

ibpsaNEWS is published periodically by the International Building Performance Simulation Association, Inc. The editors are Jeff Haberl, Dan Seth, Rik Van de Perre and Michael Witte and can be reached through the IBPSA Secretariat.

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MESSAGE FROM THE IBPSA PRESIDENT

At the Chicago Meeting a number of important milestones were reached including the tabling of a Draft Strategic and Business Plan. You will find highlights of the decisions made by the Board in a condensed version of the Chicago Minutes of the Meeting, elsewhere in this Newsletter. The Board adopted the Strategic and Business Plan documents for internal use only, and approved a number of specific initiatives for immediate implementation.

Also, the Board authorised the development and distribution of a Newsletter to paid IBPSA members - twice annually.

Since the Chicago meeting in January 1993, you have probably received a number of notifications including your new IBPSA membership card, membership invoice, preliminary conference program, and now the Newsletter. As you can see this Newsletter is packed with information and articles, which I hope you will find both interesting and useful. This issue highlights Building Simulation activities in North America. The next issue of the IBPSA newsletter will focus on Building Simulation research in Europe. BS'93 in Adelaide, Australia is in the final preparation stages, and by all accounts promises to be another success story for the Association. Please spread the word to your colleagues and make an effort to attend it yourself. Another significant milestone IBPSA has reached is the prototype installation of an "electronic bulletin board". Please contact Ph.Geril, at the IBPSA Secretariat for further details.

On behalf of IBPSA I wish to thank all members for renewing their membership. Let us make this a year of the Member and let each one of us make an effort to recruit at least one new member to the Association.

NEXT IBPSA BOARD MEETING

IBPSA Board Meeting

The next IBPSA Board of Director's Meeting will take place on June 26, 1993 at 6.00 p.m. in the Gold Nugget Room, Lobby level, Hotel Denver, Denver, Co.

Agenda

1. Call to order	Seth
2. Roll Call	Haberl
3. Accept Agenda	Seth
4. Approval of Minutes of Chicago Meeting	Haberl
5. Review of Chicago Minutes & Announcements	Seth
6. Old Business	
6.1. BS'93 Status Report	Seth
6.2. Executive Director/Secretary Contract Status Report	V de Perre

6.3 Scientific Committee Report	Mitchell
6.4. ASHRAE Bookstore BS Publications	Seth
6.5. Fund Raising Status	Gardner
6.6 Conclusion of Strategic Plan	Seth
6.7. Financial Report	Sowell
6.8. Nomination of Awards	Pederson
7.New Business	
7.1. Electronic Bulletin Board	V de Perre
7.2. Discussion of Newsletter Production	Haberl
7.3. Directions for BS'93	All

8.Adjournment

IBPSA General Meeting

The next IBPSA General Meeting will take place on June 26, 1993 at 8.30 p.m. in the Gold Nugget Room, Lobby level, Hotel Denver, Denver, Co.

Agenda

1.Call to Order	Seth
2.Roll Call	Haberl
3.Accept Agenda	Seth
4.Announcements	Seth
5.Old Business	
5.1 Finances	Sowell
5.2 BS'93 Status Report	Seth
5.3 Nomination of Awards	Pederson
5.4 Strategic Plan	Seth
6.New Business	
6.1 Electronic Bulletin Board	Van de Perre
6.2.Future Initiatives	Seth

7.Adjournment

IBPSA BOARD MINUTES

Minutes (Condensed Version)

IBPSA Board of Directors Meeting and IBPSA General Meeting

**January 23, 1993, 2.30 p.m.,
Congressional Suite, Third Floor,
Chicago, Illinois.**

Present: Alereza, Barnaby, Degelman, Gardner, Haberl, Haves, Kolsaker, Mitchell, Pederson, Pelletret, Sahlin, Seth, Sowell, Spitler, Van de Perre, Witte, Yuill.

The minutes of the Baltimore meeting were approved as amended. Action items were reviewed and some announcements made.

A motion to offer the Amistadi Report at \$10.00 to non-members and free of charge to members (on request), by means of putting it on the publications list, was unanimously approved.

The topic of financial support for the BS'93 conference was discussed . It was reported that DOE has backed out - DOE programs no longer have the funds available. The status of other funding agencies is as follows:

- 1) CERL uncertain
- 2) EPRI \$10-20K (US) promised
- 3) GRI \$10K (US) approved by procurement.

Some possible new sponsors include:

- i) Public Works Canada \$5K Cdn
- ii) Concordia University \$2K Cdn

If \$20.000 US and \$7.000 Canadian are obtained, the conference would produce a small profit.

A motion to inform Terry that IBPSA would like to move ahead with the conference was approved with one abstention. It was decided that the President will write to Terry Williamson expressing Board's position and seeking clarification on conference budgets.

Terry's initiative in dealing with conference budget was viewed with some concern and it was felt that it would be necessary for Terry to function with real budgets, and to seek steering committee's approval regarding financial matters.

A discussion about the IBPSA Awards followed. It was decided to strike the reference to a particular age when

nominating/selecting potential award recipients. A discussion about whether there should be more/less award money, was introduced. However, the Board decided to maintain status-quo. It was observed, awards are made on a bi-annual basis at each Building Simulation Conference, providing there is a qualified candidate. These awards are:

IBPSA Award for Distinguished Service to Building Simulation.

IBPSA Outstanding Young Contributor Award.

A motion was unanimously approved to offer IBPSA awards as amended, at the upcoming BS'93 conference in Adelaide, Australia. evaluation of nominees will be made by the Honours and Awards Committee, and recommendation approved by the IBPSA Board.

Strategic and Business Plan

Both the Strategic and Business Plan documents that had been previously circulated to the Board members were tabled for discussion. Members were reminded that IBPSA is primarily a "not-for-profit" organisation with a focus on fostering international co-operation in building simulation. Thus the vision expressed in the Strategic Plan documents takes into consideration these factors, and the Business Plan provides an overall financial framework to realise the vision. The purpose of the discussion here is to fine tune the Vision and the documents by debating the implementation related considerations, i.e. the "How".

