ibpsaNEWS

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MESSAGE FROM THE IBPSA PRESIDENT

The production of a substantial conference like BS'93 requires the efforts of many persistent, conscientious and dedicated people working toward a common goal. Our thanks to Terry Williamson, Satour Promotions, Scientific and Organizing Committees, Session Chairs, and many others working in the background that made BS'93 both a Technical and Financial success. BS'93 would not be possible without them and our many many Sponsors.

BS'93, The Third International Conference held in Adelaide, Australia, 16-18 August 1993; attracted a total of 106 delegates from some twenty countries representing all five continents. Conference facilities were superb and so was the Gala dinner. The Koala bear literally stole the show at the Gala event. By my account the Koala must have been photographed at least a zillion times.

Outstanding Achievement Awards were presented to both James Brown and Tommy Kusuda. Although they were not there to accept the award in person, their alternates accepted the awards at the presentation ceremony.

For those who missed the opportunity to attend, you can obtain a copy of the Proceedings from the IBPSA Secretariat in Belgium. The conference theme 'technology enhances productivity' was well served by the high calibre of papers presented and an equally high calibre of session summaries by the session chairs.

Further details about the papers, session topics and session summaries can be found in the article by Rik Van de Perre on page 5.

As a result of this event a new initiative to formulate an Australasian Group under the banner of IBPSA was launched. Terry Williamson has offered to manage the creation of such a group for the first year. This group will draw participation from the Asian belt countries including China, Singapore, Malaysia, Philippines, Newzealand, Australia and India. We will keep you posted on the developments as they will unfold. Please spread the word to your colleagues and encourage them to recruit as many members as possible.

The other significant announcement you should take note of is our next conference in Madison, Wisconsin, USA. John Mitchell and his colleagues are putting together their proposal for the next BS'95 and we will learn more about it in New Orleans. Please stay tuned.

An ad-hoc meeting of the Board of Directors (those present) was also held in Adelaide with the view to explore some issues and to make recommendations to the IBPSA membership for further consideration. Highlights of the minutes of that meeting are printed on page 4 for your information.

Dan Seth

NEXT IBPSA BOARD MEETING

IBPSA Board Meeting

The next IBPSA Board of Director's meeting will take place on 22 January 1994 at, 6:00p.m.in the Bayou I, The Fairmont Hotel, New Orleans

Agenda

1. Call to Order — Seth
2. Roll Call — Haberl
3. Accept Agenda — Seth
4. Approval of Minutes of Denver Meeting — Haberl
5. Review of Action Items & Announcements — Seth
6. Old Business
   - 6.1 BS'93 Conference Summary Report — Seth/Sowell
   - 6.2 Executive Director/Secretary Status Report — VdPerre
   - 6.3 Financial Report — Sowell
   - 6.4 BS'95 Proposal — Mitchell
   - 6.5 ASHRAE Response to BS Publications — Seth
   - 6.6 Elections — Witte
   - 6.7 Formal History of IBPSA — Sowell
   - 6.8 Electronic Bulletin Board Status — VdPerre
   - 6.9 New Program Initiatives-Proposals — Haberl
   - 6.10 1/2 Day Tech. Symposia Status in Orlando — Witte
   - 6.11 ETH Conference Status — VdPerre
   - 6.12 Adelaide Ad-Hoc Meeting Recommendations — Sahlin
7. New Business
   - 7.1 Executive Secretary Contract Renewal — Seth
   - 7.2 BS'95 Planning — Mitchell
   - 7.3 IBPSA By-Laws Review — All
   - 7.4 Membership Drive — VdPerre
   - 7.5 New Initiatives — All
8. Adjournment

IBPSA BOARD MINUTES

Minutes (Condensed Version)

IBPSA Board of Directors & General Meeting

June 26, 1993, 6:00 P.M.

Golden Nugget Room, Lobby Level

Hotel Denver, Denver, Colorado

Present: Carol Gardner, Philippe Geril, Jeff Haberl, Curtiss Pedersen, Dan Seth, Ed Sowell, Michael Witte

The following minutes are condensed to the motions carried.

The Updated Agenda

Dan reviewed the updated agenda. Larry made the motion and Ed seconded to accept the agenda as amended.

The Approval of the Chicago Minutes

Sowell moved to accept. Taghi seconded. Motion passed. Witte commended the IBPSA secretary for the voluminous minutes.

IBPSA Book prices as being proposed to ASHRAE

Dan Seth said he had not yet formally written to ASHRAE with regard to IBPSA booksales through the ASHRAE network. After some discussion within the Board prices were set at the same level as those now being handled by SCS. As the Proceedings depreciate in value year by year, new prices were proposed by the Board, which would be valid from this moment on, awaiting future review.

The Board moved and unanimuously approved the following prices:

	ASHRAE. BOOKSTORE	
	Non-Member	Member
BS89	$25.00	$25.00
BS91	$60.00	$40.00
BS93	$90.00	$55.00

IBPSA Technical Symposia

Witte moved that IBPSA plan on holding a 1/2 day IBPSA technical symposium (content to be determined) during the summer meeting of the off year for the BS conferences, which was a 2 day technical symposium. This would be composed of formal and informal content and would generate a set of proceedings. Degelman seconded the motion. A 1/2 day Technical Symposium will be held in Orlando in June 1994.

The European Members were encouraged to hold the same sort of Technical Symposium in Europe.

IBPSA Finances

The contract account for the Executive Seceratry and Director were tabled, reviewed and accepted by the Board. The Financial Statement presented by Ed Sowell for the Association was adopted based on the motion put forward by Jeff and Chip.

IBPSA Long Term Planning

After some linguistic discussions on the contents of the IBPSA Strategic Plan as put forward by Dan Seth, a motion was made by Sowell to accept the DRAFT long range plan document as published. The motion was seconded by Degelman. The Board agreed to publish 500 copies of the booklet for distribution to the membership.

IBPSA Awards

Jeff Spitler discussed the IBPSA Awards. He said that he received 5 nominations, 4 for "distinguished service," and 1 for "young investigator". After the vote by those present, Mike and Taghi moved to "accept the award nomination as proposed".

IBPSA Bulletin Board.

Larry and Mike Witte are to have a working group consisting of Jeff Spitler, Jeff Haberl and Chip Barnaby to help Philippe select a site for the IBPSA Bulletin Board. This assumes that Philippe will send letters within 30 days of this meeting to the four sites. responses would be due within 60 days, and a decision by the group within 90 days.

IBPSA Newsletter

Ed and Jeff moved to proceed with the second printing of the newsletter, with approved money by Dan, and to prepare a newsletter for distribution prior to the January

1994 meeting. Furthermore it was decided to go with high quality printing of the Newsletter in future.

IBPSA Joint conference in Zurich

Ed and Taghi moved to accept the proposal put forth by Rik Van de Perre to hold a dedicated IBPSA session as part of the CISS Conference in Zurich, (this can be considered as a first major IBPSA event next to the proprietary BS conference) and to proceed with the proposed session to the 1994 ETH conference. (see CISS'94)

IBPSA Elections

Dan proceeded to discuss the election of the next Board of Directors. As, in the past some difficulties were encountered to hold the bi-annual elections, a nominating committee was set up. Haberl suggested that the first thing needed to be done was to determine if the current members would be willing to stay on, something which could be done by phone. Witte countered, however, that the bylaws were very clear that the same persons could not succeed themselves. Haberl mentioned that the current clause was clear that if nobody was elected to take their place they could serve. (a carry-over provision of the clause that gives IBPSA the flexibility to re-appoint some officers and Board members). Witte said that this was the job of the nominating committee. Chuck Sherman, Larry Degelman, and Mike Witte agreed to be on the nominating committee. .Jeff Haberl and Ed moved that Chuck, Larry and Mike should be the nominating committee and that a ballot was to be mailed by December 1st, 1993, with results to be collected by January 1st, 1994.

New Initiatives

Jeff Haberl and Taghi moved to have a committee produce 12+ one-pagers (title, abstract, 3 line budget, deliverables) for the New Orleans meeting. The current format of the meeting was discussed. Several members felt that holding a Board meeting and general meeting at the same time was too much. It was therefore, decided that the next 'IBPSA Meeting' would be a single meeting in New Orleans. This would be accompanied by a 1/2 day IBPSA Technical Symposium to be held at Orlando, in June.

IBPSA official history

Jeff Haberl/Witte for Ed to create an official history of IBPSA that would not offend anybody, and to include comments from Ayres, Seth, Mitchell and Pederson.

IBPSA Ad Hoc Board of Directors Meeting

August 17, 1993, 12.30 p.m.

Adelaide Convention Centre

Adelaide, Australia

Present: , Clarke, DegelmanPelletret, Sahlin, Seth, Van de Perre, Williamson (conf.convenor)

The purpose of this ad hoc meeting was to discuss and formulate recommendations regarding two agenda items:

1. The production of an "IBPSA Conference Organisation Guide". IBPSA has organised three succesful international conferences. A conference style has evolved and a great deal of practical experience has been gained. It is now time to collect this material in a useful form to support future IBPSA conference organisation teams and to establish more definite terms of reference for the conference organisers.

2. Project initiatives: IBPSA now has sufficient financial strength to undertake some concrete projects.

Seth commenced by briefly relating the major points of discussion of the Denver meeting for those who were unable to attend. Formal Denver minutes will be distributed shortly.

