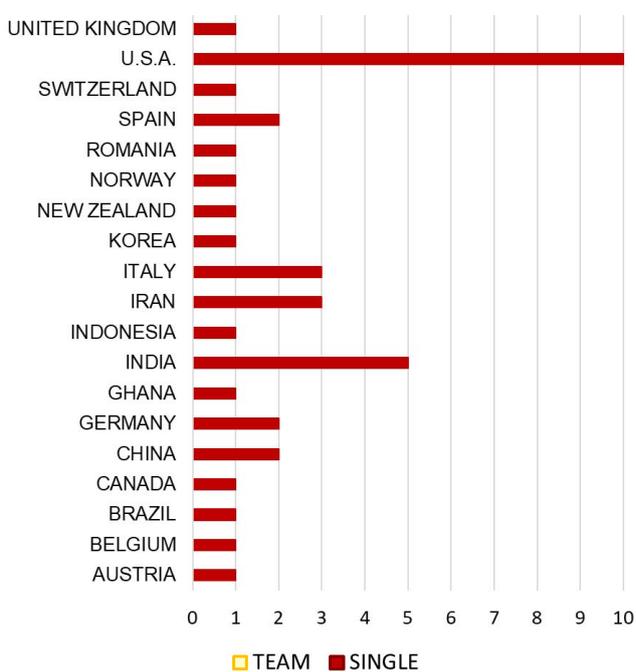
**Update from Francesca Cappelletti, competition commission member**

On 31 January 31st we had the first deadline for notification of interest in entry. We have now received about 40 notifications from 19 Countries and 5 Continents. About a half of participants are teams of two to five students.

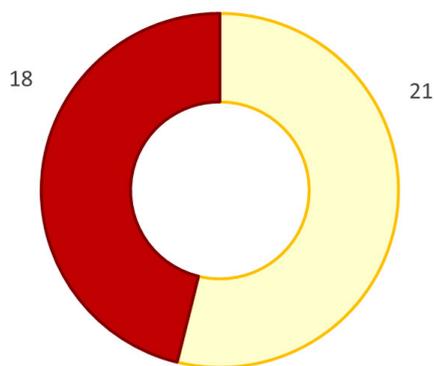
There’s still time to participate since the final submission of the report has been postponed to May 12th 2019.

Two finalists will be notified by June 1st, 2019 and will receive free registration to BS2019 plus up to 2000 Euro in reimbursed travel expenses. The two finalists will be expected to attend the Building Simulation 2019 conference and to prepare a short presentation and produce a poster for display at BS2019. Based on the conference presentation and poster, an overall winner will be announced at the conference and will receive a copy of the book on Building Performance Analysis by Pieter de Wilde, kindly offered by Wiley. ■

**Figure 1: Number of notifications by country**



**Figure 2: Notifications percentage presented by teams or by singles**



*There is another great opportunity for students this year: IBPSA-Italy is sponsoring an Award for the best student paper at BS 2019 - see Forthcoming events, page 21 - Ed.*

## Special issue of the Journal of Building Performance Simulation

A special issue of the Journal of Building Performance Simulation has been announced. *Building Performance Simulation and the User* will also form the focus of the IBPSA 2019 Webinar series.

Guest edited by Drs Clarice Bleil de Souza and Simon Tucker, this Special Issue introduces emerging perspectives and initiatives on 'user-centric' approaches to building performance simulation (BPS), discussing the associated research directions and possibilities on how to better integrate the use and development of simulation tools with different user goals and ways of working. The Special Issue includes six papers which address the following topics:

- Goals and tasks of BPS users, i.e. what BPS is used for and why
- The different levels of knowledge needed to use BPS
- The interaction of users with BPS

The special issue is supported by a webinar series which begins with a guest editorial and introduction to the topic (webinar presented on 21 February 2019) followed by six further webinars to be delivered by the authors of the papers included in the special issue.

All webinars can either be watched live or in their recorded version, which may be accessed at [www.ibpsa.org/?page\\_id=695](http://www.ibpsa.org/?page_id=695).