The discussion started with each Board Member giving an overall impression of their assessment of the documents, however, they felt that the Program Initiatives proposed were too ambitious in the light of the current resources of the organisation. They suggested to prioritize program initiatives; The Conference Initiative; The Membership Initiative; and The Service Initiative, of immediate priority to the association. Under these initiatives a number of short term goals were approved as follows: bi-annual conference; corporate membership; professional membership; student membership; tech-transfer info; career announcement service; and electronic mail facility. Also, the Board moved to accept both the

Strategic and Business Plan documents as having fulfilled Rik's contractual obligation. It was further decided to limit the circulation of these documents for Ibpsa's internal use only as DRAFT documents.

The discussion then turned to items that should be included in the Newsletter. It was decided to include the following items as a minimum for the next newsletter prior to the Denver meeting:

- minutes from the Chicago Meeting
- an article or two
- membership list
- some advertising

Nominations for the Treasurer's position left vacant, were reviewed. As there were no willing candidates to fill the position on a regular basis, it was decided to fill it on an interim basis. A motion to elect Ed Sowell was unanimously supported.

Tax implications in both the US and Canada were discussed and it was concluded that the US Government has no right to tax IBPSA if it is incorporated in Canada under international rules/treaties. This was the opinion expressed by two professional accounting firms who were approached by IBPSA.

The issue of ASHRAE sponsorship of BS'93 was discussed and it was reported by Sowell that the conference will be announced in the ASHRAE Journal in the conference section. It was further suggested that IBPSA inquire about having the conference proceedings sold in the ASHRAE Bookstore. A motion to inquire about getting BS'91 & BS'93 proceedings in AHSRAE's Bookstore in Denver at a price to be determined in consultation with ASHRAE by the President was unanimously carried.

A motion to provide comments on the work plan and progress report submitted by Rik within 30 days to P.Geril was also carried.

The Preliminary Financial Report tabled by Taghi Alereza was accepted subject to minor revisions discussed at the meeting.

BS'93 CONFERENCE UPDATE

The total number of abstracts received for BS'93 in Adelaide was 115. Total initial acceptance was 95 abstracts. About 75 papers are expected to be presented.

Venue

Adelaide, capital of the state of South Australia, is acclaimed as one of the world's most beautiful and well planned cities. Its easy pace and lively lifestyle makes it an ideal location for a vibrant, stimulating yet relaxing conference.

The conference will be held at the Adelaide Convention Centre, an international standard conference venue in the heart of the city close to hotel, restaurant, retail shopping and cultural facilities. Domestic and international airports are a short 15 minute drive from the city centre.

The weather during August in Adelaide is generally sunny and mild with temperatures on average ranging between 8 and 18 degrees centigrade. Adelaide provides easy access to all other parts of Australia.

Registration Fees

The registration fees include conference attendance, one copy of the conference proceedings, three lunches, morning and afternoon refreshments and welcome reception.

Registration before 16 Aug.1993	IBPSA Member AU\$440	Non-Member AU\$485
Last Minute Registration	AU\$510	AU\$560

For further information please contact: Building Simulation '93, Satour promotions, P.O.Box 44 Rundle Mall, Adelaide, Australia 5001. Tel: 61.8.232.3422, Fax: 61.8.232.3424

ELECTRONIC BULLETIN BOARD

IBPSA BULLETIN BOARD

IBPSA now has a bulletin board it can be used located at the University of Ghent, Belgium. At present the bulletin board is on the EARN/BITNET network, but starting in September it can be reached direct through INTERNET.

In order to access the system the first time, you need to go into your E-mail account, address a message to **SIMNET@FLAND.RUG.AC.BE** and enter into your editor the following text: **SEND INDEX**

This command will activate the system to send you all the commands necessary to operate the Bulletin Board.

At present the bulletin board contains two text files in ASCII, and the IBPSA database. Keep trying until you gain access to it and see if you can access, download and upload data from your PC.

Comments, remarks and suggestions are welcome.

WELCOME TO IBPSA!

The following people have become members of IBPSA for 1993.

- Miguel Perez Neves Aguas Portugal
- James Axley USA
- Taghi Alerezza USA
- Marx Ayres USA
- Harald Bargar USA
- Charles Barnaby USA
- David Bloomfield UK
- Robert Briggs USA
- Y.H.Choukry The Netherlands
- Drury Crawley USA
- Larry Degelman USA
- Scott Frank USA
- Carol Gardner USA
- Jeff Haberl USA
- Jon Hand UK
- Jan Hensen The Netherlands

• Alexander McGowan	Canada
• John Mitchell	USA
• Curtis Pedersen	USA
• Roger Pelletret	France
• Thomas Provan	UK
• Rudolf Rabenstein	Germany
• G.J.Riddell	New Zealand
• Ingrid Rohmund	USA
• Henry Romer	USA
• Per Sahlin	Sweden
• Dan Seth	Canada
• Charles Sherman	USA
• Jeffrey Spittler	USA
• Gerald Thomas	USA
• Rik Van de Perre	Belgium
• Anders Wallenberg	Sweden
• George Walton	USA
• Frederick Winkelmann	USA
• Michael Witte	USA
• Alex Zimmerman	Canada

PRODUCT NEWS

FSEC 3.02

Program Name: FSEC 3.02.

Description/Application: A detailed whole-building and component analysis program. Includes heat, moisture and contaminant transport simulation. Both, detailed and simplified moisture models are available. Recent enhancements include models for radon transport and pressure driven airflows in buildings and systems.

Other Applicable information: Primarily developed as a tool for research, design and development of innovative cooling and dehumidification systems. Uses the finite element method for distributed modelling. Recently enhanced to include radon transport and entry in soil/slab/building. user definable routines provide the flexibility to accommodate various user equations, options and systems.

Primary Users:

- Expertise required: Requires knowledge of numerical methods and governing equations being solved. High-level computer literacy.
- Training Available: At present, none, Planned for future.
- User manual available: Provided with program
- How many users: Approx. 25-30
- Discipline: Engineering, research, education

Input Required: Requires ASCII input file. Requires complete building details including, layout, material properties, transport coefficients, equipment performance, weather data.

Output Received: As requested by user

Platform Required: VAX/VMS or IBM PC compatible

Programming language: FORTRAN 77

Strengths/Weakness:

Strengths: Extremely detailed analyses possible. Up to 250 user defined governing equations can be incorporated. Excellent platform for integrating with other models/software.

Weakness: Weak input processor, no error checking/messages. Requires knowledge of FEM.

