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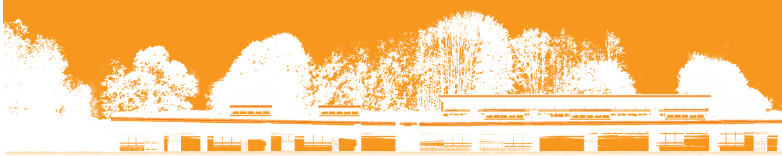

Korea Hosts ECBCS Technical Day: Energy Efficiency for Better Building Environments

S.E. Lee, Korea Institute of Construction Technology

The Republic of Korea has hosted the latest ECBCS Technical Day, held in conjunction with the 58th ECBCS Executive Committee Meeting in Seoul on the 9th November 2005. The Technical Day was focused on recent developments in energy efficiency for better building environments. It also helped to increase awareness among the Korean energy and industry representatives about activities and achievements within the ECBCS Programme. In addition, speakers and attendees discussed current energy policies of Korea, their strategies for building energy conservation and various key ECBCS projects.

Representatives from the Korean Government, industry, research sector and universities were invited to speak about their most recent results and findings on topics related to the current ECBCS research projects. The 23 ECBCS Executive Committee Members and project managers were present, and then had the opportunity to discuss various issues related to energy efficiency with about 80 attendees from Korean organisations. In fact, this meeting was a precursor to KEMCO (Korea Energy Management Corporation) becoming a full member of the ECBCS Programme.

Strategies for Energy Conservation in Korea

Mr K. Huh from the Ministry of Commerce, Industry & Energy discussed the national framework for energy efficiency and the future direction of the energy policy in Korea. In 2000, 83% of total greenhouse gas emissions came from the energy sector (e.g. fuel consumption and fugitive emissions). Hence, recognizing that the reduction of greenhouse gas emissions in the energy sector is of the utmost importance for devising countermeasures under the UNFCCC, profound and diverse policies and measures are being developed and promoted. In the energy sector, for instance, policies are being devised for energy supply & demand, buildings and transportation fuel.

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Energy Demand

Collaborative energy conservation and improvement in energy efficiency have been selected as the two major promotional strategies in curbing energy demand, forming the foundation for various policies. These include:

- a three-year plan for energy auditing,
- expansion of voluntary agreements,
- energy service companies (ESCO's),
- high efficiency equipment certification, and
- energy efficiency standards & labelling programmes.

Energy Supply

Various policies are being promoted for the energy supply sector through the establishment of renewable energy and cleaner energy distribution as promotional strategies to reduce green house gas emissions:

- formation of a market demand for renewable energy & improvement in its economics;
- expansion of integrated energy supply projects;
- a stable supply of natural gas;
- a stable supply level of nuclear energy;
- promotion of landfill gas (LFG).

Buildings

The following standards and programmes have been implemented for the buildings sector:

- mandatory standards for building insulation & energy-efficient designs;
- an energy efficiency labelling programme for buildings;
- a green building certification programme.

Transportation Fuel

For the transportation sector, the following measures are being promoted to reduce fuel use:

- compressed natural gas (CNG) for buses,
- compact cars, and
- development of diesel cars.

Dr S. E. Lee from the Korea Institute of Construction Technology spoke about the strategies for building energy conservation in Korea.

A practical process of the solar heating system in apartment housing
Mr J. S. Lee from the Housing and Urban Research Institute spoke at the ECBCS Technical Day about the design of the solar heating system for an apartment building, including performance verification of the systems by field tests and evaluation of the economic aspects of the systems.

Energy efficient building lighting systems in Korea Prof A. S. Choi from Sejong University discussed the present situation concerning the global & Korean lighting industry. He also reviewed Korean lighting power consumption, highly energy-efficient light sources & ballasts and recent Korean national lighting R&D.

ECBCS Presentations

The attendees at the Technical Day also received presentations about various ECBCS projects - including Energy Efficient Electric Lighting for Buildings (Annex 45); Integrating Environmentally Responsive Elements in Buildings (Annex44); The Simulation of Building-Integrated Fuel Cell and Other Cogeneration Systems (Annex 42).

A Korean green building (Kolon E&C Institute of Technology) including geothermal heat pump, building integrated photovoltaics, double-skin, light shelves, solar tubes and natural ventilation, etc.

ECBCS Executive Committee members in front of the Kolon building.

New Research Project: Low Exergy Systems for High-Performance Buildings and Communities

ECBCS Annex 49 Approved
Dietrich Schmidt, Fraunhofer Institute for Building Physics, Germany

Introduction

Even though there is considerable energy saving potential in the building stock, the results of the recently completed ECBCS project, ‘Low Exergy Systems for Heating and Cooling’ show that there is equal or greater potential in exergy management. This implies working with the whole energy chain and taking into consideration the different quality levels involved, from generation to final use, in order to significantly reduce the fraction of primary or high-grade energy used and thereby minimise exergy consumption. New advanced techniques must also be implemented. At the same time, as the use of high quality energy for heating and cooling is reduced, there is more reason to apply an integral approach. This includes all other processes in buildings which involve the use of energy / exergy. In recent years, we have made substantial progress in improving energy use with the development of new and integrated techniques. Some of these issues have been the focus of various projects within ECBCS. A new ECBCS project is now underway, ‘Low Exergy Systems for High-Performance Buildings and Communities’.

The conversion of exergy (e.g. heat or electricity production) plays a crucial part in possible future activities in the overall system optimisation of the entire energy system. The target is to establish a holistic approach for an affordable, comfortable and healthy built environment, while obtaining a minimum input of exergy, and implementing a substantial amount of renewable energy sources into the energy supply of buildings.

The Exergy Concept and the LowEx Approach

Exergy is a concept which helps us distinguish between two parts of an energy flow: exergy and anergy. Only the exergy part of any energy flow can be converted into some kind of high-grade energy such as mechanical work or electricity. Anergy, on the other hand, refers to the part of the energy flow which cannot be converted into high-grade energy. Unless a suitable use for it is found, e.g. waste-heat utilisation in buildings, the low-value part of the original energy flow will eventually dissipate into the environment and be irreversibly lost.

The Low Exergy (LowEx) approach entails matching the quality levels of exergy supply and demand in order to streamline the utilisation of high value energy resources and minimise the irreversible dissipation of low-value energy into the environment.