**Clarice Bleil de Souza** is Associate Professor (Senior Lecturer in UK terminology) at the Welsh School of Architecture (Cardiff University), teaching architecture technology, research methods and coordinating MSc dissertations. Her research interests lie in different aspects of design decision making: the use of digital tools in the design process, user-centric simulation, and machine learning in design and community based design.



**Simon Tucker** is Associate Professor (Senior Lecturer in UK terminology) at Liverpool John Moores University teaching building physics, environmental design, and architectural design studio. His research interests are in low carbon and sustainable building design, design methods, user oriented building simulation, and the performance of ecological building materials.

The papers and authors in the special edition will be:

*A new approach to performance-based building design exploration using linear inverse modeling*

Roya Rezaee, Jason Brown, John Haymaker & Godfried Augenbroe

Author for correspondence: [rrezaee@gatech.edu](mailto:rrezaee@gatech.edu)

*Opportunities and pitfalls of using Building Performance Simulation in explorative R&D contexts*

R.C.G.M. Loonen, M.L. de Klijn–Chevalerias, J.L.M. Hensen

Author for correspondence: [r.c.g.m.loonen@tue.nl](mailto:r.c.g.m.loonen@tue.nl)

*Performer, consumer or expert? A critical review of building performance simulation training paradigms for building design decision-making*

Sara Alsaadani & Clarice Bleil De Souza

Author for correspondence: [sara.alsaadani@aast.edu](mailto:sara.alsaadani@aast.edu)

*IBPSA announcements*

*Learning the fundamentals of building performance simulation through an experiential teaching approach*

Ian Beausoleil-Morrison

Author for correspondence: [ian\\_beausoleil-morrison@carleton.ca](mailto:ian_beausoleil-morrison@carleton.ca)

*An instructional design for building energy simulation e-learning: an interdisciplinary approach*

Elise Mendes & Nathan Mendes

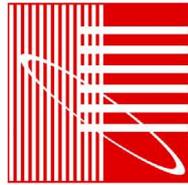
Author for correspondence: [elise@ufu.br](mailto:elise@ufu.br)

*Effects of real-time simulation feedback on design for visual comfort*

Nathaniel L. Jones & Christoph F. Reinhart

Author for correspondence: [nljones@mit.edu](mailto:nljones@mit.edu) ■

---



**IBPSA  
SUPPORTING  
MEMBER**



## Benefits of **SUPPORTING MEMBERSHIP**

- ☑ **Discounts.** Reduced-price print and online subscriptions to the Journal of Building Performance Simulation
- ☑ **Recognition.** Use the IBPSA Supporting Member logo in email signatures, web sites, and business cards
- ☑ **Support.** Help IBPSA activities

---

Details, prices, and sign up: visit <http://www.ibpsa.org/SupportingMember>

More information about IBPSA: <http://www.ibpsa.org>

## **Building Performance Analysis, by Pieter de Wilde**

Building Performance Analysis is a new book by Pieter de Wilde, published by Wiley. After Building Performance Simulation for Design and Operation, sometimes affectionately known as 'the orange book', Building Performance Analysis is the second book to be endorsed by IBPSA.