Developer/POC: Florida Solar Energy Center/ Dr. Muthusamy V. Swami

Availability/Cost: 1600 BPI tape or 3.5" diskette at nominal cost from: Florida Solar energy Center, Attn: Dr. M.V. Swami 300 State Road 401 Cape Canaveral, FL 32920 Ph: (407) 783-0300 Fax: (407) 783-571

New Public Domain Monitoring and Analysis Software Available

The Energy Systems Laboratory at Texas A&M University is pleased to announce the availability of several new public domain software packages. These packages were developed for energy efficiency monitoring and building simulation for the Texas

LoanSTAR program, a successful program which has monitored and recommend energy-saving retrofits for government buildings in the state of Texas. Most of these software packages are available for a minimal fee which covers copying the materials and handling.

Package topics include time stamps series adjustments, facilitation of #D graphics, psychometric calculations, animation of data, data archiving routines, DOE-2 weather pre-processors, DOE-2 graphics post-processors, carpet plots, psychometric plots, sunpath diagrams and more.

For complete descriptions and ordering, please contact the Energy Systems Laboratory, Attn: Publications, Dept. of Mechanical Engineering, Texas A&M University, College Station, TX 77483-3123. or call Dr. Jeff S. Haberl at 409.845.6065, Fax: 409.863.2762, or electronic mail to JSH4037@TAMSIGMA

Release of DOE-2.1E

A new version of DOE-2 (DOE-2.1E) is now available. It includes the following enhancements: ice storage, evaporative cooling (stand-alone and pre-cooling), add-on desiccant cooling, gas heat pump, PVVT system, evaporatively-cooled condenser option for packaged systems, heat pump water heater, enhanced water loop heat pump models, multizone residential system with individual zone control and variable-speed heat pump, enhanced energy cost calculation to simulate very complex rate structures, disaggregation of energy consumption by end use, multiple fuel and electricity meters, window library with 250 glazing types (single, double, triple pane; different gas fills, coatings; electrochromic glazings; super windows), switch able glazing simulation, link to the WINDOW-4 program for custom glazings

The program will initially be available for the following platforms: SUN-UNIX, VAX-VMS, and IBM-compatible PC.

For information on obtaining DOE-2.1E, contact Kathy Ellington MS 90-3147 DOE-2 Users Office,

Lawrence Berkeley Laboratory, Berkeley, CA 94720.
Phone: 510-486-5711. Fax: 510-496-4089 or 5172
Email to kathy%gundog@lbl.gov

Release of FTIDOE v2.1D.

FTIDOE provides a comprehensive set of tools to perform the complex task of dynamic building energy analysis. These tools include: Loads Analysis module, Systems module, Plant module, Economic Analysis module, Report module, Weather Analysis module and a Building Description Language (BDL) module. This combination of tools calculates peak or design loads including hourly space loads; simulates the operation of secondary heating, ventilating and air conditioning components (HVAC); models the operation of primary HVAC components; calculates life cycle costs; generates output reports; and plots weather data.

FTIDOE v2.1D is a fully optimized multi-platform implementation of the DOE-2 program developed by Lawrence Berkeley Laboratories in conjunction with the U.S. Department of Energy. FTIDOE provides full compatibility with the DOE-2 program including input, library, and weather files but offers full portability between computing systems.

CPU/Operating System: VMS, ULTRIX, SCO UNIX, IBM RS/6000, NeXT, MS-DOS, Other platforms and source code are available, call for information

Pricing and Availability: U.S. list price for FTIDOE from \$795 for a single user, network, multi-user and site licenses are available. FTIDOE v2.1D is currently available for shipping.

For further information please contact: Finite Technologies Incorporated, 821 N Street, Suite 102, Anchorage, Alaska 99501, USA; Phone: 907-272-1527, Fax: 907-274-5379.

DOE-PlusThe Interactive Version of DOE-2!

DOE-Plus is an interactive program used to create or edit a complete description of a building, simulate the building with DOE-2, and graphically analyse the simulation results. DOE-Plus is a complete implementation of DOE-2, with the added benefits of quick, easy entry of building description data with context-sensitive help messages (containing definitions of every DOE-2 keyword) and interactive error checking of user input data. Features include graphical analysis of a building (DOE-Plus draws a 3-D view of the building that can be interactively rotated), graphical analysis of the simulation results (DOE-Plus plots data from DOE-2 standard reports in user-designed graphs), display of a building description file in a tree format (showing the relationships between various DOE-2 commands), display of a multi-year calendar to aid in scheduling building occupancy events on specific dates, and graphical entry of building occupancy schedules using a bar-chart format.

DOE-Plus is valuable to both new and experienced DOE-2 users because of the interactive help and error detection, the reduced time needed to fully describe a building for simulation by DOE-2, and the powerful set of features for analysing input data and the results of DOE-2 simulations. The design of DOE-Plus reflects its developers' many years of DOE-2 experience. DOE-Plus makes extensive use of built-in libraries to store and retrieve schedules, materials, constructions, entire HVAC systems, etc. All DOE-Plus libraries can be completely customised, allowing the user to store commonly used portions of DOE-2 input files.

Required DOE-2 commands and keywords are automatically identified. Commands and keywords are logically grouped according to application. Time saving DOE-2 commands, such as LIKE, PARAMETER, and SET-DEFAULT are fully implemented. Standard default values and limits are displayed for every keyword. DOE-Plus objects such as schedules, walls, or windows) are identified by the familiar DOE-2 U-names. DOE-Plus runs on an IBM compatible computer with a 386 or 486 CPU, math coprocessor, 4 Mbytes RAM, and a hard disk. A color VGA monitor and mouse are recommended but not required. DOE-Plus

with DOE-2 costs \$790; DOE-Plus only is \$495. DOE-Plus is a trademark of ITEM Systems.

For more information please contact: ITEM Systems
Innovative Technologies for Energy Management P.O.
Box 5218, Berkeley, CA 94705-0218 Phone: (510) 549-
1444 Fax (510) 549-1778

PROJECT NEWS

Program for Estimating Energy Requirements (PEER) of Commercial Buildings

Current state-of-the-art energy analysis programs require users to describe a building and its component parts such as HVAC, Electrical systems in significant details. Also, the user is expected to understand the thermodynamic principles of energy flow in the conditioned space, the impact of various assumptions on both the mass of the building and system operations. Although, a great deal of developments in making software programs user friendly have been undertaken and indeed many programs today are simple to use, it is still not possible for (two) designers to produce similar results for the same building project with identical specifications. In fact, many test carried out in different parts of the world have proved conclusively that depending on the interpretation of building variables and how assumptions are treated in the analysis program, one can arrive at any number of results. the problem becomes further complicated when one needs to assess energy savings due to conservation measures and to perform sensitivity analysis.