Scope

The scope of this new project is to improve, on a community and building level, the design of energy use strategies which account for the different qualities of energy sources, from generation and distribution to consumption, within the buildings. In particular, exergy analysis has been found to provide the most correct and insightful assessment of the thermodynamic features of any process, and it offers a clear, quantitative indication of both the irreversibilities and the degree of matching between the resources used and the end-use energy flows. The exergy content required to satisfy the demands for the heating and cooling of buildings is very low since the temperature of a room is close to the ambient conditions. Nevertheless, high quality energy sources, like fossil fuels, are commonly used to satisfy these small demands for exergy.
The implementation of exergy analyses paves the way for new opportunities to increase the overall energy chain efficiency in the built environment. Exergy analysis can support the development and selection of new forms of technology and concepts while increasing the potential for lowering exergy consumption in buildings.

Green Building in Korea
An introduction to a ‘green building’ by Kolon Construction was presented by Dr Y. K. Kim from Kolon Construction. The key features of this energy-efficient building were to use renewable energy, incorporate energy saving systems, utilize the natural environment and create an environmentally-friendly exterior space.

The Technical Day concluded with a site visit to Kolon’s green building in Yongin-Si Gyeonggi-Do, Korea. The delegates enjoyed a tour of the building which has energy efficient systems - including a geothermal hest pump system, BIPV (building integrated photo-voltaics), an interior double skin system, a passive solar system, solar tubes and natural ventilation.
A tour of the environmentally-friendly outdoor space was also provided.

Objectives

The main objective of the approved project is to use exergy analysis as a basis for providing tools, guidelines, recommendations, best-practice examples and background material for designers and decision makers in the fields of building design, energy production and politics. Another important objective is to promote possible energy / exergy and cost-efficient measures for retrofit and for new buildings, such as dwellings and commercial / public buildings, and their related performance analyses viewed from a community level. The major benefit of following low exergy design principles is the resulting decrease in the exergy demand in the buildings. By following the exergy concept, the total CO_2 emissions for the building stock will be substantially reduced as a result of the use of more efficient energy conversion processes.

Means

To accomplish the desired objectives, participants will carry out research and pursue developments within the following four Subtasks.

Methodologies

Subtask A provides the necessary framework for more detailed exergy analyses applied at the community. Models and software for design and performance evaluation, in particular for combined exergy / energy analysis, will be produced and published. Based on the conducted analyses, pre-standardisation work will be conducted.

Exergy efficient community supply system

Within Subtask B, the design of low exergy systems is to be focused at the community level, taking the concerns of building stock owners into consideration. For example, district heating can be a very powerful low exergy concept if many buildings are connected to the expensive distribution systems. An advanced building design can lead to lower district heating operating temperatures, thus increasing the power plant efficiency.

Exergy efficient building technology

The core issues in Subtask C are the development and analysis of innovative techniques. Exergy could become an innovation driver for building systems. On one hand, improvement potential and technological breakthrough needs will be addressed.
On the other hand, system engineering and analysis will be looked at. Advanced modelling and implementation of combined dynamic exergy and energy analyses may show the potential of new technical methods. Furthermore, investigations of storage systems may provide an optimised implementation strategy.

Knowledge transfer, dissemination

For any research project to have an impact in the outside world, the results of the work must be disseminated. especially to the target audiences. Subtask D will collect and disseminate information both about ongoing and finished work. This includes setting up information platforms and organising seminars and workshops. Also, new target groups will be identified and new means for spreading information will be used. The plan is to synthesize the topics studied in the project in order to reach a wider audience.

Further information

More information can be found at: www.ecbcs.org/annexes/annex49.htm
Contact: Dietrich Schmidt (dietrich.schmidt@ibp.fraunhofer.de)

New Organisations to Represent Austria and the United Kingdom

In recent months, two new organisations have formally joined ECBCS. Designated to represent Austria by the Federal Ministry of Transport, Innovation and Technology (BMVIT), AEE INTEC has become the first organisation to represent Austria within the Programme. In addition, the Carbon Trust, designated by the Department for Environment Food, and Rural Affairs (DEFRA), has become the new organisation acting for the United Kingdom.

The Arbeitsgemeinschaft Erneuerbare Energie (AEE) was founded in 1988 as a non-profit association to support the meaningful application of renewable energy sources and the rational and sustainable usage of energy. The AEE–Institute for Sustainable Technologies (AEE INTEC) is active in the development of scientific and technical basics for solar thermal applications, with the development of efficient energy supply systems for buildings.

The Carbon Trust is an independent company funded by the UK Government. Their role is to help the UK move to a low carbon economy by helping business and the public sector reduce carbon emissions now and capture the commercial opportunities of low carbon technologies.

More information about relevant national programmes in Austria and the United Kingdom will follow in later editions of the newsletter.

New Research Project: Prefabricated Systems for Low Energy / High Comfort Building Renewal

ECBCS Annex 50 Approved

Mark Zimmermann, Federal Laboratories for Materials Testing and Research, Switzerland

Background

Energy conservation is largely dominated by existing buildings. In most industrialized countries new buildings will only contribute 10% - 20% additional energy consumption by 2050, whereas more than 80% will be influenced by the existing building stock. Therefore, the ECBCS Programme is paying special attention to R&D for innovative renovation concepts for application to existing buildings. A new project, ‘Prefabricated Systems for Low Energy / High Comfort Building Renewal’, forms part of this strategy.

Currently, most present building renovations address isolated building components, such as roofs, façades or heating systems.