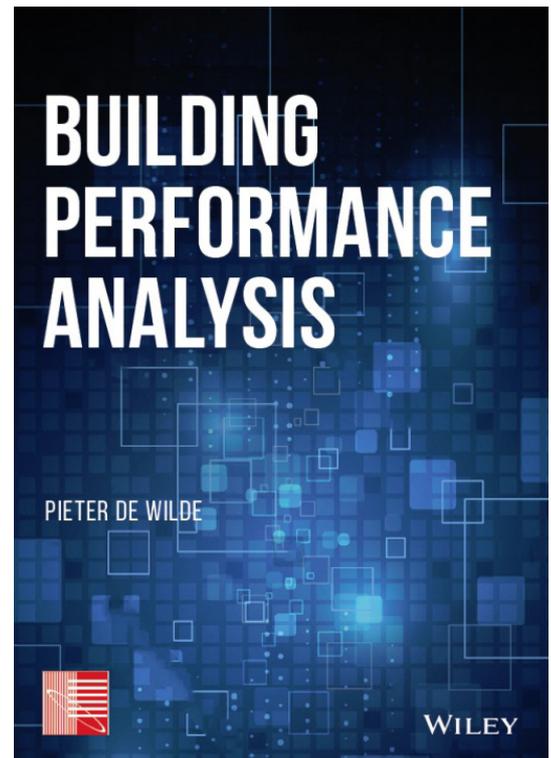
The key topic of the book is building performance. While a lot has been published on the subject of simulation, the application area is often taken for granted within the IBPSA community. Yet to do meaningful simulations, one of the hardest challenges is to define the question that is to be answered. The answer to deep questions about building performance may be gained by simulation, but there are other approaches available as well, especially in the realm of physical measurement. These are also covered in the book; hence the use of the word analysis in the title.

Building Performance Analysis offers a comprehensive and systematic overview of the concept of building performance analysis, bringing together many existing notions and ideas in one single title. It consists of three main parts. Part I deals with the foundations of building performance, Part II deals with performance assessment, and Part III with the impact of applying building performance analysis throughout the building life cycle. The book concludes with an epilogue that presents an emerging theory of building performance analysis. Building Performance Analysis is a substantial book: it has 11 chapters, 600 pages, and includes over 1600 references.

Building Performance Analysis is written for the building science community, both from industry and academia. Amongst others, it aims to make the following contributions to the field:

- 1** It reviews the significant body of knowledge on building performance that already exists, offering a point of entry to this complex subject matter for those who are new to the field.
- 2** The book emphasizes the fact that building performance deals with a wide variety of performance aspects. In doing so it challenges the community to address some of the aspects that get less prominence in the literature.
- 3** The book goes beyond simulation as a tool for building performance analysis: it also discusses physical measurement approaches, expert judgment, and stakeholder evaluation. It offers a review of the many analysis approaches available in each of these categories.
- 4** The emergent theory in the epilogue is intended as a key resource for those wishing to do further work in the field and needing to develop research questions and hypotheses. The emergent theory is very much intended as subject matter for discussion, debate, and deeper exploration.

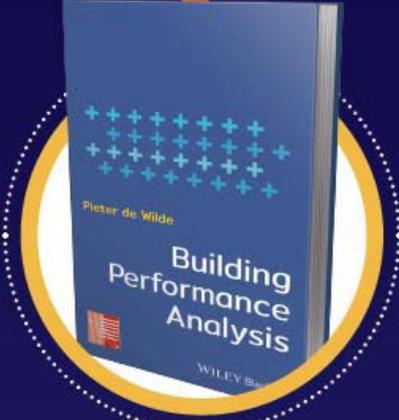
The book has a foreword by Godfried Augenbroe, long-term mentor of the author. The endorsement by IBPSA is written by Malcolm Cook, chair of the IBPSA Publication Committee. Further endorsements stem from colleagues who have helped by reviewing drafts of the work: Georg Suter, Wei Tian, Cheol-Soo Park, Dru Crawley and Ruchi Choudhary.



Further information is available on the internet through the following resources:

- A webinar specifically about the book, presented by the author on 31 May 2018 and posted on the IBPSA University YouTube channel ([www.youtube.com/watch?v=xPx-oWJ0K3k](http://www.youtube.com/watch?v=xPx-oWJ0K3k))
- The inaugural professorial lecture of Pieter de Wilde, which covers the same subject area of building performance analysis ([www.youtube.com/watch?v=85QpbfwoRQ0](http://www.youtube.com/watch?v=85QpbfwoRQ0))
- The author's website at [www.bldg-perf.org](http://www.bldg-perf.org).