It is therefore proposed to develop a database driven expert system software that will assist properly managers, building developers and designers to quickly determine energy budgets for the buildings under consideration without the need to agonise over building system details.

For more information please contact: Daniel Seth,
Public Works Canada, Sir Charles Tupper Building,

Room C 550, Riverside Drive, K1A OM2, Ottawa, Ontario, Canada. Tel: 613.736.2233, Fax: 613.736.3178

Daylighting

The aim is to investigate ways to *integrate daylighting* and electric lighting in Crown owned or leased accommodations, to maximise the benefits of this renewable resource for the improvement of the quality of the working environment and the reduction of energy consumption. The Objectives will be to collect field data of daylighting applications and prepare documented case histories, detailing technical, economic and human factors impact to improve more and better daylighting applications in Canada.

Currently daylighting is usually not part of building design and its presence is an accident, merely due to the existence of windows. The function of windows should include their ability to promote a realistic interpretation of their view of the outdoors, while allowing for controlled admission of quality daylighting. However, this is usually not the case as attested by many thermally efficient windows where true colour interpretation and daylighting admission are severely distorted and/or limited in order to achieve higher thermal efficiencies. Little attention is paid to the needs of the occupant and his reactions to his working environment. It is not unusual to find that very low transmittance glazing actually promote requests for increased electric lighting levels, in order to compensate for the perceived deficiency of daylighting next to the windowed spaces, thus resulting in unforeseen energy penalties. In any case, this solution only partially corrects the problem, as daylighting quality exceeds that of electric lighting. This fact alone can be successfully used to heighten the perception of improved luminous spaces, without added energy costs. The old concept of providing daylighting as the 'base' lighting level and using electric lighting as the 'top-up' level (to be used only when needed), is regaining acceptance as the cost of energy and awareness of improved environmental working conditions increases among workers in general.

Another element that requires attention is the control link that allows the integration of daylighting with

electric lighting, thus providing financial justification for providing improved daylighting admittance. This control link is often weak, of dubious performance and often of limited application, due to several technological shortcomings.

PWC, supported by both the public and private sector, has already achieved substantial progress in solving some of the above issues. Still more remains to be done, however, before daylighting can be exploited and properly integrated in commercial building.

For more information please contact: Daniel Seth, Public Works Canada, Sir Charles Tupper Building, Room C 550, Riverside Drive, K1A OM2, Ottawa, Ontario, Canada. Tel: 613.736.2233, Fax: 613.736.3178

Health and Safety Code Compliance Checking Using an Integrated Hypertext and Knowledge-Based Expert System.

In order to ensure health and safety of occupants, buildings must be inspected for compliance with current regulatory requirements prompted by building code changes or other performance based standards. A recent study undertaken by Public Works Canada showed that several Agriculture Canada buildings reported code violations in terms of air quality, water quality, fire safety and other environmental hazards. The results of this study were compiled in three volumes reporting a total of some 1700 occurrences of violations and recommendations to overcome these problems. There is a dearth of information that can be extracted from the above study to implement a knowledge-based expert system to assist in future building inspections. In addition to developing a knowledge base, it is also necessary to enable access to all appropriate documents such as the building code and performance standards.

A prototype expert system is currently under development. The philosophy of this expert system is to integrate both knowledge-based and hypertext representation techniques to enable building inspectors to quickly identify code violations and also refer to the

appropriate regulatory document with minimum effort. Code violation problems have been classified according to a hierarchy of components, attributes, symptoms, causes and solutions. These will be represented in an object oriented knowledge-based system and a backward chaining inference mechanism will be used to diagnose problems. All code and regulatory requirements will be stored in text files with tags to provide hypertext features during a consultation for explanation and reasoning. The system implementation is carried out in MS DOS Windows environment and the final run-time version is expected to be used in 386 Notepad personal computers.

For more information please contact: Daniel Seth, Public Works Canada, Sir Charles Tupper Building, Room C 550, Riverside Drive, K1A 0M2, Ottawa, Ontario, Canada. Tel: 613.736.2233, Fax: 613.736.3178

AEDOT Prototype 1 Revealed

The Advanced Energy Design and Operation Technologies (AEDOT). Prototype uses computer-based tools to integrate energy analysis into computer-aided building design.

The goal of the project is to provide design professionals with easy access to the massive amounts of information available on energy-efficient building design. The designer is free to explore ideas on the screen, while special tools automatically conduct concurrent energy analysis in the background.

The AEDOT Prototype 1 is a collaborative effort by developers from California Polytechnic State University (Cal. Poly), University of Oregon, and Lawrence Berkeley Laboratory (LBL), led by the Pacific Northwest Laboratory (PNL) in Richland, Washington. The AEDOT project is sponsored by the U.S. Department of energy (DOE).

The AEDOT Prototype 1 is built around a system called ICADS, which was developed by Cal Poly with support from Accugraph, IBM, and Hewlett Packard: it uses Accugraph CAS software as the primary user interface. ICADS, or the Intelligent Computer Aided Design System, links a set of intelligent design tools (IDTs) that

provide information to the designer on such topics as the structural, thermal, acoustic, and cost impact of each addition or modification that a designer makes to a design.

Energy efficiency in Building design is not a new idea. The DOE and other organisations, like the American Institute of Architects, have been sponsoring research and development efforts in energy efficiency for years. They produced dozens of guidebooks and analytical tools that have certainly helped researchers understand building energy use and develop guidelines for use in design. Unfortunately, these standalone tools often get limited use except from energy specialists, students, and energy-conscious designers.

AEDOT differs from previous efforts because AEDOT software will be a part of a designer's CAD system.

Its products will support every step in a building's development from planning and conceptual design, to preparation of construction documents.

If you would like more information on the AEDOT project, please contact Michael R. Brambley, Energy Sciences Department, Pacific Northwest Laboratory, Box 999, K5-16, Richland, Washington, 99352, USA. Telephone: (509) 375-6875.