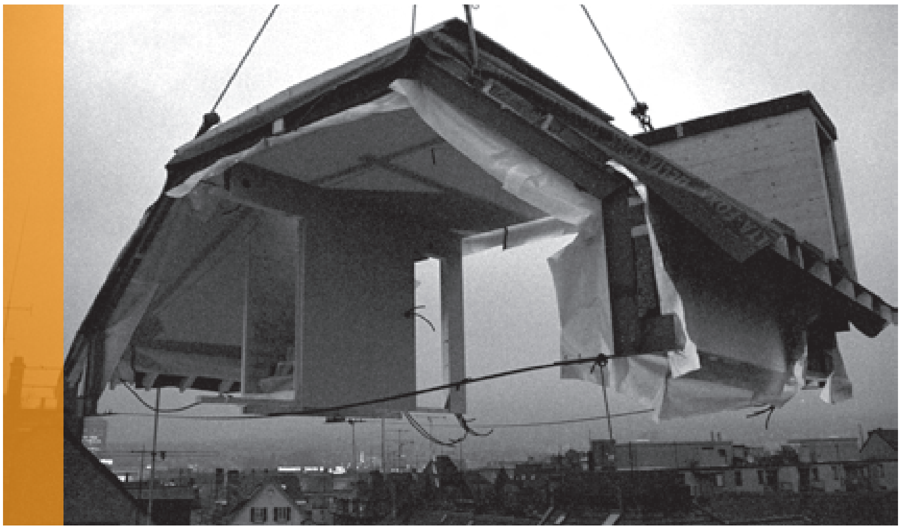
This often results in inefficient and in the end expensive solutions, without an appropriate long term energy reduction. This newly initiated project thus focuses on whole building renovation concepts that make use of advanced solutions for new energy efficient buildings and the potential for optimised space use. Advanced measurement technologies will allow an increasing level of prefabrication, so allowing new quality standards, construction and cost efficiency.

The main objectives of the project are the development and demonstration of innovative whole building renovation concepts for typical apartment buildings, representing approximately 40% of the European building stock. The work plan includes:

- prefabrication of roof systems with integrated HVAC, hot water and solar systems;
- highly insulated envelopes with integrated new distribution systems for heating, cooling and ventilation

The expected advantages of this concept are:

- energy efficiency and comfort for existing apartment buildings comparable to new advanced low energy buildings
- optimised constructions, quality and cost efficiency due to prefabrication
- optimised integration of solar energy systems
- an opportunity to create attractive new living space in the prefabricated attic space and by incorporating existing balconies into the living space
- a quick renewal process with minimised disturbances for the inhabitants.

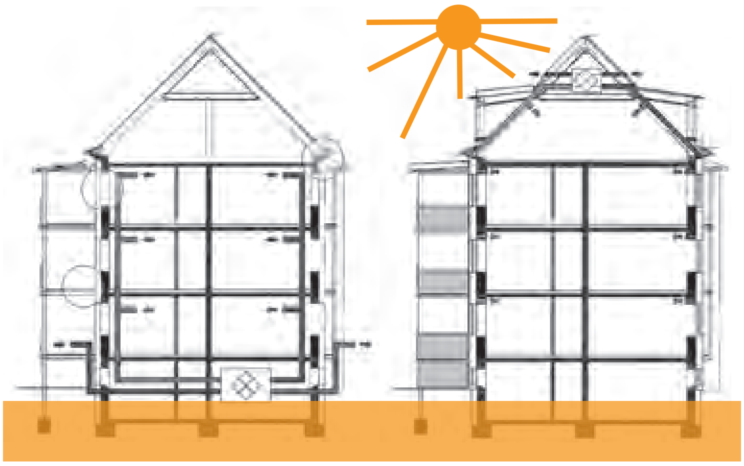


Prefabrication technologies are a key issue of the project and will allow an efficient renovation process with high quality standards (renovation by architect K. Viridén, Zurich).

FREE DOWNLOADS

Over 60 reports from ECBCS projects are available to download free of charge from the website

More information can be found at: www.ecbcs.org/docs



Traditional refurbishment (left) is often inefficient and causes a lot of physical problems. The project aims to replace old roofs by new and optimized constructions, to integrate the new ventilation unit into the roof space and to enclose the building with prefabricated façade elements with integrated ventilation ducts (right)

A: Concept definition and specification

B: Integrated roof systems | **C: HVAC and solar systems** | **D: Façade elements**

E: Monitoring and dissemination

The project is organized by means of 5 activities, known as Subtasks

Vision of prefabricated new attic spaces, as developed by the Danish SOLTAG project

Concept definition and specification

Subtask A focuses on the development of the whole building renovation concept and on its implementation and overall consequences. During this phase, variations of prototypes will be simulated, optimised, designed and specified.

Subtask A will develop the overall concept for the low energy renovation, provide the general specifications for Subtasks B, C and D and will ensure the co-ordination of this work.

Integrated roof systems

Subtask B will deal with new roof constructions which are the central element of the renewal concept, providing new roof space and hosting the new HVAC and solar systems. The design process will focus on prefabrication, quality assurance, cost optimisation, and rapid construction as well as architectural aspects/features. The subtask includes design optimisation, prefabrication, quality assurance and final on site construction. Design teams (architects and engineers), industry partners and researchers will be in close co-operation.

HVAC and solar systems

The goal of Subtask C is to design highly compact roof integrated and modular systems that can include the use of solar energy (thermal and/or PV), ventilation, heat recovery and in specific cases also heating, cooling and domestic hot water. The work includes system and component optimisation (new and where appropriate existing), production and installation during the prefabrication of the roof and façade elements and performance testing.
The existing heating and hot water system has to be considered when designing the new HVAC system. To achieve a cost effective building renovation, the possible interactions between existing and new components have to be studied. The industry partners will be supported by the research teams and the design teams.

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New BESTEST Cases: Testing and Validation of Building Energy Simulation Tools

SHC Task 34 / ECBCS Annex 43 Update

Ron Judkoff, National Renewable Energy Laboratory, U.S.A.

Objectives

The BESTEST (Building Energy Simulation Test) cases are widely valued and used throughout the world for the purpose of evaluating, diagnosing, and correcting building energy simulation software. 'IEA 34/43', a collaborative task between IEA Solar and Heating Programme (SHC) Task 34 and IEA ECBCS Annex 43, is now extending the range of BESTEST cases.

The goal of IEA 34/43 is to undertake pre-normative research to develop a comprehensive and integrated suite of building energy analysis tool tests involving analytical, comparative, and empirical methods.

These methods will provide for quality assurance of software, and some of the methods will be enacted by codes and standards bodies to certify software used for showing compliance to building energy standards. This goal will be pursued by accomplishing the following objectives:

- Create and make widely available a comprehensive and integrated suite of IEA BESTEST cases for

evaluating, diagnosing, and correcting building energy simulation software. Tests will address modelling of the building thermal fabric and building mechanical equipment systems in the context of innovative low energy buildings.

- Maintain and expand as appropriate analytical solutions for building energy analysis tool evaluation
- Create and make widely available high quality empirical validation data sets, including detailed and unambiguous documentation of the input data required for validating software, for a selected number of representative design conditions.