The book can be purchased directly from the publisher, via the major online retailers, and of course via your local bookseller. For questions and feedback, please email the author at [pieter@bldg-perf.org](mailto:pieter@bldg-perf.org). ■



# Building Performance Analysis

Pieter de Wilde

Improved building performance is a key goal for all building owners, be it energy efficiency, indoor air quality, productivity or user comfort. In the context of increasingly scarce resources, these aims place significant demands on the design, construction and operation of new and existing buildings. With the emergence of big data and corresponding analysis techniques, building owners and operators will have access to huge amounts of information, yet the performance gap between predictions (by simulation and extrapolation of data) and measurements remains significant.

The purpose of *Building Performance Analysis* is to explore and bring together the existent body of knowledge on building performance analysis. In doing so, it provides a working definition of building performance, and an in-depth discussion of the role building performance plays throughout the building life cycle. It explores the perspectives of various stakeholders, the functions of buildings, performance requirements, performance quantification (both predicted and measured), criteria for success, and performance analysis. Driving this discussion are the following questions:

- What is building performance?
- How can building performance be measured and analyzed?
- How does the analysis of building performance guide the improvement of buildings?
- What can the building domain learn from the way performance is handled in other disciplines?

In answering these questions the book makes a major contribution to the application of building performance concepts in the operation and management of high performance buildings.

ISBN: 9781119341925  
To be published in April 2018

Explores and brings together the existent body of knowledge on building performance analysis

ConstructionByWiley WB\_Construction

Visit [www.wiley.com/go/construction](http://www.wiley.com/go/construction)

WILEY

## Building Performance Simulation for Design and Operation

Jan L.M. Hensen and Roberto Lamberts

Effective building performance simulation can reduce the environmental impact of the built environment, improve indoor quality and productivity, and facilitate future innovation and technological progress in construction. It draws on many disciplines, including physics, mathematics, material science, biophysics and human behavioural, environmental and computational sciences. The discipline itself is continuously evolving and maturing, and improvements in model robustness and fidelity are constantly being made. This has sparked a new agenda focusing on the effectiveness of simulation in building life-cycle processes.

*Building Performance Simulation for Design and Operation* 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.

Produced in cooperation with the International Building Performance Simulation Association (IBPSA), and featuring contributions from fourteen internationally recognised experts in this field, this book provides a unique and comprehensive overview of building performance simulation for the complete building life-cycle from conception to demolition. It is primarily intended for advanced students in building services engineering, and in architectural, environmental or mechanical engineering; and will be useful for building and systems designers and operators.

### Selected Table of Contents

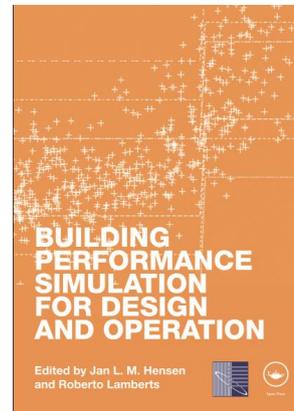
1. The Role of Simulation in Performance Based Building 2. Weather Data for Building Performance Simulation 3. People in Building Performance Simulation 4. Thermal Load and Energy Performance Prediction 5. Ventilation Performance Prediction 6. Indoor Thermal Quality Performance Prediction 7. Room Acoustics Performance Prediction 8. Daylight Performance Predictions 9. Moisture Phenomena in Whole Building Performance Prediction 10. HVAC Systems Performance Prediction 11. Micro-cogeneration System Performance Prediction 12. Building Simulation for Practical Operational Optimization 13. Building Simulation in Building Automation Systems 14. Integrated Resource Flow Modelling of the Urban Built Environment 15. Building Simulation for Policy Support 16. A View on Future Building System Modelling and Simulation

January 2011 | 536pp | Hb: 978-0-415-47414-6 | £65.00

### About the Authors

**Jan L. M. Hensen** (Ph.D. & M.S., Eindhoven University of Technology) has his background in building physics and mechanical engineering. His professional interest is performance-based design in the interdisciplinary area of building physics, indoor environment and building systems. His teaching and research focuses on the development and application of computational building performance modelling and simulation for high performance.

