Buildings for a Sustainable Future
Dubai, 15 October 2008

Summaries of presentations to be made and, in annex, biographical sketches of the panelists
SUSTAINABLE BUILDING FOR THE GLOBAL VILLAGE: THE VISION AND STANDARDS NEEDS FOR ARCHITECTS AND DESIGNERS

by Mrs. Louise Cox, President, International Union of Architects

Architects and designers, more than anyone else, know that Standards to support Innovation and sustainable building practices must be both global and local. Good design cannot be independent of the environment; it must build on and be responsive to climate. Buildings in their settings must shelter, nurture the well being of their inhabitants, feel comfortable, inspire and enhance the enjoyment of life, as well as being environmentally sustainable and accessible for all. Therefore the architect’s vision of the future needs to include an appreciation of environmental principles, cultural and natural heritage and the use of locally available resources to address local needs and life styles. We should not be aiming to replicate New York or London throughout the emerging economies of Africa and South America.

Cultural heritage provides us with the best signposts to achieving these ambitions. It contributes strongly to the personality and character of most cities and is a source of a truly sustainable development. A city's heritage illustrates its ancient and recent history. It reflects the memory, skills and wisdom of successive generations of the inhabitants and leaders. It provides those who live in and use the city with important references, landmarks and spaces, contributing to their quality of life. Over the past 200 years, building design has lost sight of the many sustainability innovations that our forefathers developed to allow communities to grow and thrive in the harshest environments. Since the industrial revolution we have moved away from working with the environment to challenging it. We design buildings that fight to survive rather than to complement their location. This is at the heart of unsustainable design and building.

The demands of growing cities and the inevitable urban sprawl and concentration lead to the loss of natural features, flora and fauna. This has a major impact on the cultural landscapes and with it, living traditions. The increase of urbanisation, population movement and relocation results in loss of traditional caretakers, repair technologies and cultural practices in the rural areas. For too long cultural heritage has been seen as an impediment to sustainability rather than an asset. Thankfully architects and designers are now increasingly looking to the cultural solutions to local environmental issues to find new ways to design better, more sustainable buildings. This also means understanding that heritages differ and our architecture should reflect cultural diversity. Our vision of the future needs to include our many pasts.

Over the past decade communities in cities and towns around the world recognise that large-scale efficiency and energy conservation programmes and the introduction of revolutionary renewable energy generation technologies tangibly help to pursue beautiful visions of the future. Renewable energy technology and other carbon emissions reduction programmes are being introduced most visibly, and at an increasing, ultimately global scale. International standards in architecture, building and engineering, alternative energies and landscape design need to develop with this change and should not always be prescriptive. They could be performance-based, to encourage innovation and adjustment to suit differing cultures and applications. For the developed and developing world, heritage and sustainability issues, equity, social responsibility, cultural identity, resistance to natural disasters, all need to be considered in integrated sustainable design and in standards.

Cultural Heritage and Global Climate Change are like "managing static remains in a dynamic landscape." Ultimately, architects seek to realise a vision for their clients with these parameters. In the global village we are all neighbours and architects’ clients are all of us, and we are all different.

What is the architect's and designer's vision? Where have we come from, where are we going, and how do we develop standards that reflect these aspirations?
SUSTAINABILITY OF BUILDING MATERIALS AND COMPONENTS

by Mr. Alain Maugard, President, Building Scientific and Technical Center (France)

In a world in which about 60% of the population will be urban in 2030, the sustainability of cities will be the major challenge during the first part of the century. This objective requires a quantified assessment of performance and suitable management of projects. Since 2000, substantial standardization work has been initiated at the international level (ISO and CEN). This work has designed a modular and universal approach, from building components to cities. The modular approach enables to value the efforts all along the supply chain. A life cycle and holistic approach is the basis of standardization work to reach the objective of sustainability in the construction sector.

The product/component level deals with standards to assess, communicate and use product performance. The building level deals with the assessment of building performance from product data and other sources of data and tools. The next steps will concern the assessment of performance of construction works on a larger scale (district and city).

Taking into account environmental, social and economic aspects is much more complex and will require a complete change of practice of the construction industry players. The current metabolism of urban civilization is incompatible with sustainable development. To reduce the environmental footprint of cities, harmonized calculation methods and coherent governance are required. International standardization will play its role of cement between cultures and countries on the way to sustainability.
It is well known that energy consumption is the root cause of climate change. In the European Union (EU), 80% of greenhouse gas emissions come from energy use. This is why the EU has launched an ambitious energy and climate change policy package which includes the target of improving the European energy efficiency by saving 20% energy by 2020.

Buildings, which are responsible for 40% of the energy consumption in Europe and worldwide, are at the heart of the European energy efficiency policy. Indeed, the biggest energy savings potential is in the buildings sector, i.e. a quarter of the energy consumed in buildings by 2020 can be saved in a cost-efficient way. It is to be noted that this sector is fragmented with different groups of businesses and professionals involved at many stages of the construction and maintenance of buildings.

Policy tools towards sustainable buildings are many: legislative and non-legislative measures, efficient technologies, standards, and implementation on the ground. In addition, proper information to consumers is needed at the right time, in the right place. The main EU tool to realize the attractive savings potential is the Energy Performance of Buildings Directive (2002) which brings a holistic and innovative approach. International Standards are among the most important elements to implement the EU policies and legislation, indeed a backbone for the EU efficiency policy. For instance, the current Buildings Directive refers to more than 30 standards. The European Commission is convinced that International Standards will be even more essential following the globalisation of construction and buildings markets but naturally also by the common concern of climate change and increasing energy prices. Good standards can give a push to energy efficient buildings. The European Commission is counting on further good collaboration with ISO on these significant issues.