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Prefabricated Systems ...continued

Façade elements

Subtask D includes design of largely prefabricated façade elements that include windows and other openings, opaque wall insulation and integrated service distribution for heating, cooling and ventilation. This concept should allow for rapid construction from the outside with minimal disturbance for the inhabitants. The challenge of this subtask will be the optimisation of duct work integration and new window design, which reduces thermal bridges and optimises daylighting and shading. Added value is achieved when old balconies which cause thermal bridges can be converted to or replaced by sunspaces or living room extensions. The design team (architects and engineers) and industry partners will combine form and function and co-ordinate their work with the requirements of Subtask B and C.

Monitoring and dissemination

Subtask E is responsible for monitoring demonstration projects and for the dissemination of the project results. The demonstration projects realised by Subtasks B, C and D will be measured and analysed before (as far as possible) and after renovation. The renovation process of the case study buildings will be documented. The dissemination will mainly address designers, building stock owners and decision makers.

Further Information

Project participants are anticipated from Austria, Belgium, Denmark, France, Germany, Portugal, Sweden and Switzerland. During 2006, the new project will be planned in detail. The project will then officially start its work beginning of 2007 and will be finalised by 2010.

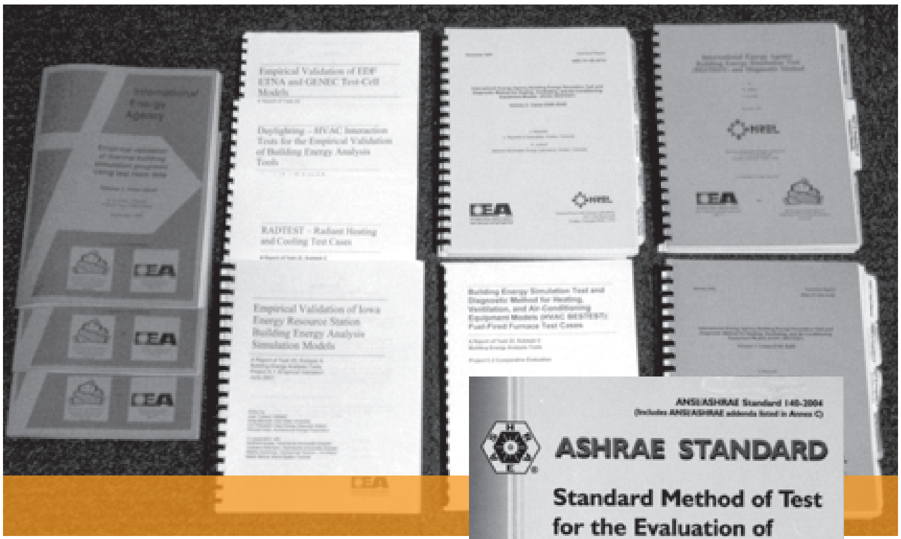
Contact: Mark Zimmermann (mark.zimmermann@empa.ch)

Web: www.ecbcs.org/annexes/annex50.htm

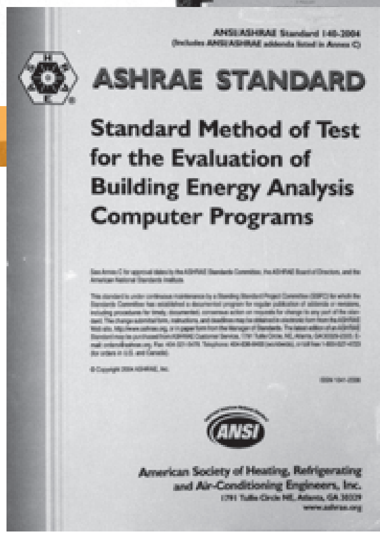
Codes and Standards Activities

Key audiences for the research undertaken within this task are national and international building energy standard making organizations. These organizations can use the test cases developed inSHC Task 12 / ECBCS Annex 21 and SHC Task 22, and test cases that are being developed in this task to create standard methods of tests for building energy analysis tools used for national building energy code compliance. An important link with industry is that the overall project manager has been acting as liaison with, and is the Chair of, ASHRAE SSPC 140 (the ASHRAE project committee responsible for ANSI / ASHRAE Standard 140). In fact, ANSI / ASHRAE Standard 140-2004 published December 2004 includes previous adaptations of:

- IEA BESTEST (NREL / SHC Task 12 / ECBCS Annex 21), and
- HVAC BESTEST Volume 1 (NREL / SHC Task 22).



Building Energy Simulation Test Produres Produced by IEA SHC Task 12/ECBCS Annex 21 and SHC Task 22



ANSI/ASHRAE Standard 140 Method of Test for the Evaluation of Building Energy Analysis Computer Programs

During 2005, ASHRAE Standard 90.1-2004, which is used for regulating energy efficiency in commercial and non-low-rise residential buildings, had a formally approved addendum that requires use of Standard 140-2004 for testing software used in building energy efficiency assessments. The International Energy Conservation Code is also referencing Standard 140. These citations are important because they mandate software evaluation using test procedures developed under IEA research activities. For example, because of the ASHRAE Standard 90.1 requirement to test software using ASHRAE Standard 140, two of the largest suppliers of building HVAC equipment in the world, Carrier Corporation and Trane, are testing their respective software packages HAP and TRACE with Standard 140. Also, EnergyPlus, the U.S. DOE's most advanced simulation program for building energy analysis, maintains their Standard 140 validation results on their website.

The Netherlands (TNO) has developed their Energy Diagnosis Reference (EDR) based on BESTEST. TNO has developed the EDR to satisfy the European Performance of Buildings Directive (EPBD) of the European Union. The EPBD emphasizes performance-based standards and requires certification of software used to show compliance with energy performance standards (normes). Portugal is also using BESTEST as their basis for software quality control under the EPBD.

Elsewhere, IEA BESTEST has been referenced in codes and standards in Australia and New Zealand. The European Committee for Standardization (CEN) used BESTEST to check their reference cooling load and cooling energy calculation methods based on the requirements of prEN 13791 and prEN 13792. The UK is setting up software accreditation for detailed thermal models, and is planning to use some building thermal fabric test cases from IEA BESTEST 1995. As part of their building energy performance assessments under the EPBD, Austria, Denmark, Greece and The Netherlands are using a new software tool that includes algorithms that have been checked with BESTEST. Also, the U.S. National Association of State Energy Officials has referenced HERS BESTEST for certification of home energy rating software. HERS BESTEST, which is conceptually based on IEA BESTEST, was developed for use specifically in detached-residential applications.