**Roberto Lamberts** 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 the IBPSA, Vice-President of the Brazilian Session and Counsellor of the Brazilian Council for Sustainable Buildings.



Visit our website for more information and online ordering:  
[www.routledge.com](http://www.routledge.com)

 **Routledge**  
Taylor & Francis Group

# 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 *ibpsaNEWS*, 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/?page\\_id=29](http://www.ibpsa.org/?page_id=29).*

## IBPSA-England

A fixed-term position exists for a Research Assistant/Associate at the University of Cambridge to work on Uncertainty Quantification of Built Environments and Energy System Models.

The post holder will develop models to test resilience of energy systems and built environments. The main tasks will include: (a) quantification of key uncertainties in input parameters, (b) investigation of uncertainties due to future changes and short-term events, and their influence on energy systems, (c) investigation of methods to model and propagate uncertainties to quantify resilience of energy systems. The post holder will link energy system models of the built environment to both national and sub-national infrastructure planning. The post holder will be mentored by Dr Ruchi Choudhary (Engineering, Cambridge) who is currently based at the Data-centric Engineering Program of the Alan Turing Institute (ATI) in London.

Further information is available from [www.jobs.cam.ac.uk/job/20637/](http://www.jobs.cam.ac.uk/job/20637/) ■

---

## IBPSA-Netherlands + Flanders

### IBPSA-NVL 2019 Workshop on Quality Assurance of Simulations: “All models are wrong, some are useful”

*Wim Plokker*

On 18 March IBPSA-NVL organized a workshop on the subject of *Quality Assurance of Simulations: All models are wrong, some are useful* at Boydens Engineering in Brussels — a title inspired by George Box and Norman Draper’s insightful comment in their 1987 book *Empirical Model-Building and Response Surfaces*. This was a follow up of the workshop organized last year in Deventer, *Quality Assurance of Simulations of Buildings and Systems for Design and Operation* at the Saxion University of Applied Science. The workshop was preceded by the general assembly.

The workshop program consisted of a number of presentations from different perspectives: simulation experts from practice and research, a manufacturer, a software developer and a principal. A short outline of IBPSA Project 2 was also presented. The presentations were followed by a discussion around five propositions:

- Do we need a quality label for simulation experts?
- Do we want to differentiate between different types of quality label, for example:

- labels for simulations with limited boundary conditions, such as the U-value window profile calculation currently promoted by BCCA (Belgian Construction Certification Association).
- labels for simulations with many preconditions where the knowledge and experience of the simulation expert can strongly influence the result?
- Do we need a quality label hierarchy?
  - for example a quality label “A IBPSA”: top-level simulation expert who can do all simulations
- Do we need to limit the administrative burden of labelling, and if so, how?
- How do we maintain simplicity, without too great a proliferation of labels, because this also causes confusion?

It was concluded that:

- there is a clear demand for a quality label for simulation experts, which should be attached to individuals, not to companies;
- clients lack the knowledge to ask the right design questions to be simulated. The simulation is more often a goal than a means. A basic training of what simulation has to offer is important, and should form part of every training course in architecture and engineering.

During the general assembly Dirk Saelens, President of IBPSA-NVL, presented the IBPSA-NVL Best Thesis Award 2017 to Wouter Karssies, an MSc student from the Eindhoven University of Technology (TUE). His winning thesis on *Optimization workflow regarding daylighting, energy and glare, for performance assessment of new generation semi-transparent photovoltaic façades* was submitted and supervised by Professor Hensen. In his work Wouter developed and applied an optimization workflow focusing on daylighting, energy and glare with the aim of assessing the performance of an innovative semi-transparent photovoltaic façade. ■



## IBPSA-Nordic

### BuildSim-Nordic 2018, 27-28 September, Helsinki, Finland

The BuildSim-Nordic conference 2018 was held on 27 and 28 September at Aalto University, Helsinki, Finland, organized by IBPSA-Nordic. The purpose of the event was to create a platform for exchange of ideas and research, and to establish cross-country collaboration regarding research in the field of building performance simulation among all Nordic countries.