Clarke gave his views of what should be IBPSA's role concerning local building simulation organizations. The structure of the UK BEPAC association was taken as an example of a well-functioning local effort. BEPAC currently has about 150 members, many of which are active in Task Groups, which are devoted to specific aspects of building simulation, e.g. validation. A newsletter is issued on a regular basis.

Clarke pointed out that IBPSA should not try to compete with national efforts, such as BEPAC. The functions of IBPSA should be to:

- serve as a communication centre between local organisations
- communicate relevant national activities to its membership
- organise international conferences
- host an international building simulation Electronic Bulletin Board System
- seek to initiate local building simulation organisations in geographical areas, such as the Baltic states, where there is currently little activity

A free discussion then commenced regarding the first agenda item. It was agreed to give the following recommendations:

1. a conference manager must be formally authorized, within given limits, to act on IBPSA's behalf
2. a document should be produced stating the terms of reference for the conference organisers
3. guidelines should be written to support conference organizers.

Terry Williamson (BS'93 convenor) agreed to prepare a set of notes - summarizing his experiences from the BS'93 organization - which can be used as a base for the production of the discussed documents.

Rik Van de Perre (BS'91 convenor) agreed to do the same with respect to BS'91.

It was agreed to recommend that IBPSA should seek to establish a conference organization early enough to make it possible for the planned conference to be announced at the previous one.

Pelletret proposed that low conference registration fees should be asked from students in order to attract more local students to each conference. The group agreed to make this a recommendation.

Clarke brought up the possibility of a similar fee reduction for practitioners. However, the group felt that, for this category, the conference fee most likely has less impact on the individual's decision to attend.

Three potential IBPSA projects were then discussed:

1. Clarke will investigate the possibility of utilizing an EHBS from an EHBS from Univ.of Newcastle which presently can be used free of charge.
2. Pelletret will draft a work statement for the production of a glossary of building simulation terminology.
3. Also briefly discussed was the possibility of a dictionary of CAD and energy terminology, to be published by IBPSA. No decision was reached on this issue.

IBPSA CONFERENCE UPDATES

REPORT FROM THE IBPSA BS'93 CONFERENCE

Last August, the world building modelling community gathered "down under".

The IBPSA bi-annual Building Simulation conference (BS'93), convened at Adelaide in South-Australia. For three days, one hundred model developers and model users discussed the latest developments and future directions of Building Simulation.

71 papers, authored by 140 researchers from 65 institutions, were presented in 5 conference tracks, covering 21 distinct session topics.

The **FUNDAMENTALS** track (25 papers) covered topics ranging from 'heat and mass transfer', 'controls and equipment', 'air flow modelling', 'weather', 'lighting', 'structures and construction', up to 'fire simulation'.

The **APPLICATIONS** track (16 papers) paid attention to 'building simulation in practice', 'multidiscipline integrated tools', 'building design', 'simplified methods', and' standards and regulations'.

The **TECHNOLOGY TRANSFER** track (15 papers) discussed 'user needs and experiences', 'education', 'user-interfaces' and 'case-studies'.

The **METHODS AND COMPUTER APPLICATION** track (9 papers) went to the core of the simulation activity dealing with 'mathematical methods',

'simulation environments' and 'object oriented environments'.

Finally the **VALIDATION** track (6 papers) investigated some quality assurance aspects of the simulation business, from a 'general validation' perspective up to 'validation case studies'.

An incomplete overview of discussion topics addressed during the conference, include items like:

- how to pose correct questions
- how to formulate a modelling problem
- how to model a building
- how to integrate computer tools A and B within a single environment
- how to reassure that one is not excluding or overlooking some important facets
- when to use detailed simulation models
- do we have enough insight of how simulation models are used
- what is the purpose of simulation: to develop insights or to generate numbers
- how to validate models
- how to verify predicted multi-zone air flows
- when to use CFD compared to zonal air-flow models
- how valid is the older GLASER moisture model
- how to incorporate detailed moisture models into whole building simulation programs
- how practical is the control of radiant cooling systems with a single operating temperature
- what is the effect of the sensor location on the overheating predictions
- how to account for the variation in lamp power and light output with the lamp wall temperature
- how to model moisture absorption. desorption and accumulation by building materials
- how to model evaporative cooling systems
- how to use fuzzy-logic to define the rules of rule-based controllers for HVAC systems
- how to develop a taxonomy concept that gives modellers greater flexibility in creating new models
- how to use stochastic modelling and genetic algorithms to optimise the control of HVAC systems
- how to simulate daylight performance of fenestration systems in spaces of arbitrary complexity
- where to obtain and how to use daylighting data
- what is the available budget for simulation
- how to simulate automation in the construction process
- how to couple simulation to CAD-packages
- how to simulate thermal loads in constructions
- how significant is thermal stratification in large glazed spaces
- how to model multiple sources of buoyancy in enclosures
- what is the behaviour in enclosures with opposite sources of buoyancy
- how to simulate non-isothermal air flows
- what is the effect of conduction through walls on the air flow pattern
- how to model air flows through small openings
- how to model air and heat flows through large openings between stratified building zones
- how to model turbulence

- what are the limitations of physical testing in wind tunnels compared to 3D CFD modelling
- can a new building change the ventilation pattern in a natural ventilated existing building
- how to implement multi-zone air flow models in Neutral Model Format software environments
- how to implement 3D-air flow models in object oriented simulation environments
- what is the impact of furniture on simulation results
- how to generate the data needed to estimate energy consumption and design loads
- how sensitive are estimates to uncertainties in input data
- what is the best way to use weather data
- how to define extreme conditions
- how to estimate missing data
- how to solve inverse problems such as fault detection and optimal control problems
- how to target a coherent set of tools supporting different user-levels
- is 'natural' problem partitioning more efficient than automatic problem partitioning strategies
- how to support (user-driven) hierarchical partitioning of the problem
- how to upgrade existing or new simulation tools to an intelligent simulation environment
- how to add functionality (data-sharing, coupling or reasoning facilities) to a graphical front-end
- how to take benefit of model documented methods like NMF and PROFORMA
- is NMF the best way to decompile existing models for implementation in new OO-environments
- what is the current status of various OO building simulation projects
- what is the future of OO-simulation
- can re-use (of existing codes) and re-engineering (of new OOP codes) be combined
- how to develop an Integrated Data Model: bottom-up approaches versus the top down approach
- how to take benefit of the ISO-STEP technology
- how do building parameters and operating conditions influence energy end use and load profiles
- how to develop simple models relating heating and cooling energy to envelope characteristics
- is there a place for simplified design tools
- what is the viewpoint of the practising engineer
- is energy simulation too complex for most new building projects
- where are the greatest opportunities for building simulation
- how to join forces in building simulation
- what type of information do users have and need
- will the market for simulation software ever grow
- what is the optimal format of information for a design professional
- how do computer tools change the way of learning about a subject
- how does computer technology change the type of design information
- how to train users of simulation based building performance analysis tools
- how to get input data in building audits through low cost short term metering systems
- what are the benefits of sensibility analysis
- what is a good methodology for the thermal evaluation of a building

- are existing softwares suited for building analysis in hot climates
- who needs computer tools, and why
- where is appropriate input data available
- why is Building Simulation (not) used
- how to interpret outputs from simulation programs
- how to design program interfaces suited for the design process
- how to design user interfaces for the design process
- how to go from model validation to model accreditation

For those who may have similar questions, and missed the opportunity to attend the most important Building Simulation event of the part two years, first class edited Proceedings (579pp) of the Building Simulation '93 Conference are available , and can be ordered from the IBPSA Secretariat, (together with Proceedings from previous IBPSA Conferences).

An IBPSA Publication list and order form is enclosed in this Newsletter

The overwhelming technical progress which has been made over the past two years in each of the 21 above identified building simulation topics cannot be summarised in a single column article.

Nevertheless some common threads became apparent during the conference:

- yes, the modeller can now be freed from the simulation burden
- yes, even more complex systems can now be modelled
- yes, existing and new simulation tools can be upgraded to integrated simulation environments
- yes, new simulation engines have reached some maturity (concerning their internal mechanics)

The papers presented at the conference clearly illustrated that today Building Simulation Technology is already capable of enhancing productivity, while indicating that continued research and developments in Building Simulation techniques may enhance tomorrow's productivity even further.

Now that a lot of the obstacles, (related to internal simulation mechanics and to external market constraints, - which prohibited in the past an efficient building simulation activity), are rapidly disappearing, the modeller is able to concentrate exclusively on his one and only job, namely to model a building, and to evaluate the performance of the building through simulation.

This gives more power, freedom and flexibility to the building modeller.

Simulation Systems have improved, and as reiterated many times at the conference, good modelling systems are systems, which are invisible to the modeller. But do we agree on a common definition for good modelling techniques?

Better modelling systems are within easy reach, although specific transfer initiatives are necessary to bring the new technologies on to the market place. But is the market place ready (or capable) to absorb the increase in simulation power, freedom and flexibility ?

Many of the presented papers, as well as the lively discussions at the conference, illustrated the growing awareness amongst model developers and model users, for the need of a standard framework of a building simulation methodology, in order to measure and ensure 'quality'.

This does certainly not mean that current building simulation work would be of low quality, but documenting building modelling domain knowledge, upgrading this domain knowledge with the input from the building modelling community, and bringing (translating) this domain knowledge within simulation environments, (for existing and newly developed simulation engines), were recognised by many conference participants to be weak parts of the current building simulation practice, which also risk to slow down the 'productivity' related building simulation developments.