Targets Prototype Nears Completion

The Targets software will make possible a new approach to performance-based standards and guidelines for the energy-efficient design of new commercial buildings. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE); the Illuminating Engineering Society of North America (IES); and the American Institute of Architects/ Association of Collegiate Schools of Architecture (AJA/ACSA) Council on Architectural Research form a building industry team that is participating with PNL in the Targets project, a multiyear effort funded by the U.S. Department of Energy's (DOE's) Office of Building Technologies. A whole-building energy "target" is an energy-use limit that a specific building design must meet to be considered acceptably energy efficient. (Typically, it will be defined in Btus/ (yoft2)

Standards and guidelines based on the performance of an entire building provide **maximum flexibility** for the designer to creatively address project requirements, while ensuring overall energy efficiency in addition, performance based standards provide **incentives** for designers to innovate and to adopt new systems and materials. For example, by specifying the latest energy-efficient lighting systems, a designer might be allowed to include larger window areas in the design than would otherwise be permitted. In contrast, prescriptive requirements provide no incentive for performance that exceeds the required minimums and may even serve to freeze design practice at currently accepted levels.

The goal of the Targets project is to surmount the technical challenges that must be addressed if performance based energy standards are to be made practical and widely accepted by the buildings industry. These technical challenges include the capability to generate targets that are responsive to the unique combinations of functions, site, and energy and construction costs that are encountered in most new commercial building projects. In addition, energy-performance levels must be economically sound for them to be accepted, and they must be implemented in a way that makes them easy for designers to use.

The software under development generates energy targets based on the user's own description of the building project-making each target customised to the building project for which it is generated. Economic optimisation methods are applied in an automated process to define a set of cost-effective energy-efficiency measures for the project, which provide the basis for the performance target levels. While initial development work has not focused on the user interface, later versions of the Targets software will package the computational capabilities within a flexible, easy-to-use interface for designers to use in both generating targets and demonstrating compliance.

In addition to providing a technically robust basis for performance standards, the Targets software may have additional important applications. These applications include providing design guidance to designers of new

buildings, determining cost-effective energy retrofit measures for existing buildings, and planning and evaluating research and development efforts aimed at developing new energy-related building technologies.

For more information on the Targets project, contact Robert S. Briggs. Energy Sciences Department. Pacific Northwest Laboratory, Box 999, K5-16, Richland, Washington 99352; USA. Telephone: (509) 375-3854.

GENERAL INFO

What is CRADA ?

It's a powerful tool enabling industry to gain access to, develop, and commercialise new technologies. A Co-operative Research and Development Agreement, or CRADA, is a contractual agreement between a federal laboratory and one or more industrial or university partners who agree to collaborate, share costs, and pool the results of a particular R&D program.

Through CRADAs, industry can leverage resources by pooling staff, facilities, and other resources with the world-class R&D personnel and facilities of the national laboratories. CRADAs give industry an opportunity to use new technologies evolving from Federal research programs.

Recent legislation encourages federal laboratories to enter into CRADAs with industry and academia. Under a CRADA, a national laboratory can provide personnel, technology, services, facilities, and equipment. the terms of a CRADA are brief and flexible so that each agreement can be negotiated and tailored to the needs and resources of the participating parties.

Intellectual property is protected too-data generated as part of CRADA can be treated as proprietary and is not subject to the Freedom of Information Act.

For example, in October 1992, the Pacific Northwest Laboratory (PNL) signed a Collaborative Research and Development Agreement (CRADA) with the University of Oregon and ASG of Sausalito, California, a leading

developer and supplier of computer-aided design (CAD) tools for the buildings industry.

This CRADA brings together the US Department of Energy's Advanced Energy Design and Operation technologies (AEDOT) project, led by PNL, and the Energy Efficient Industrialised Housing (EEIH) program, led by the University of Oregon. The project will integrate an energy analysis capability with computer-aided design applications developed by ASG.

The CRADA team is currently developing a software prototype called ASG Energy. This prototype will automatically determine the heating and cooling loads for building designs that are developed using AutoCAD and ASG software. ASG Energy will automatically extract geometric features, such as building volume and exterior surface areas, from the CAD database. It will also allow the user to define other energy-related parameters, such as occupancy and lighting schedules. (default values can be used if the user does not want to specify them.). The heating and cooling loads for the building can then be calculated using the AHSRAE Simplified Energy Analysis Method.

Results will be displayed graphically, showing the annual heating and cooling loads or load information for a particular day during the year. Users will be able to examine the constituent elements of these loads, either by load component (e.g., internal gains, solar gains, envelope gains and losses, ventilation gains and losses) or by architectural element (windows, walls, slabs, roofs). The information presented by ASG Energy will help building designers choose configurations, orientations, and materials that reduce these loads, thereby decreasing the overall energy consumption of the building.

The ASG Energy prototype developed under this project is expected to form the basis for an energy tool that ASG will release as part of its software products around January 1994.

PUBLICATIONS

Two NEW Publications from ACE³

Emerging Technologies to Improve Energy Efficiency in the Residential and Commercial Sectors

This report surveys 100 new energy-saving technologies that can save electricity and natural gas, ranging from those that entered the market in 1991 to those likely to be commercialised by 2002. Data on the 50 technologies with the largest potential savings is provided, including likely costs, savings and date of commercialisation. Prepared for the California Conservation Inventory Group. 155 pp, 1993. \$30.00

Gas DSM and Fuel Switching: Opportunities and Experiences

This major study examines the economic potential for gas efficiency savings in the service areas of three New York State gas utilities. An examination of the economics of converting from electricity to natural gas for various end-uses as well as utility experience with gas efficiency and fuel switching are included. Prepared for the New York State Energy Research & Development Authority and the New York Gas Group (NY residents may request copies from NYSERDA). Soft Cover, 8 1/2"x 11", 400 pp, \$40.00.

For further information please contact: Glee Murray, ACE³ Publications, 2140 Shattock Avenue, Ste.202, Berkeley, CA 94704. Phone: 510.549.9914, Fax: 510.549.9984. California Residents must also include 8.25% sales tax.