The event was a great success, attracting 35 participants listening to 15 dedicated presentations from ongoing research. The sessions were divided into topics on energy, thermal comfort, energy and costs and optimization. In the afternoon, both a General Meeting and a Board Meeting took place, followed by a joint dinner.

Mika Vuolle from Equa ran the workshop on the second day and shared his insights, suggested suitable approaches, and distributed the latest models he has made to tackle “simulation challenges”. The rest of the time was used for tips and tricks, and he was also able to show some new features of IDA ICE v6 (see **Software news** on page 30 - Ed).

For the IBPSA Nordic Simulation Award (2018) it was decided to present two awards. In addition to the IBPSA-Nordic Simulation Award for outstanding research or implementation work in the field of building simulation, another Award was given for outstanding achievements and contributions in Building Simulation practice.

The first award was given to Janne Hirvonen, Aalto University for his work on Optimal energy renovation of apartment building for effective emission reduction. The second was given to Santeri Sirén, Ramboll Finland Oy for his work on Using parametric multi-model building performance simulations to support building design. Former awardees of the IBPSA-Nordic Simulation Award include Sunliang Cao (2014), Marc Azar (2015), Zsófia Bélafi (2016) and Jason Bournas (2017).

*Below, scenes from the conference: the conference break (above left); Professor Novakovic of NTNU in deep discussion on simulation issues with Jakub Dziedzic (also of NTNU) and Natalia Lastovets of Aalto University (below left); and presentations to Janne Hirvonen of Aalto University (above right) and Santeri Sirén of Ramboll Finland Oy (below right). Congratulations to them both!*



Finally, on a sad note, Professor Åke Blomsterberg of LTH, Sweden passed away this year!

We liked Åke a lot. He was always smiling.  
It was a pleasure to work together with him.  
Åke will always be in our memory.  
We miss him a lot

## Seminar on the practical use of simulation tools for the calculation of energy and indoor climate in buildings



On 18 October 2018 IBPSA-Nordic joined Norsk VVS Energi og Miljøteknisk Forening in organizing a seminar at Lillestrøm during the Norwegian HVAC days (vvsdagene) to promote knowledge and practical use of simulation as a means of improving the energy, environment and financial performance of buildings and their technical systems.



The seminar focused on practical work, with the aim of achieving a greater use of simulation tools in the daily work of construction projects. Accordingly, the presenters, all experienced users of simulation tools, were a mix drawn from both educational and research institutions and from industry. The speakers were Salvatore Carlucci, Laurent Georges,

John Clauß and Yiyu Ding (NTNU), Arnkell J. Petersen, Line Karlsen and Are Furnes Lausund (Erichsen & Horgen AS), Robert Martinez (Norconsult AS), Matthias Haase (SINTEF Byggforsk), Max Tillberg (Bengt Dahlgren Göteborg AB), and Lars Ålenius (EQUA Simulation AB). The event was held largely in Norwegian (with some lectures in English).

The seminar was well received by the 24 participants and the majority are planning to come back in 2019.

*Below, participants in the IBPSA-Nordic seminar (left) and Lars Ålenius, EQUA Simulation (at the lectern) and Professor Voja Novakovic, NTNU (right) ■*



## IBPSA-Scotland



### **uSIM18 : Seminar on the practical use of simulation tools for the calculation of energy and indoor climate in buildings**

*Nick Kelly, uSIM18 Conference Chair*

IBPSA-Scotland held its first urban energy simulation conference, uSIM18, on 30 November 2018 at the University of Strathclyde's Technology Innovation Centre (TIC) in Glasgow. This focused on looking 'beyond the building' towards the application of building simulation to community and urban-scale performance analysis.

The conference was sponsored by IES Ltd, with Dr Don McLean, founder and CEO of IES Ltd. delivering one of the conference keynotes. The other was delivered by Prof. Joe Clarke, a building simulation pioneer and IBPSA-fellow. Whilst these talks came from an industrial and academic perspective, respectively, both concentrated on how building simulation needs to evolve in areas such as using big data and Artificial Intelligence (AI) to better assist in decision support. Future areas where building simulation could have an impact were highlighted as the design of smart, low carbon energy networks; resilient communities and cities; and the formulation of national energy policy for the urban environment.