Activities

For the purpose of defining the Projects constituting IEA 34/43, it is useful to define the terms "comparative tests" and "empirical validation". In comparative testing, an IEA Building Energy Simulation Test (BESTEST)-type comparative / diagnostic evaluation test procedure is written and software programs are compared to each other. Advantages of comparative

tests include ease of testing many parameters, and that simple building descriptions may be used; the major disadvantage is lack of any truth standard in comparisons for cases where analytical solutions are not possible.
In empirical validation, software is compared with carefully obtained experimental data. The advantage of empirical tests is that true validation of the models may be accomplished within the uncertainty of the experimental data; disadvantages are that gathering high quality experimental data is expensive and time consuming, making it difficult to test the individual effects of many parameters.

Comparative tests include:

- BESTEST ground-coupled heat transfer with respect to floor slab and basement constructions,
- BESTEST multi-zone heat transfer and shading, and
- BESTEST air flow, including multi-zone airflow.

Within the comparative test cases, analytical verification tests for evaluating basic heat transfer and mathematical processes in building energy analysis tools will be included where possible.

Empirical validation tests include:

- shading / daylighting / load interaction,
- chilled-water and hot-water mechanical systems and components, and
- buildings with double-skin façades.

When a number of building energy simulation programs are tested against the same empirical data set, comparative tests are also possible. Such comparative tests can help identify deficiencies in the empirical experiment if they exist, or broadbased deficiencies in the current modelling state of the art.

The following administrative support project will facilitate availability and distribution of IEA tool evaluation test procedures:

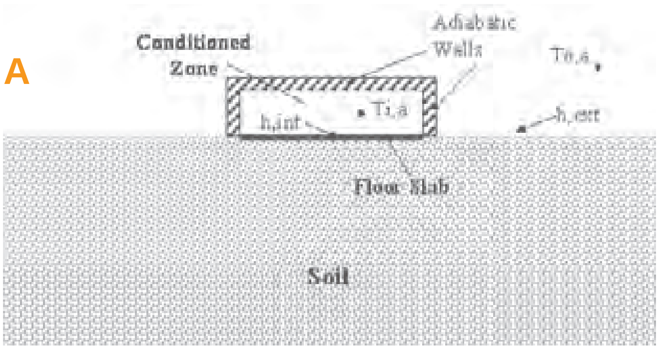
- Develop a single web site that consolidates IEA tool evaluation tests from SHC Task 12 / ECBCS Annex 21, SHC Task 22, and IEA 34/43.

The resulting penetration of BESTEST is evident from a recent study comparing 20 whole building energy simulation tools, which indicates that 19 of the 20 tools reviewed had been tested with at least one of the IEA BESTEST procedures; 10 of the tools had been tested with more than one of the BESTEST procedures. The study also indicates that test procedures developed by the IEA dominate the set of available tests.

Project A: Ground Coupled Floor Slab and Basement

Project Leaders: Joel Neymark and Ron Judkoff, National Renewable Energy Laboratory, U.S.A.
The objective of Project A is to assess the accuracy of building energy analysis tools that have incorporated detailed models for predicting ground-coupled heat transfer related to floor slab and basement constructions.

A



Fundamental Ground-Coupled Heat Transfer Test Case with Boundary Conditions

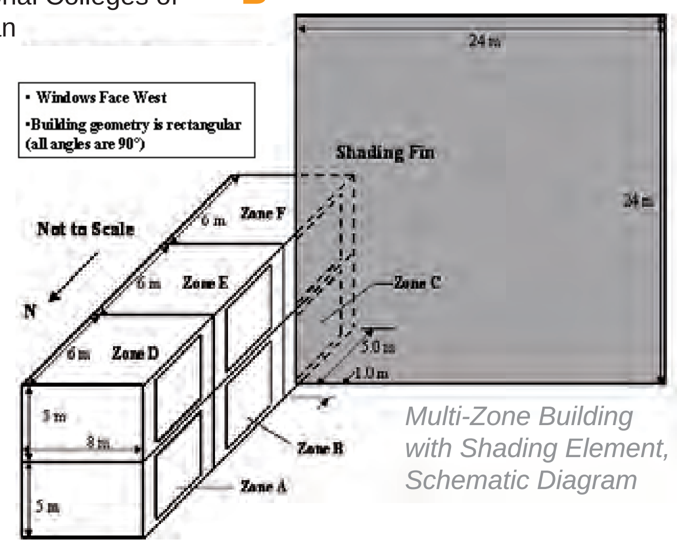
Project B: Multi-Zone and Airflow Comparative Tests

Project Leaders:

- Non-Airflow Tests: Joel Neymark and Ron Judkoff, National Renewable Energy Laboratory, U.S.A.
- Airflow Tests: Yasuo Utsumi, Institutes of National Colleges of Technology, Japan

The objective of Project B is to specify a set of comparative test or analytical verification cases that investigate the comparability among simulation programs for modelling multi-zone configurations, including airflow test cases for both single-zone and multi-zone configurations.

B



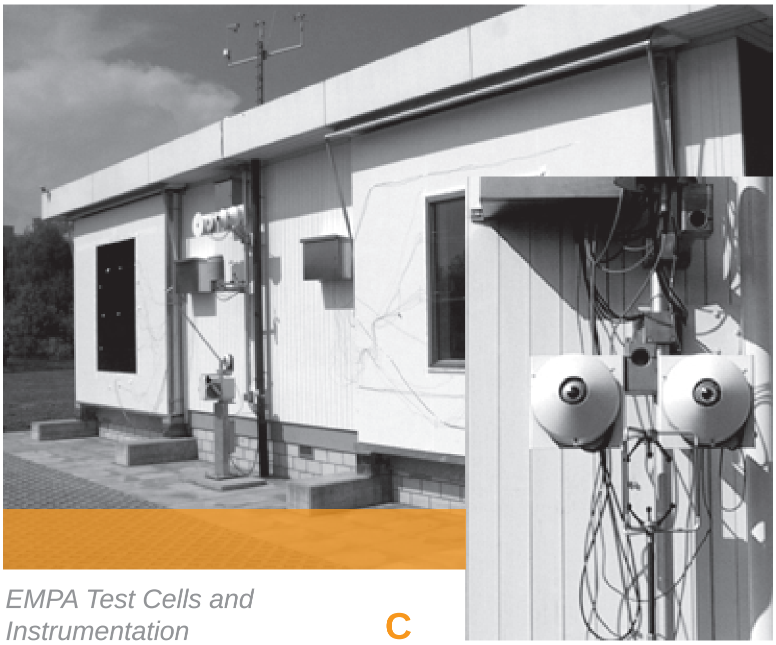
Multi-Zone Building with Shading Element, Schematic Diagram

Project C: Shading/ Daylighting/Load Interaction Empirical Tests

Project Leaders:

- EMPA Empirical Tests: Heinrich Manz, EMPA, Switzerland
- ERS Empirical Tests: Greg Maxwell, Iowa State University, U.S.A.