Productivity of Building Simulation can be measured by evaluating the internal mechanics of the simulation process. Quality of Building Simulation can be assessed

by investigating how well a modeller did follow an agreed simulation methodology. Any building simulation methodology should ensure that:

a) a problem is correctly formulated

b) the feasibility of simulation is investigated

c) a set of appropriate models and simulation engines is selected

d) a set of appropriate input data is chosen

e) the selected models and simulation engines are correctly used

f) the model results are correctly interpreted

g) quality assurance procedures are in place at every level of the methodology

A lot of creative thinking already started to arrive at a good framework for a building simulation methodology, while a tremendous effort will be needed to formalise various simulation methodologies adapted to the many different building problems, - as they occur world-wide.

Productivity and Quality must be both considered in Building Simulation. This was a clear message heard at several Building Simulation '93 sessions. Proving and improving the 'quality' of our today's building modelling and simulation activity, is a major challenge for the future.

Rik Van de Perre

First Joint Conference of International Simulation Societies

August 22-25, 1994, ETH - Zurich - Switzerland

IBPSA Conference Track:

Building Simulation

Scientific program - Building Simulation

Conference Chair: Rik Van de Perre, Brussels (BE)

Program Chair: Alfred Moser, Zurich (CH)

General Conference Chair and contact:

Jurgen Halin, ETH Zurich, Institute of Energy Technology, Claussiusstrasse 33, CH-8092 Zurich Switzerland, Tel: +41.1.632.46.08, Fax: +41.1.262.21.58, E-mail: Halin@czheth5a.bitnet

Suggested Session Topics

1. BUILDING CONSTRUCTION SIMULATION

1.1 Structural Engineering

1.2 Soil Mechanics

1.3 Earthquake Simulation

1.4 Building Construction Management

1.5 Building Life-Cycle Analysis

1.6 Urban Planning

2. BUILDING PROCESS SIMULATION

2.1 Heat and Mass Transfer

2.2 Fluid Flow Modelling

2.3 Indoor Air Quality

2.4 Lighting and Daylighting

2.5 Acoustics

2.6 Fire-Safety

2.7 Plant and Controls

2.8 Building Management

3. BUILDING SIMULATION IMPLEMENTATION

3.1 Modelling Approaches

3.2 Simulation Environments

3.3 Intelligent Environments

3.4 Building Visualization

3.5 Human-Computer Interfaces

4. BUILDING SIMULATION TRANSFER

4.1 Validation and Quality Assurance

4.2 Education and Training

4.3 Technology Transfer

4.4 Simulation Tools and Case Studies

4.5 Policy, Standards and Regulations

Conference Calendar:

Abstracts due before	31.01.1994
Notification Acceptance before	31.03.1994
Camera-ready Copies due by	31.05.1994

WELCOME TO IBPSA

IBPSA is pleased to have already 34 paid-up new members for 1994 in the first week of January. For those interested in becoming a member of IBPSA, use the enclosed membership application form.:

Hiroshi Akasaka	Japan
Abdul Al-Hammad	Saudi Arabia
Marx Ayres	USA
Liana Berberidou	USA
Oliver Berchtold	Switzerland
Axel Bring	Sweden
G.Z.Brown	USA
Mario Chiarelli	Canada
Raphael Compagnon	Switzerland
Angelo Delsante	Australia
A.L.Dexter	United Kingdom
Neville D'Cruz	Australia
Jonathan Finkelstein	Australia
Tetsuo Hayashi	Japan
Joe Huang	USA
Sam C.Hui	Hong Kong
Alexandre Jeandel	France
Søren Östergaard Jensen	Denmark
Drewe A..Just	Australia
Kjell Kolsaker	USA
Hong Ham Lam	Hong Kong
Tak Ming Lay	Hong Kong
Miguel Munoz	Germany
Abdullatif E.Nakhi	United Kingdom
John Palmer	Australia
Cor Pernot	The Netherlands
Prasasto Satwiko	New Zealand
John G.Silverio	Canada
Edward Sowell	USA
Sinisa Stankovic	United Kingdom
Raine Talonpoika	Finland
Karel J.Veldhuisen	The Netherlands
Emilio Vicario	USA
Terry Williamson	Australia

GENERAL INFO

WHAT IS CADDET ?

CADDET was established in 1988 under the auspices of the International Energy Agency (IEA) and is currently supported by thirteen countries.

CADDET provides a mechanism through which information from CADDET member countries on demonstrated energy saving technologies can be exchanged and disseminated. The overall aim is to encourage well informed decision making and an increased repetition of successful demonstration and similar projects.

CADDET provides information and analysis of all aspects of demonstrated energy technologies in the following end-use sectors

- transport
- industry
- buildings
- agriculture
- utilities

CADDET produces

1. Analyses Series reports, comparative analysis reports on demonstration projects of specific technologies.
2. the CADDET Register, a database on demonstration projects, completed and ongoing, in member countries.
3. the CADDET Newsletter, a quarterly journal giving details of ongoing demonstration activities, forthcoming meetings, energy prices and book reviews.
4. brochures, information sheets highlighting projects of specific interest or replication potential.
5. Expert meetings, to discuss specific energy efficient technologies and results of analysis work.

CADDET Analyses Series reports may be ordered from G.Van Hoof, NOVEM, CADDET Centre, P.O.Box 17, 6130 AA Sittard, The Netherlands.Tel: 31.46.595.224, Fax: 31.46.528.260

All reports cost:

US $25 to CADDET member country citizens and organisations

US $100 to IEA members but non CADDET members.

US $200 to non IEA member countries

For general enquiries and orders from non-member countries please contact the above mentioned address.

CADDET's relationship to the IEA

The IEA is an autonomous body which was established in 1974 within the framework of the OECD to implement an international energy programme.

A basic aim of the IEA is to increase energy security through energy conservation, development of alternative energy sources, new energy technology, and research and development.

This is achieved, in part, through a programme of energy technology and R&D collaboration currently within the framework of 35 Implementing Agreements, containing a total of more than 60 separate collaboration projects.

Rationale for CADDET

Through transfer of the results of the technology, which is applied in the demonstration projects, useful lessons can be learned from both successes and failures.

CADDET aims to overcome unnecessary problems and "re-inventing the wheel", caused by lack of communication between the information sources and interested parties.

CADDET acts as a cost-effective way of sharing information through transfer of technology on an international basis, thus complementing national activities. It should also lead to constructive discussion between the countries involved.

Organisation

CADDET records, analyses, compares and disseminates amongst participating countries detailed information on demonstration projects to promote more efficient use of energy. The organisation was established to accelerate the spread of reliable information on proven technologies, the exchange of experiences on what works and what does not, and the understanding of technical, economic and other factors which determine success of failure.

To carry out these functions, CADDET has evolved a system for international technology transfer which is made up of three key elements.

1. National Teams, serving as channels for the transfer of basic information to the Centre on suitable projects and for the distribution of our products to industry, users and decision-makers.

2. Analysis capabilities for better understanding of the technologies and other issues.

3. A Centre which through the central role in the system acts as a hub for the flow of information and serves as co-ordinator of common interests.

Energy Efficiency member Countries

CADDET Energy Efficiency started in April 1988 with nine countries. Its membership expanded to 15 in 1993. **Member countries are (alphabetically)**

Australia	New Zealand
Belgium	Norway
Canada	Republic of Korea
Denmark	Sweden
Finland	Switzerland
Italy	United Kingdom
Japan	USA
The Netherlands	

National Teams

National Teams (NT's) are the link between end-users in their countries and the CADDET Centre. On one hand, the NTs provide end-users with the information which is available through direct mailing of the publications, presentations at seminars etc.

On the other hand, NTs provide CADDET Centre with information on demonstration projects in their country.

This information will then in turn be disseminated over all member countries.

The NTs have an important central function in the organisation.

- Firstly, they are aware of the available knowledge in their country and can promote this through the CADDET organisation to a larger audience.

- Secondly, they are well informed of their government's policy with regard to energy efficiency (i.e. does the programme concentrate on transport, industry, or buildings? etc. and what aspects?

In other words, they are aware of what knowledge is needed in their country and, through the CADDET organisation, where it is available in other member countries.

The economic benefit of a well organised National Team in that specific knowledge is needed in their country and, through the CADDET organisation, where it is available in other member countries.

The economic benefit of a well organised National Team is that specific knowledge within a country reaches a larger than national audience, whilst money can be saved through learning from experiences of others.

CADDET Energy Efficiency deals with the reduction of energy use per unit of output without affecting the level of service provided. It involves the final consumption of energy for the production of heat, light or electricity. Technologies in the following sectors are covered;

- Agriculture

- Buildings
- Industry
- Transport
- Utilities (including district heating)

Products

The flow of information is contained in five products:

1) Register

The Register is a database of demonstration projects. It is the heart of the operation. It uses a FoxPro software database development and currently contains (end 1993) 1700 projects.

Information provided on a project is: a title, general, technical, operational, environmental and economic data. Furthermore information on organisations involved as well as available literature. The information contained in the Register can be accessed through searches on key-word, technology, country etc.

The Register can be purchased for NLG 160 (Dutch Guilders).

2) Technical Brochures

Technical Brochures represent those Register entries which have been identified as being of particular international relevance.

3) Analysis Reports

CADDET carries out technical and economic analyses on demonstration projects in the Register, covering similar processes or technical fields. They represent the lessons learned from projects and summarise the international state of the art. Therefore they present the intellectual added value of CADDET.