The themes raised by the keynote speakers were reflected in the conference paper presentations. These had a very international feel, with delegates ranging from as far afield as Japan. The day was split into 6 sessions on: urban microclimate, acquiring data for urban modelling, stock modelling tools and techniques, urban-level design and optimisation, responsive demand and stakeholder engagement in urban energy modelling. The 16 papers presented stimulated some extensive discussion and all are available at [www.esru.strath.ac.uk/Documents/Proceedings/uSIM18/usim\\_index.htm](http://www.esru.strath.ac.uk/Documents/Proceedings/uSIM18/usim_index.htm).

Some interesting common threads emerging from the presentations included the use of probabilistic approaches in urban modelling to fill in data gaps in areas such as building geometry and occupancy. There were also several presentations where building simulation was deployed in the analysis of future energy networks and where responsive building demand was an integral part of network operation.

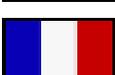
Thanks are extended to the staff of the TIC building and to conference helpers, who ensured that the conference ran smoothly. Thanks are also due to Strathclyde's catering staff who made sure that the delegates were very well fed. Given the success of this first conference, IBPSA-Scotland intends to run uSIM as a conference series, with the next instalment being in 2020. The call for abstracts should follow in late summer 2019.

The proceedings from uSIM18 are now available on the IBPSA website at [www.ibpsa.org/usim-2018-proceedings](http://www.ibpsa.org/usim-2018-proceedings). ■

# IBPSA affiliates

---

See the IBPSA Central web site at [http://www.ibpsa.org/?page\\_id=29](http://www.ibpsa.org/?page_id=29) for details of affiliate websites and contacts. Affiliate representatives are voting members of the IBPSA Board except where marked \*.

	<b>IBPSA-Argentina</b> contact: Raul Ajmat		<b>IBPSA-Italy</b> contact: Vincenzo Corrado
	<b>IBPSA-Australasia</b> contact: Quentin Jackson		<b>IBPSA-Japan</b> contact: Yoshiyuki Shimoda
	<b>IBPSA-Brazil</b> contact: Nathan Mendes		<b>IBPSA-Korea</b> contact: Cheol-Soo Park
	<b>IBPSA-Canada</b> contact: William O'Brien		<b>IBPSA-Mexico</b> contact: Jose Luis Jaspeado-Escalona*
	<b>IBPSA-Chile</b> contact: Danny Lobos		<b>IBPSA-Netherlands + Flanders</b> contact: Wim Plokker
	<b>IBPSA-China</b> contact: Da Yan		<b>IBPSA-Nordic</b> contact: Jørgen Erik Christensen
	<b>IBPSA-Czech Republic</b> contact: Martin Bartak		<b>IBPSA-Pakistan</b> contact: Naghman Khan
	<b>IBPSA-Danube</b> contact: Marija Todorovic		<b>IBPSA-Poland</b> contact: Piotr Narowski
	<b>IBPSA-Egypt</b> contact: Mohammad Fahmy		<b>IBPSA-Portugal</b> contact: Guilherme Carrilho da Graça*
	<b>IBPSA-England</b> contact: Pieter De Wilde		<b>IBPSA-Scotland</b> contact: Nick Kelly
	<b>IBPSA-France</b> contact: Etienne Wurtz		<b>IBPSA-Slovakia</b> contact: Roman Rabenseifer
	<b>IBPSA-Germany</b> contact: Christoph Nytsch-Geusen		<b>IBPSA-Switzerland</b> contact: Gerhard Zweifel
	<b>IBPSA-India</b> contact: Jyotirmay Mathur		<b>IBPSA-Turkey</b> contact: Gulsu Ulukavak Harputlugil
	<b>IBPSA-Indonesia</b> contact: Ramadhani Santoso*		<b>IBPSA-UAE</b> contact: Khaled Al-Sallal
	<b>IBPSA-Ireland</b> contact: James O'Donnel		<b>IBPSA-USA</b> contact: Wangda Zuo