The objective of Project C is to collect empirical data for validating models of (1) thermal performance of windows, (2) illuminance calculations, (3) heating / cooling load of the room, and (4) interaction between natural and electrical lighting and HVAC systems.



EMPA Test Cells and Instrumentation

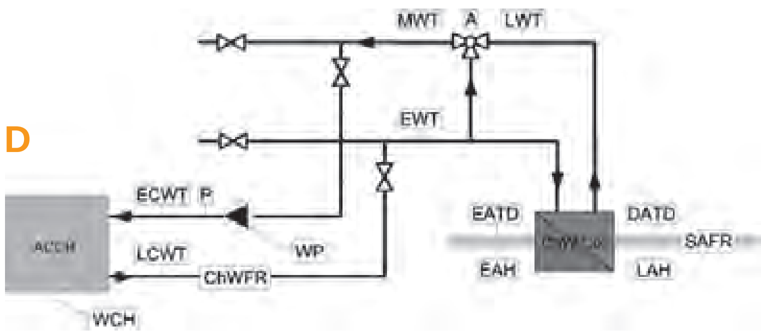
C

Project D: Mechanical Equipment and Controls Empirical Validation Tests

Project Leader: Clemens Felsmann, Dresden University of Technology, Germany

The objective of Project D is to specify a set of empirical validation test cases for chilled-water and hot-water hydronic components and systems, including tests for models of: chiller, boiler, hydronic network (piping, valves, etc.), the air / water heat exchanger (coil), and the entire system.

D

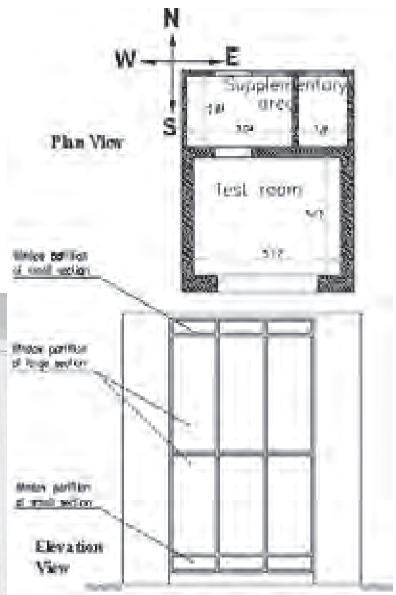


Project E: Double-Skin Building Empirical Validation Tests

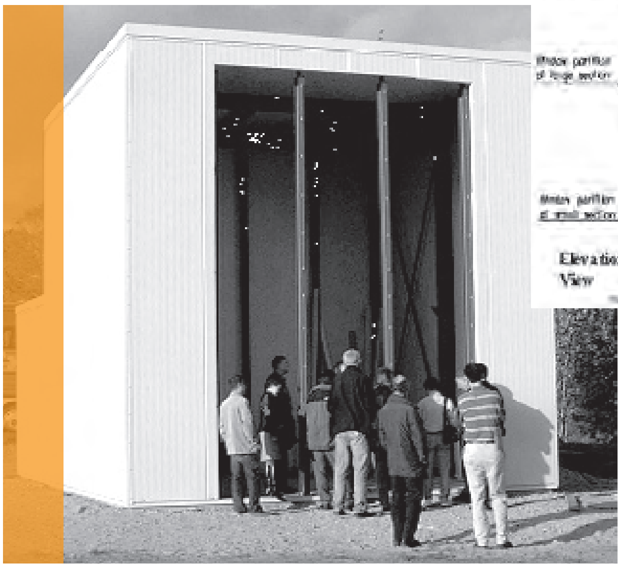
Project Leader: Per Heiselberg, Aalborg University, Denmark

The objective of Project E is to assess suitability and awareness of building energy analysis tools for predicting heat transfer, ventilation flow rates, cavity air and surface temperatures, solar protection effect, and interaction with building services systems in buildings with double façades.

E



Aalborg University Double-Skin Facade Test Facility Plans and Construction Progress



Residential Cogeneration Systems: A Review of The Current Technologies - New Publication

New Annex 42 Report

A new report recently published by the ECBCS Programme aims to provide an up-to-date review of the various cogeneration technologies suitable for residential applications. It provides introductory information on these technologies to the wider technical community.

The growing worldwide demand for less polluting forms of energy has led to a renewed interest in the use of cogeneration technologies in the residential sector due to their potential for significantly reducing the quantities of pollutants emitted in supplying residential electricity and heating.

Cogeneration systems in the residential sector have the ability to produce both useful thermal energy and electricity from a single source of fuel such as oil or natural gas. This means that the efficiency of energy conversion to useful heat and power is potentially significantly greater than by using the traditional alternatives of boilers or furnaces and conventional fossil fuel fired central electricity generation systems. If managed properly this increased efficiency can result in lower costs and a reduction in greenhouse gas emissions.

Cogeneration also has the added advantage of diversifying electrical energy production, thus potentially improving security of energy supply in the event of problems occurring with the main electricity grid.

As residential scale cogeneration technologies are still in their infancy, the potential for residential cogeneration energy and emissions savings is yet to be firmly established, and the emissions savings are determined by the emissions of the displaced fuels. However, a study of the actual performance of a domestic Stirling engine system installed in a house in France in 2003 showed a primary energy saving of 13%, and potential savings energy and emission savings of 28% have been claimed for this technology in the UK.