SIMULATION RESULTS

INFO from ORNL

The Existing Building Research Program of the Office of Building Technologies within the Conservation and

Renewable Energy Program of the U.S. Dept of Energy has continued over the past several years to advance capabilities in the United States for improving the delivery of energy efficiency technologies to buildings. Building simulations are an important part of this work, as they allow us to extend the results of field measurements and reduce overall study costs and length of completion.

Recent residential study

A field test was performed during the summer of 1991 in Scottsdale, Arizona, to evaluate the space cooling electricity savings and demand reduction potential of retrofitted exterior masonry wall insulation for single-family houses. Eight houses were retrofitted and monitored in the test. The insulation--extruded polystyrene covered by stucco-- was installed on the masonry wall exterior at the middle of the summer test period. Total and air-conditioning system electricity consumptions in the houses were recorded during the entire test period. meteorological data were collected from nearby weather stations. The data were collected for short-term pre- and post-retrofit periods of about two months each.

A modelling study (using DOE-2.1D) was performed in conjunction with the field test to check the internal consistency of the recorded data, to calibrate the computer program (DOE-2 input) for extrapolating the measured savings, and to use the programs to estimate the annual savings for the test houses. These programs were then used to estimate the savings for this measure applied to a prototypical house at selected locations in the southern part of the United States.

The comparisons of the predicted and measured air-conditioning electricity consumptions are within 10% for four of the houses, about 70% low for one house, and about 30% to 40% low for three houses in the field test. The energy savings data were normalised over an entire year with and without the walls being insulated. The thermostat setpoints were assumed to be 70° F for heating and 79°F for cooling. The 79°F value is about the average of all the indoor temperatures measured in

the houses during the test. Phoenix TMY weather data were used for these calculations.

The average normalised air conditioner electricity saving for these houses in Phoenix is about 640 kWh or 11.5%, ranging from about 7% to 14%. The average peak-hour saving for the year is about 0.7 kWh, or about 14%. The impacts of external wall insulation were calculated using TMY weather data for a number of cities in the southern region of the country. The predicted annual air-conditioning electrical energy savings are the greatest - 10% to 14%- for the houses in Phoenix and Las Vegas. In contrast, they are the lowest - 1% to 5%- for the houses in Florida. In many locations, the expected savings are in the range of 8% to 10%.

Recent study of a small commercial office building.

A baseline small commercial building is modelled to determine the impacts to building energy consumption from both shell and equipment retrofit measures using Boston weather data. Five retrofit measures that offer substantial reductions in energy use are evaluated for their energy-savings potential and energy-savings interactions using a simulation program (DOE-2.1D). demand savings are not addressed, but their inclusion could significantly improve the paybacks determined for some measures. Although a specific building is modelled, the results offer insight into the relative importance of these measures from an energy viewpoint that may apply to a variety of small buildings.

The impacts on natural gas space heating and total electricity consumption in a small commercial building from ceiling insulation, lighting reduction, wall insulation, high-efficiency air conditioning, and thermostat setback/set-up are evaluated. In addition, the interaction between various levels of ceiling insulation and other measures targeted at specific end uses (lighting and cooling) and heating and cooling loads. Loads are calculated based on NOAA typical meteorological year weather data for Boston, Massachusetts. Reductions in natural gas and total electricity consumption are converted to cost savings for

cases of low and high fuel costs. These cost savings are then related to measure costs to provide payback results. A range of low and high measure costs are also used so that results will likely bracket the wide range of fuel and measures costs that occur in practice.

Thermostat setback/set-up has the fastest payback at under one year for all cost scenarios. The payback of this measure changed only slightly with ceiling insulation level. The second fastest payback is from the addition of ceiling insulation to an uninsulated attic (1 to 8 years). For low installation costs, ceiling insulation always has a payback of less than three years. The payback period for ceiling insulation from R-7 to R-19 or R-30 provides paybacks of around 4 to 7 years for low measure costs and around 10 to 20 years when measure costs are high. Shorter paybacks (4 and 10 years) are associated with the lower fuel cost.

The payback from a 30% lighting energy reduction ranges from 8 to 27 years. The high fuel/low measure cost scenario is the only one providing a simple payback of less than 10 years. All cases except the low fuel/high measure cost case have paybacks of less than 20 years. Simple payback for this measure is essentially independent of ceiling insulation level.

The simple payback of wall insulation is under 10 years only for the high/fuel low measure cost scenario. Two of the three remaining cases have paybacks between 11 and 21 years. The payback period for wall insulation is slightly better when ceiling insulation is present.

The high-efficiency air-conditioning measure did not have a reasonable payback under any measure/fuel cost scenario. The lowest simple payback period is more than 50 years. The energy cost savings of this measure might justify the incremental expense of buying a more efficient unit when replacement becomes necessary, however. Based on the equipment sizes in the building evaluated additional expenditures of around \$400 for the low-cost and \$800 for the high-cost scenarios (\$60 to \$120 per ton) could be cost justified upon unit replacement for a simple payback within ten years.

Recent study of a large commercial office building

The United Nations building, located in Washington, DC, was selected to disaggregate the benefits of previously installed building energy retrofits. This all-electric building was built and occupied in 1973, then retrofitted with lighting improvements, HVAC improvements, and energy management controls in 1988. The energy savings through retrofits are about 200 MWh per month on average with total demand savings of 600 kW off the summer peak. Total retrofit cost was about \$700,000 while savings are about \$160,000 per year.

Short-term field data collection and computer simulation are used to estimate disaggregated savings benefits in this building. Survey data of the building cover time-of-use, occupancy schedules, functional areas, exterior envelope construction, HVAC system, controls, zoning, lighting systems, and equipment. Field test measurements include hourly total electric consumption for the whole building, outdoor temperature, and humidity data collected through the existing sensors installed in the building.

Using existing building energy consumption data, DOE-2.1 D simulation program input data for pre-retrofit and post-retrofit conditions are developed and calibrated. Both monthly energy consumption data over a long time and hourly data over a period of less than a year are used to develop the calibration. Then, a series of simulations are conducted for the incremental benefits of each retrofit installation. A special short-term field test was conducted to obtain data for estimating potential benefits of the EMCS if the building HVAC systems had not been shut down originally during unoccupied periods.