4) Newsletter

CADDET produces a quarterly magazine, the Newsletter containing articles on energy efficient demonstration projects or related activities.

The articles describe new technologies, products or processes being developed or demonstrated, or discuss aspects of more general interest such as training programmes, regulations etc.

5) Workshops and Expert Meetings.

With the aim of discussing the results of an analysis study or provide input hereto, workshops are being organised.

Budgetary representation of activities

The budget for CADDET Centre is some USD $1.000.000 This does not include the budgets for the National Teams in the member countries. Each country determines on an individual basis its level of participation in the organisation and subsequently its National Team budget.

CADDET REPORTS

Nr 1 Small-Scale Cogeneration

Nr 2 Heat Transformers in Industrial Processes

Nr 3 New Technologies for Heating and Cooling Supply in Office Buildings

Nr 4 Thermal Storage: Managing Electrical Loads in Buildings

IBM-PC version of DOE-2 software from Elite. EZ-DOE Elite Software's new, exceptionally easy to use IBM-PC version of the DOE-1.2d software that includes full screen input and editing with mouse support, includes a full 1,000 page manual. Contact: Terri King, PH# 409-846-2340, FAX 409-846-4367 for more information.

Interactive DOE-Plus from ITEM systems announced. DOE-Plus is ITEM Systems new interactive DOE-2 program that allows complete editing and graphical analysis of DOE-2 simulations on the PC. Includes a context sensitive help system for the BDL, and error checking. Contact: ITEM Systems, PH# 510-549-1444, FAX 510-549-1778.

Graphical, Weather-packing and DOE-2 Analysis Software from the ESL. The Energy Systems Laboratory at Texas A&M University now has MS/Windows-based graphical analysis tools, weather-packing facilities, and other post-processing software for DOE-2 simulations, including 2-D, 3-D, and animated carpet plots which can be used during calibrations. Contact: Dr. Jeff Haberl, PH# 409-845-6065, FAX 409-862-2762.

FTI/DOE version 2.1d and 2.1e from Finite Technologies Inc. FTI/DOE provides a comprehensive set of tools for performing DOE-2 analysis. Text-based and GUI-based versions are available for on DOS, UNIX, Macintosh and VMS platforms. Contact: Scott Henderson, PH# 907-272-2714, FAX 907-274-5379.

Prototype AEDOT scheduled for release from Pacific Northwest Laboratory. The first version of ASG Energy, an AEDOT software prototype to help produce energy efficient buildings is available from PNL. This unique software has been created through the team effort of PNL, the University of Oregon, and ASG of Sausalito, CA. Contact: Diana Shankle, PH# 509-372-4350, FAX 509-372-4394.

1994 ACEEE Summer Study. The American Council for an Energy Efficient Economy is planning their 1994 Summer Study to be held in August/September of 1994. ACEEE also publishes many state-of-the-art publications on diverse topics such as building energy efficiency, DSM, and energy policy. For a publications catalog contact: Glee Murray, PH# 202-429-8873, FAX 202-429-2248.

DOE-2 Users News. DOE-2 Users News, published by Lawrence Berkeley Laboratory for the USDOE, has been the source of the latest information concerning the DOE-2 program. For information about how to receive your copy contact: Kathy Ellington, PH# 510-486-5711, FAX 510-486-4089.

Nr 5 Natural Gas as a Vehicle Fuel

Nr 6 Energy Efficient Lighting in Commercial Buildings

Nr 7 Controls to reduce Electrical Peak Demands in Commercial Buildings

Nr 8 Energy Efficient Retrofitting of Office Buildings

Nr 9 Gas-Turbine Based CHP in Industry

Nr 10 Industrial Ventilation

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THE ENERGY DESIGN ADVISORY SERVICE AS AN AID TOWARDS A NEW WORKING FRAME

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In 1987, the Energy Design Advisory Service was set up as a joint initiative of the Royal Incorporation of Architects in Scotland, and The University of Strathclyde's Architecture and Building AidS Computer Unit (ABACUS). The scheme was funded by the then

UK Department of Energy and The Scottish Development Agency as a pilot for a UK wide scheme EDAS was so successful that it was decided to expand the service to the whole of the UK as the Energy Design Advice Scheme. The UK government is now in the process of setting up 5 UK centres.The launch of the second centre, in the South East of England at the Bartlett School of Architecture took place on the 5th March 1993, and the opening of a third centre in Northern Ireland is imminent. Each centre will have a staff of one or two people with expertise in low energy design and and an administrative back-up. In the framework of a integrated design, EDAS provides a unique service to building design teams and this paper outlines the service provided, highlighting the opportunities realised, benefits gained aimed and lessons learned from the operation of the scheme together with presentation of relevant case study material from live projects undertaken by EDAS.

1. BACKGROUND

EDAS aims to improve the energy performance of buildings by improving communication between available information and knowledge and the design professions via workshops, seminar, information dissemination, access to case study material, access to a catalogued in-house library of energy related design information and assistance with interpretation of the relevance of state of the art technology and design information including, potentially, development of knowledge-based systems. By so doing it is anticipated that an educational role will also be fulfilled by increasing the confidence of designer to adopt climate and energy sensitive design as a mainstream approach.

The EDAS scheme provides two levels of design advice. Up to one day's free advice on energy related aspects of building design on any eligible project and a second level whereby EDAS will meet up to 50% of the cost of a detailed energy study on any projects of 500 square metres or more, or on projects involving multiple units (.e.g. Housing)).The other main criteria for eligibility is a definite intent to build EDAS does not provide advice on feasibility studies There is a particular emphasis on solar and bioclimatic architectural design, due to the fact that EDAS is ultimately funded by the Department of Trade and Industry (DTI) through the Renewable Energy Programme.

It is not the intention that EDAS centres are perceived as centres of excellence" providing all of the advice from in-house expertise. The EDAS staff provides engineers with general initial advice and information on energy related aspects of design projects, and if eligible for detailed advice, will recommend independent, approved energy experts to provide clients with further distance. Thus, EDAS aims to improve links between recognised expert consultants and clients seeking advice. Ultimately it is hoped that when Government funding is finally withdrawn, the EDAS scheme will have enabled clients to form links with recognised information sources and experts in a number of energy related fields while simultaneously developing their own skills in these same areas. EDAS will then cease to operate having fulfilled its purpose.

2. OBJECTIVES

The main objectives of the project are:

2.1 information dissemination.

EDAS can provide UK design teams with access to much of the accepted Best Practice information available from recognised UK and other European research institutions. This extends to assistance with the interpretation and application of the information available.

Typically this phase forms part of the initial (free) one day service under which advice on the following is provided.

- Design principles for low energy/climate sensitive design
- Potential benefits (or otherwise) of simulation modelling
- Use of simple computer based calculation methods
- On selection of appropriate manual calculation tools

The scheme provides initial appraisals in-house, performing say, basic calculations.both manual and computer based, to assist in the design process.

Despite the availability of an abundance of design information, and computer based design tools, direct application of 'information' and 'technology' in relation to new projects is often difficult. Statements about 'oonsideration' of local climate or 'making use' of fabric mass may seem self explanatory, but assessment of local weather conditions and quantification of the impact of fabric mass will almost always be site specific. There is an ever growing need for new ways of turning information into knowledge. Much of this may seem self-evident, and identified and addressed by initiatives such as COMBINE. However, EDAS deals with around 150 enquiries per year, all of which relate to low energy, and bio-climatic design principles, we therefore have a potentially unique opportunity to:

- identify where advice on the application of low energy design principles is required and also where advice is readily available and understood.(thus providing an opportunity to identify educational shortcomings and principles already being adopted as good practice in low energy design)

- through live projects, identify critical stages in the design process to ensure advice will have maximum impact on ultimate energy use. (thus improving the effectiveness of advice given and highlighting the importance of communication between design team members at all stages)

- identification of patterns and paradigms in energy advice sought and advice given (thus, potentially, we will be able to develop knowledge based design advice systems for use in-house by designers, which are backed up by experience from live projects).

2.2 Expansion of Low Energy Design Expertise.

Climate sensitive, energy effective design can be approached from a number of standpoints. Energy effective designs can be realised without sacrificing aesthetic considerations. In fact, setting out to approach the design challenge with a low energy/bio-climatic objective con provide an ideal opportunity to throw off the usual design constraints faced by designers, offering a vehicle to explore new or previously neglected territory, resulting in innovative and far reaching solutions to old problems. However, in initial projects, the design process will require extra time and effort. Design teams may require advice and financial assistance. Despite a number of CEC programmes and initiatives designed to address the promotion of energy conscious, bio-climatic design as the accepted mainstream approach, designer in the main, still lack the information, skills and confidence to adopt methods which "design out" fail safes such as traditional heating and air conditioning. They also have little evidence in many cases, of the applicability of passive solar strategies to specific local climate. Although much of the information exists, it is often inaccessible or indigestible. In the case of simulation based applications most designers are either unconvinced of its utility or intimidated its complexity as an in-house tool. in addition, designers are often unaware of what information exists and how to gain access to both information and expertise. EDAS has endeavoured to provisional links to both information sources and specialist low energy design expertise.

EDAS aims, through mechanisms such as those outlined above, together with the following,

- to improve energy literacy by improving communication between available information and knowledge and the design professions:

- workshops to demonstrate and provide 'hands on' experience of new technology.

- supporting seminars to assist in information dissemination and to provide relevant, up to date case study material.