Technologies available and under development for residential, i.e. single-family (<10 kW) and multifamily (10 kW – 30 kW) applications, commercial (5 kW – 100 kW) and institutional cogeneration (20 kW – 100 kW) applications include:

- reciprocating internal combustion engine based cogeneration systems,
- micro-turbine based cogeneration systems,
- fuel cell based cogeneration systems, and
- reciprocating external combustion Stirling engine based cogeneration systems.

Since the focus of this report is on technologies that are suitable for single-family and multi-family residential cogeneration applications (generally covered by systems of <10 kW_e and <25 kW_{th}), only the reciprocating internal combustion engine, fuel cell and Stirling engine based cogeneration systems are reviewed. The review covers the performance, environmental benefits, and cost of these technologies where the information was available. This information was collated from manufacturers and research organizations for the various technologies, and includes access to as yet unpublished material for the residential, commercial and institutional cogeneration sector.

Micro-turbine based cogeneration systems that are currently available have capacities larger than are suitable for single-family dwellings, and are therefore not reviewed in this report.

At the time of writing this report the use of small-scale commercial cogeneration plant in applications like hospitals, leisure facilities,

(particularly those incorporating swimming pools), hotels or institutional buildings is well established and some of the technology fairly mature. These products are used to meet electrical and heat demands of a building for space and domestic hot water heating, and potentially absorption cooling of a building. However, the use of cogeneration plant for residential scale buildings has yet to become commercially viable though several manufacturers have developed products or are developing products suitable for residential scale use.

The full report may be downloaded from www.ecbcs.org/docs

The 6th International Conference on Indoor Air Quality, Ventilation & Energy Conservation in Buildings - IAQVEC 2007

Conference Announcement

28th – 31st October 2007, Sendai, Japan

Scope of the conference
The intended topics to be covered in the 6th International Conference on Indoor Air Quality, Ventilation & Energy Conservation in Buildings conference as follows:

- Indoor Environment and Health Effects
- Pollutants and Pollutants Sources
- Ventilation Requirement and Strategies
- Innovative Ventilation and Air-Cleaning Systems
- Human Comfort and Indoor Environment
- Moisture Transfer and Condensation Proofing
- Ventilation and Thermal Systems
- Outdoor Environment Related to IAQ
- Systems Control and Building Services
- Energy Conservation and Built Environment
- Design and Simulation Tools
- Sustainable Approach
- Innovative Technologies and Solution
- Facilities Management and Maintenance
- Policy and Legal Issues

Conference Venue
The conference will be held at the Sendai International Centre, located 2 km from the JR Sendai station on the west side of the downtown area.

IAQVEC 2007

Technical Tours
It is anticipated the following Technical tours will be offered:

- Climate test facilities, Tohoku Electric Power, Sendai
- Near-Zero-Energy house, Hokushu Housing, Sendai
- Clean room facility, New Industry Creation Hatchery Centre (NICHe) Tohoku University, Sendai

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Conference website:
www.iaqvec2007.org

7th International Conference on System Simulation in Buildings - SSB2006

Conference Announcement

11th - 13th December 2006, Liège, Belgium

Scope of the conference
The following priority topics will be considered at the 7th System Simulation in Buildings conference, to be held at the University of Liège's Thermodynamics Laboratory:

- modeling of HVAC components
- system simulation methods and tools
- application to commissioning
- application to energy manage ment and to maintenance
- application to audit and retrofit

This conference will be among others, the occasion to present some final results from ECBCS Annex 40 "Commissioning of Building HVAC Systems for Improved Building Performance" and to deal with some aspects of he new Annexes HVAC Systems for Improved Building Performance" and to deal with some aspects of the new Annexes 42 "The Simulation of Building-Integrated Fuel Cell and other Cogeneration Systems ", 43 "Testing and Validation of Building Energy Simulation Tools", 47 "Cost Effective Commissioning of Existing and Low-Energy Buildings" and 48 "Heat Pumping and Reversible Air Conditioning".

The 7th System Simulation in Buildings conference is organized in very close cooperation with ECBCS and with the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).

Calendar
Notification of final program: 1st September 2006
Pre-prints sent to registered participants: 24th November 2006
Conference:
11th – 13th December 2006

This continues similar associations with the 6 previous conferences.
Language: The official conference language is English.

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EPIC 2006 AIVC
Conference Announcement

20th – 22nd November 2006, Lyon, France

Scope of the conference
The EPIC 2006 AIVC conference will be organised in the framework of the 4th European Conference on Energy Performance and Indoor Climate in buildings (EPIC), the 27th Conference of the Air Infiltration and Ventilation Centre (www.aivc.org) and the conference of the International Energy Agency Energy Conservation in Building and Community Systems Programme (www.ecbcs.org).
It is intended to include the following topics:

- Extreme Low Energy Buildings and Buildings with Positive Energy
- Energy Performance Regulations and Certification : where are we and where to go?
- The Existing Building Stock : Technical, Economical and Social Aspects for a Wide Scale Upgrading
- Performance Assessment of Building Components and Installations
- Sustainable Urban Planning
- Advanced Glazing, Façade and HVAC Technologies
- Natural Ventilation in Urban Set tlements
- Design of Buildings of High Archi tectural and Environmental Quality
- Contributions & Challenges of the Information Society in relation to achieving Environmental Quality
- Indoor Climate Criteria in relation to Sustainable Building
- Indoor Climate, Energy & Econo my, i.e. the Economic Value of Indoor Climate, the Overall Cost of Low Energy Concepts
- Opportunities & Barriers for the integration of Renewables in the Built Environment
- International and National Policies for medium and long term Energy
- Innovative Concepts for Education and Training

EPIC track
During these sessions, a wide range of presentations in relation to the conference topics dealing with Energy Performance and Indoor Climate in Buildings will be presented.
AIVC track organised by the Air Infiltration and Ventilation Centre
A total of 8 sessions will cover a wide range of topics dealing with ventilation, e.g. development of new ventilation systems, ventilation and thermal comfort, indoor air quality, energy performance of ventilation systems, airtightness of buildings.
EPBD and IEE track organised by the EPBD Buildings Platform

This track also contains 8 sessions during which the focus is primarily on the implementation of the European Energy Performance of Buildings Directive. Information will be provided about the relevant projects of the Intelligent Energy Europe (IEE) programme, the activities in the EPBD concerted Action and the EPBD Buildings Platform, the mandate given by the EC to CEN for developing a whole range of standards facilitating the implementation of the EPBD. Moreover, a wider view on the EC policy regarding energy in buildings as well as the long-term challenges will be presented.
IEA track organised by ECBCS
Ten ECBCS Annexes will lead sessions covering topics such as low exergy systems, high performance thermal insulation, commissioning of buildings and HVAC, testing and validation of energy simulation tools, integrating environmentally responsive elements in buildings, energy efficient lighting, energy efficient retrofit buildings for governmental buildings.