The complex interaction of measures makes assigning specific savings values to each measure difficult. The most reasonable assignment of benefits by measure, based on evaluation of all simulation results, is estimated to be: 0.9 GW/yr each for the comprehensive lighting retrofit and the variable air volume (VAV) HVAC retrofit (each saving about 13% of total pre-

retrofit energy), and 0.6 GWh/yr for the energy management procedures in place before the retrofits occurred, we estimate that total energy savings would have been about 1.6GWh/yr for the EMS retrofit (based on our short-term field test and simulation calculations).

The cost savings for the retrofits indicate the impacts of the utility electricity rate structure for the building. The lighting and VAV retrofits provided significant benefits from reduction of electric demand during peak periods, while the controls retrofit did not. Thus, the dollar savings from the control retrofits are proportionally less.

CALENDAR OF EVENTS

Fourth EuroPIA International Conference

21-24 June, 1993

Delft University of Technology

ADVANCED TECHNOLOGIES
Architecture - Planning - Civil Engineering

The main theme of the **EuroPIA'93** conference is "The prerequisites for and the impacts of advanced technologies in civil engineering, architecture, building engineering, urban design and urban planning". This concerns the integration of these technologies in the following fields: research, development, education and professional environments.

This conference aims at bringing together professionals and scientists, providing a forum for the exchange of ideas and experiences related to the integration of the new technologies and to discuss terms and conditions for introducing **new tools** (offered by the latest developments in the fields of artificial intelligence, robotics and image processing) and the **new strategies** (required by the inevitable changes of the professional and educational working environments).

Relevant subjects and themes of EuroPIA'93

- intelligent design support environments
- decision support systems
- knowledge representation
- human and machine intelligence
- image processing
- computer vision (applications and components)
- machine training and learning systems
- construction robotics
- intelligent design and planning tools
- computer graphics
- interactive virtual realities for design and planning
- intelligent CAD-CAM-CIM
- design and planning informatics

At present the following workshops will be organised

- research in architecture/building engineering/civil engineering and technology in 2000
- intelligent (design) information environment
- research in urban design/urban planning and technology in 2000
- intelligent CAD systems
- computer vision and image processing
- building and construction robotics
- decision support systems
- research in education and technology in 2000

For further information please contact: EuroPIA'93 Conference Secretariat, Aula Congress Office, Delft University of Technology, P.O.Box 5020, 2600 AA Delft, The Netherlands. Tel: 31.15.78.80.22, Fax: 31.15.786755, E-Mail: wwbnbeh@tudrva.tudelft.nl

Computing in Architecture

ACADIA Conference

October 14-17, 1993
Texas A&M University

ACADIA (Association for Computer-Aided Design in Architecture) is to hold its annual conference at Texas A&M this year.

The College of Architecture at Texas A&M University is hosting a "Computing in Architecture" Event that will take place from 14 through 17 October of this year. Highlighting this event will be a one-half day colloquium and a three-day conference of ACADIA (The Association for ComputerAided Design in Architecture). The colloquium will be oriented toward CAD in Practice, and the ACADIA conference has the theme: "Education and Practice: The Critical Interface."

There will be no registration fee for attending the "CAD in Practice" Colloquium, and the fee for attending the ACADIA conference is expected to be about \$150. Included in the Computing in Architecture Event will be CAD vendor exhibits, tutorials in CAD software use, guided tours and demos of the College's Visualization Laboratory and the Electronic Design Studio, and a reception for interfacing with attendees from other firms and universities from throughout the world.

For more information, please contact: Vallie Miranda or Larry Degelman Site Co-ordinators for the ACADIA Conference Phone (409) 845-1015 Fax: (409) 845-4491 e-mail: larry.archone.tamu.edu

FUTURE/BUILD '93

"Building for Competitive Advantage"

October 25-27, 1993

Mart Plaza Hotel, Chicago

FUTURE/BUILD '93, an international conference presented by the Intelligent Buildings Institute

Foundation (IBIF), will address these issues within the framework of building solutions for the future. The fourth annual FUTURE/BUILD conference will be conducted at the Mart Plaza Hotel, October 25-27, 1993 in Chicago, Illinois, USA.

For further information and registration, call IBI at 202/457-1988 or fax 202/457-1989.

BEPAC 1994 CONFERENCE

BEP'94

Building Environmental Performance: Facing the Future

5-8 April, 1994

York, United Kingdom

Supported by IBPSA

Conference Theme

Building Performance is a central issue on today's environmental agenda: making buildings comfortable to live and work in takes more energy, and generates more CO₂, than any other single purpose in the developed world. Recent years have seen a considerable effort in the building performance field, with substantial programmes of R&D being fostered by the International Energy Agency, the Commission of the European Communities, and national bodies such as the UK's Science and Engineering Research Council, the US National Science Foundation and their respective Government Departments. Together these programmes have brought about significant improvements to the state-of-the-art in building design and performance - not least by improving the underlying theory and practical implementation of performance prediction methods. At the same time, the pace of change has widened the gap between research and practice and created the need for better interpretation and dissemination of research results, and for more specialist involvement in design.

Venue

The conference will be held at the University in the historic city of York. This ancient city, which is

dominated by a magnificent medieval Cathedral, is served by excellent road and rail links, easing travel from major UK airports. The programme will include a formal dinner.

For further information please contact: Mrs.Elaine Baker, BEPAC Administration, BRE, Garston, Watford WD2 7JR, United Kingdom. Tel: 0923.664.132 Fax: 0923.664.780

FOCUS ON

The Alliance to Save Energy

The Alliance to Save Energy is conducting a multi-year program to develop sound policies and programs to improve energy efficiency in residential, commercial and federal buildings. Their efforts include projects to involve both the private and public sector in identifying how to improve the energy efficiency of buildings; how private institutions, such as the banking and utility industry, can create market-based approaches to stimulate efficiency and help disadvantaged homeowners; models to improve federal, state and local building codes; and how the federal government can make public buildings more energy efficient.

Federal Buildings Energy Conservation R&D Programs

The Alliance joined with the American Council for an Energy-Efficient Economy to organise an advisory panel of industry representatives and researchers from national laboratories to review and analyse the Department of Energy's (DOE) Buildings Conservation R&D Program. We published a report containing policy recommendations which will form the basis of our efforts over the next several years to educate policy makers in the Administration and on Capitol Hill about making federal conservation R&D programs more effective.