- assistance with interpretation of the relevance of state of the art technology and design information including, potentially, development of knowledge-based systems.

2.3 Access to Expert Consultants to Foster an Integrated Approach to Energy

Conscious Building.

By taking advantage of the service offered it is hoped that designers will gain confidence in the basic principles. To support these endeavours, EDAS also provides up to 50% funding assistance to aid evaluation of building energy performance on projects, linking design teams with expert consultants to assist in evaluation based on a variety of tools.

This puts at the disposal of design teams:

- a wide range of computer software both in house and via established expert consultants.
- in addition, benefits of testing new theories by computer
- benefit of experience and hindsight from previous projects, including identification of paradigms,
- consistencies and inconsistencies on similar building types.

Also, from experience of how people perceive design problems and react to advice given, EDAS can respond pro-actively to meet the needs of users better.

4. USER RESPONSE AND RESULTS

Surveys of EDAS's customers showed that the Service had been extremely successful in meeting the expectations of those who had initial consultations. 90% were satisfied that the service had been provided quickly enough and that the answer were helpful. In the case of Full Consultations, 75% were satisfied with the speed of response and 80% with the quality of information.

EDAS was monitored by a team of independent consultants over the period from June 1989 to November 1991. During this time over 300 initial (free) Consultations and around 62 partly funded consultations took place. Calculations of potential energy savings arising from consultations were undertaken. A wide range of energy savings was found, especially among full consultations, making these calculations dependent on significant variations in a small number of cases. A best estimate, agreed by the ETSU Project Officer, was that each initial consultation saved, potentially and on average, the equivalent of £600 per year, and each full consultation £11,300. These figures suggest that the average annual potential saving from projects directly receiving EDAS advice is in the order to £720,000. This may be compared with a one off payment by government to EDAS of about £400,000. Alternatively, government funding running at £200,000 per year may be compared with annual savings from the consultations undertaken each year of about £360,000. Government investment in EDAS appears to have been proved a highly effective means of influencing design teams and reducing fuel consumption in buildings in Scotland. The success of the pilot scheme has resulted in the launch of the nation-wide scheme with government investment of £7 million over 5 years.

PROJECT NEWS

PASSYS RESEARCH IN EUROPE

SHORT HISTORY OF PASSYS

Passive solar design has been widely recognised as an important source for energy conservation in the built environment. Up to the beginning of the eighties very little was known about the actual performance of many newly developed components and systems, such as advanced glazings, transparent insulation Trombe walls, sunspaces, ...

In order to overcome this lack of knowledge as well as to gain confidence in simulation and simplified design tools, the European Commission launched the PASSYS project as a concerted action in 1986. PASSYS stands for 'Passive Solar Components and Systems Testing'. The objectives were to develop reliable and affordable procedures for the testing of the thermal and solar characteristics of Passive Solar Components (PSC) in a building system, to increase confidence in passive solar simulation through validation and further refinement, and to increase confidence in passive solar simplified design tools.

The major tools available for these tasks were the concept of the test cell for outdoor testing and the detailed building energy simulation program: ESP-r developed at the University of Strathclyde, Glasgow, and previously selected as the European reference model. The first countries involved were Belgium, Denmark, Germany, France, Italy the Netherlands and the United Kingdom, not to forget the CEC's Joint Research Centre at Ispra. In 1989 Portugal, Spain and Greece joined the project and commissioned a test site each with one classical test cell and one new type cell with in addition to the original PASSYS Test Cell concept, a removable roof, allowing the testing of roof components as well. At the start of the second phase of the project, known as PASSYS II, it was decided to widen the scope of application of the test method to all types of building components, not only passive solar components, and to set up a close collaboration with industry and European standardisation activities. With

the last objective, PASSYS clearly intends to relate the research to the needs of the building industry, This is where we are now: PASSYS has finished the research phase and is ready to offer its final products to the building community; not only the scientific findings of the project, recorded in a series of reports, but also a number of practical tools and services.

A European network

The basic tool for the experimental work of PASSYS is the PASSYS test cell, Thirty five of these identical cells are located at twelve test sites all over Europe, (Recently a new test site with one test cell has been erected in Espoo, Finland, see further, and two of the German test cells have been moved from Stuttgart to a new test site in Cottbus),

These test cells are highly insulated boxes, The outside dimensions are 8,44 x 3,80 x 3,60 m^3, while the test room has inside dimensions of 5,00 x 2.75 x 2,75 m^3 (volume 38 m^3). At its south oriented facade, it is capable of holding a building component of 2.75 x 2,75m^2 inside an insulated frame.Some of the test cells have the possibility of testing roof components as well.

The cell is equipped with a sophisticated heating and cooling system, controlled by the computer, to impose various temperature or power regimes. This equipment is installed in the service room at the North end of the test cell. Both indoor and outdoor climates are continuously monitored through an extensive set of sensors: solar radiation (diffuse and direct, on horizontal and vertical planes), long wave radiation, wind speed and wind direction, relative humidity , air temperatures at various places, surface temperatures at 23 places on the outer and inner skins of the cell, heating and cooling powers,...

All these measurements are registered at one-minute intervals by a central data acquisition system, controlled by the SADAT software running on either a HP1000 computer or, more recently, on a PC, All the equipment, sensors, hardware and software.are commonly selected and applied at all test centres.

DATA SETS

A large number of tests have been performed at the 12 PASSYS test sites Part of these were common tests on common components, others were on particular specimens. The same test strategy, during nine weeks, for control of the indoor climate was applied for all these tests and a number of prescribed quality procedures had to be followed. Given the high rate of data sampling and the large amount of sensors involved, these tests resulted in a huge file of data.These datasets are checked cleaned using a purpose built software package, called PASFIL. This treatment allows the gaps in the data series to be filled and the minute datato be filtered into hourly averaged values. Each selected dataset, coping with the high quality requirements, is documented in a standardised way.

These data documentation files are gathered in a database structure: PASDB, available on floppy disk, The data sets themselves are stored on a central computer facility, The available data sets include experiments on the calibration component, the PASSYS Reference Wall, both a lightweight version (insulated panel with a double glazed window) and a massive one (in addition a brick-work inner leaf), the reference wall with a solar blind, a Trombe wall, a wall with Transparent Insulating Material, a conservatory in, front of a timber frame wall. These components arc described in detail in the 'PASSYS' Tests Components Descriptions.

TEST METHOD

STEADY-STATE AND DYNAMIC CHARACTERISTICS

One of the aims of the PASSYS Project at its start in 1986 was to develop common test methods for the characterisation of the thermal and solar performances of these-called Passive Solar Components, later on generalised to all types building facade elements. The main characteristics of such components are the heat loss coefficient (UA) and the total solar heat gain factor or solar transmittance (gA), Additionally interesting features are the potential for heat accumulation in the component, expressed as a thermal capacity (C), and the thermal coupling with the indoor environment.

The characteristics are derived from detailed measurements of both indoor and outdoor conditions, including the PASSYS test room's response to the effectof the component placed in its South facing aperture. The real and dynamic outdoor environment guarantees that the derived performance reflects the real situation in practice. Several heating and cooling modes

are applied on the indoor conditions. Given the highly variable outdoor conditions, there are no simple techniques to determine representative values for the sought characteristics without excessive test duration, Also, extra attention is required for properties which vary with climate conditions.

After cleaning and checking the measured data, mathematical models are used to identify the physical parameters. A transient parameter identification technique was selected after thorough study of some nine different candidate methods during the first phase of PASSYS. Software tools have been developed producing the optimal set of required parameters as well as statistical information on the reliability of the results: MRQT is the computer code developed at TNO, based on a 'deterministic' method.; the other tool is CTLSM, an advanced computer package developed at the University of Denmark, based on a 'stochastic method'.

The PASSYS method has been applied and further developed for the determination of the U-value of building components 'in situ', in real buildings. This method is candidate for standardisation by CEN TC 89.

MODEL VALIDATION METHODOLOGY

Simulating reality

Detailed simulation of the energy performance and behaviour of buildings can only be made available for engineering work and practical applications, if the reliability of the simulation program is sufficiently guaranteed.

The PASSYS Subgroup Model validation and Development has developed a methodology for the validation of detailed building energy simulation programs. The methodology may be used by model developers for validating or calibrating their models. It is, however, anticipated that the main area of use for validation methodologies is in software accreditation procedures in connection with simulation based standards, e.g.at CEN level. Such standards have only recently been introduced, but a growing importance is anticipated in the coming years.

Extensive experiments have been set up, using the PASSYS Test Cells with various components and under various test strategies and climatic conditions. The generated data sets may be of great value in the context of software accreditation procedures, as well as for other validation exercises.

In order to develop and demonstrate the validation methodology, the detailed simulation program ESP-r has been applied (see ESP-r). The methodology and the validation exercises are extensively described and documented in the Final report from the Model Validation and Development Subgroup: "Validation of building energy simulation programs (2 volumes).

PASSPORT to optimal energy use

PASSPORT is a software tool for the calculation of the heat requirements of a building, taking into account the solar gains, on a monthly basis. It is based on the correlation method developed by the PASSYS Subgroup Simplified Design Tools and includes the European standard method developed by CEN TC 89 WG 4.

Possible applications of PASSPORT include:

- optimisation of the design of a building from the point of view of energy use during the heating season
- assessment of the performances of a particular component installed on different buildings under different climates
- assessment of the effect of different energy conserving measures on a building

PASSPORT is available through the CEC DG XII project SOLINFO.