Language: English will be the official language. Simultaneous translation in English and French will be provided for the opening and closing sessions.

Venue
EPIC 2006 AIVC Conference will be held at the “Palais des Congrès” Convention Center, Lyon, in the heart of the Cité Internationale.

Hotel information
Contact Lyon Convention & Visitors Bureau (lyoncvb@lyon-france.com) and book your room as soon as possible. You can also refer to the web site for updated information about hotels.
Conference Secretariat
Laboratoire des Sciences de l’Habitat - Département Génie Civil et Bâtiment, CNRS URA 1652 Ecole Nationale des Travaux Publics de l’Etat - Rue Maurice Audin,
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Recent ECBCS Annex Publications

Annex 5 - Air Infiltration and Ventilation Centre (AIVC)
- AIR Newsletter published every 3 months

Database
- AIRBASE - bibliographical database, containing over 17,000 records on air infiltration, ventilation and related areas, Web based, updated every 3 months.

Technical Notes
- Reducing Indoor Residential Exposures to Outdoor Pollutants, 2003, Sherman M and Matson N, TN 58
- Parameters for the design of demand controlled hybrid ventilation systems for residential buildings, 2005, Dorer V, Pfeiffer A, Weber A, TN 59
- Efficacy of Intermittent Ventilation for Providing Acceptable Indoor Air Quality, Sherman M H, TN 60, 2006

Annotated Bibliographies
- Review of Airflow Measurement Techniques, 2003, McWilliams J, BIB 12

AIVC Conference Proceedings
- Ventilation, Humidity Control and Energy, 2003, Washington, USA, CP 24
- Ventilation and Retrofitting, 2004, Prague, Czech Republic, CP 25
- Ventilation in Relation to the Energy Performance of Buildings, Brussels, Belgium, CP 26

Ventilation Information Papers
- Displacement ventilation, 2004, Schild P G, VIP 05
- Air to air heat recovery in ventila tion systems, 2004, Schild P G, VIP 06
- Indoor air pollutants – Part 2: Description of sources and control/ mitigation measures, 2004, Levin H, VIP 07
- Airtightness of Buildings, 2004, Dorer V, Tanner C, Weber A, VIP 08
- Energy performance regulations: Which impact can be expected from the European Energy Performance Directive? 2004, Wouters P, VIP 09
- Sheltering in buildings from large scale outdoor releases, 2004, Chan W R, Price P N, Gadgil A J, VIP 10
- Use of Earth to Air Heat Exchangers for Cooling, 2006, Santamouris M., VIP 11

See www.aivc.org for details of Annex 5 publications.

Annex 19 – Low Slope Roof Systems
- Technical Synthesis Report: Annex 19 Low Slope Roof Systems, Palmer J, 2003

Annex 22 & 33 Advanced Local Energy Planning
- Technical Synthesis Report, ESSU, 2005

Annex 32 - Integral Building Envelope Performance Assessment
- Technical Synthesis Report: Annex 32 Integral Building Envelope Performance Assessment, Warren, P, 2003

Annex 34 - Computer Aided Evaluation of HVAC System Performance
- Technical Synthesis Report, ESSU, 2005

Annex 35 - Control Strategies for Hybrid Ventilation in New and Retrofitted Office Buildings (HYBVENT)
- Technical Synthesis Report, ESSU, 2005

Annex 36 - Retrofitting in Educational Buildings: Energy Concept Adviser for Technical Retrofit Measures
- Retrofitting of Educational Buildings - Case Study Reports, edited by Morck O, 2003
- Energy Concept Adviser, 2005 www.annex36.com

Annex 37 - Low Exergy Systems for Heating and Cooling of Buildings
- Low Temperature Heating Systems - Increased Energy Efficiency and Improved Comfort, brochure, 2002 www.vtt.fi/rte/projects/annex37
- Lowex Guidebook - www.lowex.net/english/inside/guidebook.html

Annex 38 - Solar Sustainable Housing
- Sustainable Solar Housing: Marketable Housing For A Better Environment Brochure, 2003
- SIS demonstration housing project in Freiburg, Germany, 2003
- Demonstration house in Monte Carasso, Switzerland, 2003
- Demonstration houses in Kassel, Germany, 2003
- Demonstration houses in Hannover-Kronsberg, Germany, 2003
- Zero energy house, Kanagawa, Japan, 2003
- Sunny Eco-House, Kankyokobo, Japan, 2003 www.iea-shc.org/task28

Annex 39 - High Performance Thermal Insulation Systems (HiPTI)
- Vacuum Insulation in the Building Sector: Systems and Applications, 2005
- Vacuum Insulation Panels: Study on VIP-components and Panels for Service Life Prediction of VIP in Building Applications, 2005 - download from www.vip-bau.ch

Annex 40 - Commissioning of Building HVAC Systems for Improving Energy Performance
- Commissioning Tools for Improved Energy Performance: Results of IEA ECBCS Annex 40, 2005 - download from www.commissioning-hvac.org

Annex 42 - The Simulation of Building-Integrated Fuel Cell and Other Cogeneration Systems (COGEN-SIM)
- Residential Cogeneration Systems: a Review of The Current Technologies, 2005 - download from www.cogen-sim.net

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38 Solar Sustainable Housing (Solar Heating and Cooling Task 28)

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42 COGEN-SIM : The Simulation of Building-Integrated Fuel Cell and Other Cogeneration Systems

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43 Testing and Validation of Building Energy Simulation Tools (Solar Heating and Cooling Task 34)

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44 Integrating Environmentally Responsive Elements in Buildings

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45 Energy-Efficient Future Electric Lighting for Buildings

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46 Holistic Assessment Toolkit on Energy Efficient Retrofit Measures for Government Buildings

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50 Prefabricated Systems for Low Energy / High Comfort Building Renewal

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