Federal Energy Management

In 1990, the Alliance published a study of the opportunities for saving energy in federal buildings and ways to improve the federal government's management of its energy use. Many of our recommendations are now part of the energy bill enacted in October 1992. Key provisions will enable private-sector energy service firms to provide financing and energy efficiency equipment to federal facilities. We will continue to monitor and urge federal agencies to reduce their energy use and costs through these arrangements with private firms, and to participate in utility demand-side management programs.

Commercial Building Retrofit Strategy

The Alliance is completing a review of federal efforts to upgrade the energy efficiency of the existing stock of commercial buildings. This project involves the organisation of three advisory panels:

1. representatives of organisations own large stocks of commercial buildings, such as pension funds and insurance companies.
2. manufacturers and installers of energy efficient equipment
3. academic and national laboratory researchers involved in building retrofit research.

Recommendations on improvements in the federal program and other programs that will stimulate energy-efficient commercial retrofits are being made. The Alliance plans to pilot-test a commercial building retrofit strategy in several locales during 1993-94.

Energy-Efficient Mortgages and Home-Energy Rating Systems.

The Alliance played a major role in the formation and adoption of languages in the Energy Policy Act of 1992 which directs DOE to establish uniform, voluntary guidelines for Home Energy Rating Systems and for the Department of Housing and Urban Development (HUD) to pilot test enhanced Energy/Efficient/Mortgages in five states within 24 months. In 1993, the Alliance will aggressively implement the EEMS/HERS provisions of the Energy Policy Act designed to increase housing

affordability through increased access to energy-efficiency mortgage financing. Staff will assist in the development of uniform HERS guidelines for voluntary use in areas where no rating systems exist. The Alliance will also participate in the formation of a National HERS Council necessary for accreditation of HERS systems. Staff will provide technical assistance to the new HUD pilot tests and actively seek participation by consumers, mortgage lenders and the real estate industry. Consumer and stakeholder demand for EEMS/HERS will be increased through articles, conference papers.

Utility Demand-Side Management Programs.

The Alliance is demonstrating how to integrate residential conservation programs in gas utility demand side management programs. Over 60 percent of US homes are heated with natural gas, yet few gas utilities offer conservation programs to residential customers. The Alliance is helping a local utility in Washington, D.C., to design a residential multi-family building program compatible with both utility and customer needs. The Alliance plans to increase the involvement of utilities in promoting energy-efficient mortgages and rating systems to their customers as part of demand-side management programs.

Low-Income and Elderly Home Weatherization Programs.

The Alliance organises innovative programs to demonstrate more cost-effective and energy-saving ways for state and utility weatherization programs to lower energy bills for low income families. Working with community action agencies, state energy offices, utility companies and the Oak Ridge National Library, we conducted three field test of advanced energy auditing techniques and ways to select measures based on life-cycle economics. Field tests conducted in Wisconsin, New York, Oklahoma and North Carolina showed that it is possible to doubt energy savings using these techniques. We will use issue briefs and lectures to educate weatherization groups across the country about the advanced auditing techniques.

Improving State and National Building Codes

The Alliance is working on a multi-year project to accelerate the adoption of more energy-efficient construction standards in state building codes. In 1991 the Alliance published a study showing major energy savings are possible if state building codes are upgraded to those recommended by the Council of American Building Officials' Model Energy Code (CABO-MEC). The Alliance has initiated projects in selected states to help upgrade their codes. The Alliance is helping to educate builders, real estate professionals, and customers about the benefits of higher energy efficiency standards in building codes.

The Alliance also played a major role in the acceptance of changes to the MEC. As of 1993, these changes will result in 5 percent to 15 percent further improvements in the efficiency of new commercial buildings built to the revised MEC. In 1993, the Alliance will participate in an administrative review and revision of the MEC to include up-to-date performance standards. Although technically complex, such improvements of these codes are likely to have major impacts on the energy savings potential of the buildings industry.

For further information please contact: Malcolm Verdict, Director of Research, The Alliance to Save Energy, 1725 K.Street, N.W.Suite 509, Washington DC 20006. Tel: 202.857.0666

READERS'FORUM

Articles published in the IBPSA Newsletter are open to debate. Please send your written observations, comments, suggestions about the published articles to the IBPSA Secretariat.

IBPSA received the following request from Marcq & Roba, Consulting Engineers, Bd.Leopold II, 221 B-1080 Brussels, Belgium. Fax: 32.2.425.60.77

Dear Sirs,

we would like to receive information about existing software dealing with the "simulation of thermal dynamics in buildings". We are especially looking for a software which is capable of:

- simulating the functioning of systems.
- estimating the annual needs of a building.
- heating energy needs
- air-conditioning needs
- electrical consumption

If you can help us please contact Mr.Coppens at the above mentioned address.

IBPSA MEMBERSHIP APPLICATION

Membership Classification Desired
(Check One)

- ☐ Sustaining Member US\$500/year
An individual, company, or institution unrelated practice
- ☐ Member US\$75/year
A graduate from a college or university, or a registered Professional Engineer or Architect.
- ☐ Student Member US\$25/year
An individual under 25 years of age who is a full-time student.

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Please pay by **bank transfer** to the IBPSA-SCS account: 290-0031830-35 of the Generale Bank, Agentschap Gent-Centrum, Kouter 8, B-9000 Ghent, Belgium.

Or pay by **Credit Card**:

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IBPSA PUBLICATIONS

The proceedings for BS '89 and BS '9, are available from the IBPSA Secretariat as long as stocks last

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BS-91	\$55US	\$90US
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BS-89&91	\$75US	\$150US
IBPSA Report(*) free 92.1		\$20US

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or for those in the US and Canada to:
Society for Computer Simulation International P.O. Box 17900 San Diego, California 92117-7900 USA Phone: 619-277-3888 FAX: 619-277-3930

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Acceptable formats are Microsoft Word (MS-DOS,
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interchange format, PICT format, PAINT format. Please
do not hyphenate or justify ASCII text. Please include a
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IBPSA

The Professional Association devoted to improve the Built Environment through Computer Simulation and Analysis.

Mission

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

Goals

Along with building designers, owners, operators and developers, identify problems within the built environment that may be solved by improved simulation tools and techniques.

Identify the performance characteristics of buildings on which simulation should be focused.

Identify building performance simulation R&D needs and transfer new development to the user.

Promote standardisation of the building simulation industry.

Inform and educate its members and the public regarding the value and the state-of-the-art of building performance simulation.