# IBPSA committee chairs & contacts

---

## Membership & Regional Affiliate Committee

Dru Crawley

## Conference Committee

Paul Strachan

## Awards & Fellows Committee

Michaël Kummert

## Website committee

Pieter-Jan Hoes and Roel Loonen

## Publications Committee

Malcolm Cook

## Communications Committee

Christina Hopfe

## Futures Committee

Joe Clarke

## Education Committee

Rajan Rawal

## Projects Committee

Matthias Haase

## IBPSA News

Christina Hopfe, Editor-in-Chief

Marion Bartholomew, Editor

To submit Newsletter articles and announcements:

Christina Hopfe (Newsletter Editor-in-Chief)

Loughborough University, UK

Email: [C.J.Hopfe@lboro.ac.uk](mailto:C.J.Hopfe@lboro.ac.uk)

## IBPSA Corporate Address

c/o Miller Thomson

40 King Street West, Suite 5800

Toronto, ON M5H 3S1

Canada

For additional information about IBPSA, please visit the Association's web site at [www.ibpsa.org](http://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](mailto: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](mailto:jglazer@gard.com) or +1 847 698 5686. ■

# CALL FOR PAPERS

## 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](mailto:j.hensen@tue.nl). For full submission details, please see the journal's homepage [www.informaworld.com/jbps](http://www.informaworld.com/jbps) and click on the "Instructions for Authors" tab.

To register to receive an alert when the first issue is published, please visit:

[www.informaworld.com/jbps](http://www.informaworld.com/jbps)

### Volume 1, 2008, 4 issues per year

Print ISSN 1940-1493 Online ISSN 1940-1507

Institutional Rate (print and online access)	US\$468	£240	€374
Institutional Rate (online only)	US\$444	£228	€355
Personal Rate (print only)	US\$156	£80	€125
IBPSA member subscription (print only)	US\$49	£25	€39

### TAYLOR & FRANCIS GROUP ONLINE SERVICES

#### Alerting services from informaworld™

To receive the table of contents for *Journal of Building Performance Simulation* visit the Journal homepage at [www.informaworld.com/jbps](http://www.informaworld.com/jbps)

To sign up for other table of contents, new publication and citation alerting services from informaworld™ visit: [www.informaworld.com/alerting](http://www.informaworld.com/alerting)

#### Online Access

Online access is included with a print institutional subscription to the Journal or alternatively is available as an online only option. For further information connect to: [www.informaworld.com/jbps](http://www.informaworld.com/jbps)

#### Online Sample Copies

A fully searchable sample copy of this journal will soon be available at [www.informaworld.com/jbps](http://www.informaworld.com/jbps)

#### informaworld™ Librarians' Area

Visit our web resource for Librarians and Information Professionals at: [www.informaworld.com/librarians](http://www.informaworld.com/librarians)



#### eUpdates

Register your email address at [www.informaworld.com/eupdates](http://www.informaworld.com/eupdates)

to receive information on books, journals and other news within your areas of interest.



#### CrossRef

An international active reference linking service. Visit [www.crossref.org](http://www.crossref.org) for more information.

### To the Librarian

Please include this journal in your next serials review meeting with my recommendation to subscribe:

From \_\_\_\_\_

Dept \_\_\_\_\_

Date \_\_\_\_\_

Please note this Taylor & Francis journal offers either print & online or online only subscriptions for institutions.

To find out more about our journals, please visit: [www.informaworld.com/journals](http://www.informaworld.com/journals)

For further information or to subscribe, please contact:

T&F Order Processing, T&F Informa UK Ltd, Sheepen Place, Colchester, Essex CO3 3LP

Telephone: +44(0)20 7017 5544

Fax: +44(0)20 7017 5198

Email: [tf.processing@informa.com](mailto:tf.processing@informa.com)



Taylor & Francis  
Taylor & Francis Group