Assessing summer comfort

When designing passive solar buildings and trying to minimise the heating requirements during winter, there is a risk of obtaining uncomfortable conditions during the warm season. Therefore a simplified tool is also needed for the assessment of the thermal comfort of such buildings in summer, Several approaches have been studied by the Subgroup Simplified Design Tools, among which a stochastic rnodel to predict the long term thermal behaviour of free floating buildings.The results of these studies are reported in the Research Report of the Subgroup Simplified Design Tools.

ESP-r Consolidated Version

ESP-r Environmental Systems Performance, is a detailed building energy simulation program, developed at the University of Strathclyde. It was selected as the European reference model and extensively used in the frame of the PASSYS activities on Model Validation and development as well as on the development of Simplified design Tools.

All improvements resulting from developments within PASSYS or in parallel developments are now integrated in a consolidated version of ESP-r available for research purposes. An electronic discussion platform has been established between the users of this research version of ESP.

STANDARDISATION

The European Council Directive on Construction Products (December 1988) defines 6 Essential requirements to building products for obtaining free access to the open European market. Energy conservation is one of these requirements. This future market will be characterised by harmonised European standards, for the development of which a mandate is given to CEN, the European Committee for Standardisation. A large number of Technical Committees and associated working Groups are preparing new standards also in the field of material and product testing. Aware of these important developments, PASSYS has been co-operating with several working groups of the Technical Committee 89 'Thermal performance of buildings and building components'..WG 4 has developed a standard for calculating the annual energy demand for heating a building. The PASSYS Simplified Design Tools Subgroup has contributed to this standard on various topics: multi-zoning, shading by obstacles, intermittent heating, utilisation of free gains. The CEN standard method is incorporated in the PASSYS simplified design tool PASSPORT The Model Validation and Development Subgroup contributed to the development within WG 6 of a standard on the determination of the internal temperature in the warm period The activities of WG 8 on thermal test methods have been followed by several participants of the related PASSYS group, This resulted in the request to draft a standard proposal on the in situ identification of the U-value of building components according to the method developed within PASSYS.

FINAL REPORTS

Phase I (1986 - 1989)

The PASSYS Test Cells. subgroups Instrumentalization Report Part 1. Eds. P Wouters,L Vandaele. BBRI. CEC DG XII, Brussels, 1990. EUR 12882 EN

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PASSYS Test Components Descriptions, Ed. A.Guy, Pilkington. CEC DG XII, Brussels, 1993. EUR 15121

PASSYS Test Procedures, Ed. H.A.L. van Dijk, TNO DG XII, Brussels, 1993. EUR 15122 EN

Software

PASSPORT User-friendly simplified design tool or calculation of heating demand of building, including the CEN method, running under MS-DOS. PASSPORT User Manual, M Santamouris, PROTECHNA. CEC DG XII, Brussels, 1993.

ESP-r Consolidated Version Environmental Systems Performance, detailed building energy simulation program for research applications. ESP-r User Manual, J. Clarke et al , ESRU University of Strathclyde

SADAT Data Acquisition software versions for HP 1000 and for PC under Concurrent DOS. A.Galato, COMPHOEBUS. SADAT User Manual (included in the PASSYS Operations Manual.

MRQT Identification software for evaluation of PASSYS tests, including model construction software PASTA. MRQT User manual, TNO, Delft, 1992

CTLSM Identification software for evaluation of PASSYS tests. CTLSM User guide, IMSOR, Lyngby, 1992.

PASFIL Software for cleaning of raw dala PASFIL User Manual, TNO CEC DG XII, Brussels, 1993,

PASDB Database software giving access to and full documentation on the PASSYS High Quality Data Sets. ESRU University of Strathclyde CEC DG XII, Brussels 1993. Documentation Manual, J.J.Bloem, JRC Ispra.

High Quality Data Sets One minutely and cleaned hourly averaged data sets from PASSYS experiments available for model validation purposes All software products are available through the CEC DG XII Project

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HEATING ENERGY AND ENVIRONMENTAL PERFORMANCE OF BUILDINGS (REPORT ON IEA ANNEX 24

Dave Bloomfield, Building Research Establishment, UK

A group of experts met at workshops and planning meetings during 1989 to discuss the adequacy of available procedures for predicting the thermal performance of buildings. This feasibility study identified the need for a range of predictive tools differing in levels of complexity, accuracy and capabilities according to the intended purpose of "application". This led to the formation of Annex 21 .

Surveys within the UK established that although building services engineers do make regular use of computer programs for predicting performance, their use by architects is very limited at the early design stage where they could have the most impact. The most common applications were found to be:

- checking compliance with Building Regulations
- assessing condensation risk
- assessing internal temperatures
- sizing plant
- estimating energy consumption

Contributory factors to the limited take-up of predictive tools are:

- inadequate documentation of models and their limitations
- inadequate understanding of industry needs and procedures for use
- lack of objective methods for quantifying their inherent accuracy
- difficulty in finding appropriate input data
- poor program user interfaces making programs difficult to use
- lack of integration and compatibility between systems and required data

Annex 21 was therefore set up in October 1989 to address these issues, structured into four sub tasks:

A Documentation

B Appropriate use of models

C Evaluation

D Design support environment

Sub task A - Documentation

As we move away from traditional assessment methods that can be simply described and manually operated, it becomes more difficult for a user to understand all the assumptions that have been made by the developer of the tool (although a simple method is likely to contain even more assumptions and limitations than a more detailed one) if for no other reason, professional liability and the increasing attention being paid to formal Quality Assurance procedures, dictate that the professional responsible for building design should understand enough to select suitable calculation procedures and to use them in an appropriate way. A review of the state of the art showed the need to develop procedures to enable modelling assumptions to be documented in a consistent and logical way. Various approaches have been tried and a computer based "expert system" (MIS) has been developed. This has three main parts:

1. software structure that provides an adaptable framework for organising and storing information.

2. a set of "libraries" that mirror the objects and physical processes that exist in the real world.

3. actual instances of information that define the assumptions and theoretical bases of the predictive tools themselves.

The main software development work has been completed - the MIS runs on a PC and will be a product from the Annex. Finding an efficient and logical structure of linked libraries has occupied a major part of the Sub task work but is now virtually complete. The Libraries consist of sets of "menus" of assumptions logically possible for each aspect of the model

The documentation process consists of selecting the option appropriate for a specific tool for all of the relevant menus, Because the menu terms are logically linked to other menus, a great deal of modelling knowledge has been built into the system by the IEA experts. This means that the documentation process itself is very simple with relatively few questions being presented to the documenter (typically the developer of the tool). The IEA experts are currently testing the system and documenting programs of importance. In their own countries. It is expected that this phase of knowledge input will cause an evolution of the MIS by increasing the possible options where necessary. Once this phase is complete it will be possible to produce "standard" paper based manuals for the programs documented and also to make direct use of the MIS "database" of information to answer such questions as:

- how does program A deal with aspect X?
- what programs have detailed models of aspect. Y?
- how do programs A and B differ in their essential assumptions?

Sub task B - Appropriate use of models

Several studies have shown that the way in which a computer program is used can influence the results obtained; different users of the same program attempting to predict energy performance have produced

estimates varying by as much as 4 to 1. The entire process of program selection, input data selection, program-specific modelling decisions, Output data specification and the interpretation process needs to be examined if this situation is to be understood and improved upon. How to use a program for a particular application must be thoroughly documented if prediction tools are to be reliable and to be of use in the building design process.

Sub task B has developed a procedure for documenting "Performance Assessment Methods" (the combination of program and method of use for a specific application). This has been tested by developing a set of national PAMs for assessing overheating risks. These PAMs contain information in a structured form not only on how things are to be done, but also on the rules for doing them, the rationale behind the rules and quality assurance checks that should be performed at each stage. They have been subjected to peer review within the Annex and have been used to test their effectiveness in use by means of a two stage user test for a case study office building. In the first stage the building was assessed without use of the PAM and then this was repeated with the PAM provided in the second stage. In both the Netherlands and the Swiss work a wide spread in results was found in the first stage. This was substantially reduced in the second stage (by a factor of 10 in the Swiss case. It was also evident that many simple mistakes were made by the users, thus demonstrating the need for QA Techniques.

Sub task C - Evaluation of Programs

This sub task is conducted jointly with Sub task B of the Solar Heating and Cooling's Task 12. Inevitably prediction tools contain simplifications and approximations and cannot be expected to predict reality with perfect precision, nor is this necessary. A clear understanding of needs such as is being developed within Sub task B is needed to define the accuracy required. Sub task C aims to produce, document and test methods for evaluating, i,e. measuring the accuracy of, programs.

Discrepancies between predictions and reality may result from:

- unintentional errors in computer code
- inappropriate solution techniques
- inappropriate algorithms
- oversimplification

A range of validation techniques has been identified from previous work:

- review of theoretical basis (for which the results of sub task A are needed)
- check computer code manually (for which source code is needed)
- compare predictions against solutions derived analytically (restricted to simple cases for which solutions are available)
- compare against other state of the art prediction methods (inter model comparison)
- compare measured building performance (empirical validation)

The main effort in (EA 21 has been devoted to Intermodel Comparison (IMC) and Empirical Validation (EV).

IMCs cannot give program accuracy directly but they can help identify probable errors if designed carefully and if tests are subject to good quality control. The best respected national detailed simulation programs have been used to set ranges for key output variables for simple buildings against which other programs can be tested, A set of test cases designed to stress the basic heat transfer processes is nearly complete. It was found necessary to resolve early large disagreements by conducting detailed investigations. This process has already revealed and allowed the elimination of errors in several of the detailed programs themselves.

EV is the most obvious way to validate programs. However, it is generally possible to adjust simulation predictions to obtain agreement with reality because of the inevitable uncertainties in both the measured data and the data which has to be input to the program. In order to be meaningful, it is therefore necessary for the program user to carry out the simulations with no knowledge of the measured building performance. A review of previous EV work concluded that the errors external to the program were such that it had not been possible to draw conclusions on the programs, A methodology for avoiding such problems was devised as

part of a previous UK collaborative effort and this was adopted to carry out a '"blind" EV test within IEA 21 ,

The results of a previous (1990) world-wide review of high quality datasets were updated and led to the selection of datasets from test cells located in England

A set of absolute minimum criteria for selecting EV datasets was devised ; the main ones are:

- no active heating or cooling systems
- weather data collected at site
- data available at hourly intervals
- air temperature, wind speed, direct and diffuse solar radiation data available
- unoccupied; each zone controlled independently
- infiltration must be measured
- no features which cannot be explicitly modelled by programs to be tested
- full data must be available and liaison with monitoring institution possible
- no uncertainties which introduce unacceptable external errors

The test rooms were operated by the Energy Monitoring Company (EMC). They consist of pairs of rooms separated by highly insulated party walls, The outside walls are of timber frame construction lined with plasterboard. The floor, which consists of concrete slabs on top of insulation, is raised from the ground to eliminate the uncertainties associated with heat loss to the ground The rooms are tightly sealed, and regular pressurisation tests are used to ensure that infiltration is below 0,05 ach, corresponding to approximately 1% of the total building energy balance. The rooms are highly instrumented, Rigorous calibration procedures are used to ensure that the readings recorded from all sensors are accurate. Wherever possible calibrations are established that can be traced back to national standards, ensuring that the datasets are reliable and have a high degree of credibility. Datasets for two ten day periods and three different rooms were used, one with panel radiator heating to constant air temperature setpoint of 30 Deg. C and one unheated" The three south walls contained an opaque panel and two different giving systems" The main output parameters to be predicted were energy consumption and air temperatures.

In order for the IEA exercise to be conducted '"blind" the data must not have been previously published. A UK group undertook the management of the EV project, providing well documented "building, weather and operating conditions" A hot line telephone support service was operated to provide modellers with unambiguous advice and information on any aspect of the facility and measurements. This group also performed all the analysts of results using state-of-the-art methods to assess uncertainties and thus provide an objective measure of the accuracy of the program's predictions.

In addition to the telephone hotlIne support, all enquiries were logged and distributed to all modellers via newsletters, Input files were checked centrally for obvious errors and the second set of results were taken as the final predicted results. A rigid timetable and methodology was established In advance and agreed to by all participants.

Because of the unique nature of this exercise (the most extensive, and the first objective, high quality "blind" EV exercise, which will cease to be blind once measured results are released), and the high level of effort required, it was decided to invite experts from outside IEA 21/12 to participate, This was extremely successful with 24 programs finally taking part, from Australia, Europe and USA,

The results have been discussed in working meetings of the group and have been distributed to participants, It has been decided to allow those participating In the exercise to provide their own analyses and explanations of their results. These will be incorporated in the overall IEA report on the exercise.

Valuable lessons have been learned In the course of the work, Particular methodological difficulties encountered include:

a) How to define and to minimize "errors" made by the program users.

b) How to quantify the effect of genuine uncertainties in the building under test, the operating conditions and the measurements.

It is impossible to eliminate all user errors with absolute certainty" In many cases the values of the input data selected are a matter of judgement - so that there are no right or wrong values" It therefore follows that any test of a program becomes a test of the combination of Program A and User X.

Conclusions from any empirical validation exercise therefore have to be treated with caution,

It is important that the uncertainties involved in both the modelling and the experimental processes be properly accounted for, thus giving rise to confidence intervals against which predictions can be compared, Estimates of 95% confidence intervals have been obtained using one of the programs under test (SERIRES) Participants are being given the opportunity to provide further information using their own programs. It is expected that the final report will be available in January 1994

Sub task D - Design Support Environments (DSE)

A DSE can be loosely defined as a software framework containing systems or tools to aid a designer in the tasks involved with creating and testing alternative building and plant designs, It Is likely to contain at least some sort of CADrafting tools, It can be thought of as the means to bring all of the programs and performance assessment methods together into a system that can bring modelling tools into practice.

An attempt has been made to define the ideal requirements that a user might want to have in a DSE and a review of systems under development or in actual existence has been undertaken. The report identifies the need for systems better able to bridge both the different stages of design (early conceptual to final) and the different disciplines involved (architects, heating, lighting engineers etc.). It also highlights the crucial issue of designing adequate user interfaces. There is a need to develop standard tests that can be used to determine objectively the facilities and capabilities of DSEs.

HAMTIE: WHO'S AFRAID OF COMBINED HEAT-AIR-MOISTURE TRANSPORT? REPORT ON IEA ANNEX 24

Hugo Hens, KU-Leuven, Laboratorium Bouwfysica, Belgium

Thermal insulation is an efficient mean to "economise energy in buildings", everyone accepts this, In most IEA countries, compulsory insulation levels have been introduced over the past two decades. Lately the greenhouse effect threat pushes us towards further decreases in U-values, Yet the U-value of a highly insulated component is no longer an unambiguous concept. In fact, the thicker the insulation layer, the more dominant second order effects as enthalpy flow and latent heat, a consequence of combined Heat-Air-Moisture (HAM) transport. HAM not only influences thermal quality. It also defines hygric behaviour and component durability

As the title suggests, one should be afraid of the way experts handle HAM in design; a compendium of simple models, obsolete tools and old fashioned rules. At the same time, remarkable progress in material property knowledge, in HAM modelling and component testing is underway in different laboratories. Not only better models emerge but also new design rationales for highly insulated components, combining optimal thermal insulation with correct hygric performance and good durability.

Annex Objectives and Organisation

Annex 24 aims to intensify progress in HAM by international co-operation. Ten later fourteen countries joined to work together towards two objectives: studying the physical background of HAM transport in new and retrofitted, well insulated envelope parts, and analysing the consequences for thermal quality, energy consumption, hygric behaviour and durability. Together they identified well insulated as [equ] with Uc the "heat conduction" U-value, Five tasks were defined:

- algorithm and model development
- environmental conditions
- material properties

- experimental verification
- performances and practice

Each task is activated by a Task Leading Country: Belgium for task 1, UK for task 2, Canada for task 3 and Germany for task 4. Task 5 starts the last Annex year.

First results

Modelling

Information on existing HAM computer codes has been compiled in a first official Annex report, with data and comments on 29 codes (ref. 1). These belong to nine different types, from simplified to very complete. Type 1 represents the Glaser diffusion scheme, with no possibilities to quantify HAM influence on U value and energy consumption, Type 9, full HAM modelling allows analysis of enthalpy and latent heat flow and prediction of real thermal quality and hygric behaviour, Most codes belong to type 4, a moisture transport model for vapour and capillary flow.

All models combine conservation of energy and mass with linear relations density of flow rate potential gradient, irreversible thermodynamics, stating that simultaneous mass and energy flows depend on as much identical potential gradients as flows exist, and the equations of state (for example: partial vapour saturation pressure-temperature). Simple models use constant material properties full models potential dependent properties. Boundary conditions range from exterior and interior temperatures and relative humidities only to exterior and interior temperatures and relative humidities, indoor radiant temperature, solar radiation, clear sky long wave radiation, wind velocity and direction, driving rain, all function of height, Type 1 to 3 use a fictitious dry state as initial condition. Full models start from the transient "building moisture content" reality.

Discussions left: moisture potential. How to handle air, flow? Contact conditions between materials? Surface film coefficients? Performance and durability evaluation.

Environmental Conditions

Initial moisture content indoor and outdoor climate and surface heat, moisture and air flow are crucial elements in HAM modelling. Actual work concentrates on climate. As real climate can never be simulated, reference outdoor conditions, reflecting the average and extreme conditions in a given region or country are needed. This is extremely important, as hygric response and durability are largely defined by the outdoor climate: a roof concept for example may function well in Southern Italy perform badly in Scotland and be a disaster in Northern Sweden or central Canada. For full modelling the annex preferred the monthly average 1 on 10 concept: 1 year on 10 more severe.

Indoor climate could be scheduled in indoor climate classes (ICC), a help in judging hygric load and defining performance levels. Research looks to the practicality of common "difference in indoor-outdoor vapour pressure" thresholds between ICC in different outdoor climates. If this reveals possible, indoor climate load comparison becomes much easier and performance description more typological .

Material Properties

Start was a round robin on moisture diffusivity of spruce Four laboratories got involved. The results are disappointing and reassuring at the same time, disappointing because differences between labs look important, reassuring because these differences are not bigger than those caused by its homogeneity of the timber samples reassuring because an average order of magnitude nevertheless comes out.

Discussions on symbols and material property definitions resulted in a second official annex report: a glossary of symbols and definitions (ref.2). A computerised data base of material property values and relations is under development. It should be practicable in different types of codes, from simple to very complete.

Experimental Verification

Work concentrated on enquiries and common exercises. A first exercise concerned a heavy flat roof, from in to outside: acoustical ceiling, air space, concrete floor, lightweight concrete screed, mineral wool thermal insulation (MW) and membrane. The unfinished roof stood exposed a couple of months to the wet Belgian climate. Result: a rather high moisture content in floor

and screed. The exercise consisted of predicting moisture redistribution in the roof and thermal quality. Most countries proved MW is getting wet exponentially, with the U value stabilising at a higher level than "conduction" predicts. Especially the first year a high value is calculated. Reason: latent heat flow. The roof section is now under test in a hot box - cold box apparatus, simulating hygric behaviour.

The second exercise concentrated on a timber framed wall, built in Ottawa, Canada: 12 mm exterior particle board, 15 cm mineral wool, 12 mm interior fibre board. Without indoor air leakage, the wall is an example of good diffusion design: no interstitial condensation at all.

Air leakage, however induces severe concealed condensation, saturating each winter again the exterior fibre board and giving ice between board and MW. In spring time, the melting ice soaks studs and silts. Air leakage also marginalizes heat conduction compared to the convective losses (Figure 5), It turns opposite walls into a coupled active insulation system, Extra energy conservation by active" effect mounts to some 12%, compared to conduction and air flow separately.

Conclusion

Work in Annex 24 progresses steadily. As understanding grows computer codes upgrade and their use becomes more popular, being afraid for combined heat-air-moisture transport and its unexpected and turbulent consequences could turn into confidence. A sound understanding, performing modelling tools, to the point performance checks simple practice hints and a real quality insurance should be the ultimate goal.

Literature

Annex 24, report 1, "Enquiry on existing HAMCAD codes". Acco. Leuven, 1993, 40pp.

Annex 24, report 2, "Heat, air and moisture transport through building materials and components: symbols and terminologies"Acco, Leuven, 1993. 24pp.

CALENDAR OF EVENTS

6-8 April 1994

The University of York

BUILDING ENVIRONMENTAL PERFORMANCE

FACING THE FUTURE

BEP'94, BEPAC's second major conference, will present the latest results from a wide range of research work in the modelling field, show how state-of-the-art design methods are working in practice, and look forward to the agenda practitioners and researchers will face at the turn of the century.

Over a hundred abstracts have been received from a dozen countries, and nearly 50 papers will be presented in the main sessions, with many more forming the basis for specialist seminars. The latest environmental design software will be on display throughout the conference.

Technical Sessions

- Environmental Performance, featuring Assessing Performance, Performance in Practice and Performance Monitoring.
- Design Tools featuring, Validation, Design Tools in Use, Lighting and Ventilation, Integration, Applying Models, Plant Modelling, Validation and Specific Topics.
- Green Buildings, assessing the overall "green-ness" of buildings, tools and techniques of performance assessment, "passive-solar" design.
- Agenda 2000

For more information please contact: Mrs.Rhona Vickers, BEP '94 Conference Organiser, AIVC, Souvereign Court, University of Warwick Science Park, Coventry CV4 7EZ, Great Britain. Tel: 44.203.692.050, Fax: 44.203.416.306

13-15 June 1994

Conference and Exhibition

Palais des Congres, Brussels, Belgium

EITC

European IT Conference

Commission of the European Communities

1994 marks the completion of 10 years of Community R&D in information technology.1994 is also the year when Community R&D in IT enters a new phase with the adoption of the Fourth Framework Programme. These events have prompted the Commission to reshape the annual ESPRIT Conference and to move it to a time best suited for taking the next step in the public dialogue on the future implementation of the IT programme.The theme of the conference is one that promises to play a major role in determining the future direction of R&D in IT.

Five parallel sessions devoted to technological issues addressed in the IT R&D programme.

Information Infrastructure and New Markets

A panel discussion involving prominent vendors and suppliers. The issues to be addressed are the new markets for information-intensive products and services (ranging from distributed management to entertainment) created by the emergence of the new information infrastructure. A key theme will be the importance of the information infrastructure to companies' competitiveness in these new markets.

A Round Table on IT and the Transformation of the Enterprise. Conclusions from the preceding sessions by eminent political and industrial leaders, followed by a debate on the lessons that can be learnt about the effect of IT on industrial policy and employment.

A programme of social events is available

For further information please contact: EITC 1994 Conference Secretariat, 200 rue de la Loi, BU 29 - 06/50, B-1049 Brussels, Belgium. By Fax: +32.2.296.83.97

3-8, July, 1994

Dead Sea, Israel

11th PLEA International Conference

The 1994 PLEA conference will focus on:

- Passive cooling and heating systems, and methods of integrating them into the fabric of the building
- Micro climatic modification of outdoor spaces .
- Expert systems in cooling, heating and day-lighting for extreme climatic conditions
- Urban form and its energy aspects
- Earth sheltered and underground buildings
- Alternative building materials
- Design support tools
- Information dissemination about buildings and open spaces in extreme conditions
- Historical prototypes
- Architectural case studies in extreme climates

Scientific program

A four day program is proposed comprising plenary sessions, technical sessions panel discussions and exhibits. In addition there will be a professional visit to the J.Blaustein Institute for Desert Research at Sede-Boker.

Design Competition

A design competition will be held in conjunction with the Conference. Information about the competition will be sent under a separate cover.

Language

English is the official language of the Conference.

GENERAL INFORMATION

Conference Venue

The Conference will take place in the dramatic setting of the Dead Sea, Israel, close to the famous historic site of Massada. The Dead Sea is the lowest place on earth, 400 m below sea level, and is one of the most famous health resorts in the world. In July it is hot and dry during the day with cooler evenings. Dress is informal. Swimsuits, head covering and comfortable walking shoes are recommended.

Conference Secretariat

11th International PLEA Secretariat, Peltours-Te'um Congress Organisers, P.O.B. 8388, Jerusalem, 91 OB2, Israel, Tel: (972) 2 617402, Fax: (9721 2 637572

Street Address: 3 Masaryk Street, Jerusalem

22-25 AUGUST, 1994

BUDAPEST, HUNGARY

CIB-ISIAQ-HAS

CONFERENCE

HEALTHY BUILDINGS'94

Topics

- Human requirements on the indoor environment incl. social, mental, physiological and psychological aspects)
- Performance of the building installations and regulations including individual systems)
- Source control requirements and control in product development and use)
- How to construct cost-conscious healthy buildings short and long term aspects). New buildings and renovation of buildings
- Efficient energy use in healthy buildings
- Management and maintenance of healthy buildings
- Feedback of practical experiences (How to implement research results into practical use)

Exhibition

There will be the possibility to present a broad range of instruments and equipment in the field of HB during the Conference.

For further information please contact: Healthy Buildings' 94, Prof. Dr. L.Banhidi, Technical University of Budapest, H. 1521 Hungary, Phone: 361-1812-960, Telefax: 361 1812-960, 361 1666-808

International Conference on Composite Materials and Energy

Enercomp'95

May 7-9, 1995

Bonaventure Hilton

Montreal, Canada

Enercomp '95 is an International Conference on the use of composite materials to produce, store and distribute all forms of energy: electrical, petroleum, gas, solar and wind.

It will cover, polymeric, metallic, ceramic composites under the following themes:

- Innovative applications
- Composites use as energy-efficient materials in transportation, construction and other areas
- Energy savings through durability of composites
- Fabrication technology and energy-efficient processes
- Failure analysis and degradation

- Design procedures
- Innovative materials
- Recycling concepts and procedures
- Duality assurance
- New fabrication technology and added-value production
- Technology transfers

For further information please contact: Hydro-Quebec, 1800, Montee Sainte-Julie, Varennes (Quebec), Canada, J3X 1S1, Fax: (514) 652.8905

December 5-7, 1994

University of Liege

4th International Conference

on System Simulation in Buildings

Scope of the Conference

As well as the three previous ones, this fourth conference will be organised in very close co-operation with the International Energy Agency (IEA, Energy Conservation Building and Community System) and with the American Society of Heating, refrigerating and Air-Conditioning Engineers (AHSRAE, TC 4.7. "Energy Calculator")

The following topics will be considered

- Building and HVAC component
- Parameter Identification
- Experimental validation
- Use of Models for system design optimal control, fault detection and diagnostic
- Case studies

Practical Information

As for the previous conference, the number of papers will be restricted to a maximum of 35 through severe selection, in order to reserve enough discussion time during the conference. Pre-prints of the communications will be distributed to registered participants before the conference and discussions will be published in the Proceedings.

The number of participants will be limited to a maximum of 75 in order to enhance scientific and technical discussions. In view of the success of the previous conferences, it is highly advised to register as soon as possible.

Conference Administration

For pre-registration and all enquiries please contact: Jean Lebrun, University of Liege, Campus du Sart Tilman Thermodynamics laboratory, Parking P33, Batiment b49, B-4000 Liege (Belgium), Phone: +32.41.56.48.00 Fax: +32.41.56.48.12 E-mail: U510417@bliulg11

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BS-89	$25US	$25US
BS-89&91	$55US	$75US
IBPSA Report	free	$20US

Add 15% for shipping (domestic or overseas surface mail).

Add $25US for shipping by overseas air mail.

The proceedings for BS '89 and BS '91, are available from the IBPSA Secretariat as long as stocks last

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If possible, please submit material in magnetic form on either DOS or Macintosh diskette or via electronic mail. Acceptable formats a Microsoft Word (MS-DOS, Windows or Macintosh), ASCII text only, RTF interchange format, PICT format, PAINT format. Please do not hyphenate or justify ASCII text. Please include a printed copy the material.

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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.

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