Our common energy future is challenging. The future will be most likely organised around different patterns of energy production, consumption and behaviour. Energy efficiency plays a key role in all sectors. Action is needed now. Everyone can and need to contribute.
INTEGRATING SOLAR ENERGY IN BUILDING DESIGN

by Dr. Stephen Treado, Associate Coordinator, White House Task Force on Energy, Security and Climate Change, Executive Office of the President (USA)

The effective utilization of solar energy in buildings is an extremely promising concept that holds great potential for promoting sustainability and energy efficiency while providing desirable and productive indoor environments. However, many challenges exist that hinder a wider implementation of solar-based resources in buildings, including the dynamic characteristics of solar radiation, the need for comprehensive design and analysis techniques to develop appropriate building designs, and the expertise needed to implement structural, mechanical, electrical and control systems that are able to fully utilize solar energy.

While we know that solar radiation can be used to provide heating, electrical power, daylighting and cooling in buildings, thereby substantially reducing energy usage and greenhouse gas emissions, doing this in a cost effective manner requires economies of scale and a commoditization of new and innovative solar technologies. A primary factor needed to facilitate the mainstreaming of solar energy in buildings is the availability of standards to support the design, construction and operation of robust solar energy systems that can alleviate the “fear factor” intrinsic in the implementation of any new technologies. Ultimately, increasing the demand for building solar technologies will reduce costs and improve performance, which in turn will provide energy security and reduce environmental impacts.
Masdar City offers an excellent opportunity to become part of the world’s first carbon-neutral, zero-waste, city in the heart of Abu Dhabi.

A fully integrated green community, Masdar City will be the world’s first carbon-neutral, zero-waste city entirely powered by renewable energy. All buildings’ designs are based on traditional regional architecture and urban planning. The city will showcase world leading and innovative building practices and is being constructed to provide a global model for sustainable living and working.

Masdar City will become a world-leading clean technology hub, offering unique opportunities for academics, researchers, industry, the finance community and entrepreneurs to work together to develop ever cleaner and innovative technologies.

Up to 1,500 companies are expected to base themselves in the city, which will provide an attractive business environment due to its Free Zone (FZ) status. Benefits include 0% taxes for companies or individuals, simple administrative processes, 100% foreign ownership, 0% import tariffs, strong intellectual property protection and no restrictions on capital movement. Excellent transport links and proximity to nearby manufacturers, suppliers and the markets of the Middle East, and the growing economies of China and India make the city’s value proposition highly attractive.

Masdar city will be car-free. A personal rapid transportation network, powered by renewable energy, will whisk residents and visitors quickly and quietly through carefully designed streets and public places. Shaded walkways will encourage pedestrians and the city will be linked to surrounding communities, the centre of Abu Dhabi and the international airport through a network of road and rail transportation routes.

Masdar city showcases Abu Dhabi’s commitment to the challenges of meeting some of mankind’s most pressing issues; energy security, the environment and truly sustainable human development for which standardization and, in particular, International Standards should be available in view of the strategic role they play in addressing these challenges.

One day, all cities will be built like this.
MODERATOR

Mr. Rashad Mohammed Bukhash  
(UAE)

is Chairman of the Architectural Heritage Society (UAE) and Director of the Architectural Heritage  
Dept. of Dubai Municipality which he joined in 1987 as a Planner Architect. His positions at Dubai Municipality  
also include that of Head of the historical buildings section and Director of the general projects department. Mr. Bukhash's  
extraordinary experience encompasses the planning, organization and management of engineering projects; the survey, record, design  
and restoration of historical buildings; museum design; the heritage, architecture and history of the UAE; and the  
preparation and review of texts for museums, of documentary films and of books. In this respect, he is the author of or contributed  
to more than 20 books. In 2002, Mr. Bukhash received the Rashid Award for Excellency. He holds a Master in Philosophy in Architecture  
from the University of Manchester (United Kingdom).

SPEAKERS

Mrs. Louise Cox  
(International Union of Architects)

became President of the International Union of Architects (UIA) in July 2008. UIA is the umbrella body of 120 national sections representing 1.4 million architects worldwide. She was previously UIA First Vice President and UIA Vice President Region IV, Asia and Oceania and coordinator of the UIA Regional Heritage Work Programmes. Mrs. Cox is Co-President of the UNESCO-UIA Validation Council for Architectural Education, a member of the UIA Education Commission and an Adjunct Professor in the Faculty of the Built Environment at the University of New South Wales (Australia). Mrs. Cox has had wide experience in heritage, conservation, institutional and health planning and contract administration of major health projects. She is a Life Member of the National Trust of Australia, a member of Australia ICOMOS¹, the Treasurer of Docomomo Australia Inc² and a former member of the North South Wales (NSW) Heritage Council. Mrs. Cox served as President of the Royal Australian Institute of Architects (RAIA) from 1994 to 1995 and she currently chairs the RAIA National Heritage Committee. Mrs. Cox is a Board Member of Standards Australia, and was Chairman of their Joint Australia/New Zealand Building Standards Sector Board for six years.

¹ ICOMOS: International Council on Monuments and Sites
² Australian branch of an international organization called DOCOMOMO which is dedicated to the documentation and conservation of buildings, sites and neighbourhoods of the modern movement.
Mr. Alain Maugard
(France)

has been Executive President of the *Centre Scientifique et Technique du Bâtiment* (CTSB) since 1993. He is a Member of the Scientific Council of the French Environment and Energy Management Agency (ADEME), and a member of the Advisory Group for Key action “City of Tomorrow and Cultural Heritage” of the Fifth European Community Framework Programme (5FP). Mr. Maugard was President of the European Union of Agrément (UEAtc) from 2003-2005 after having been President of the European Network of Building Research Institutes (ENBRI) from 1999-2001. Prior to these positions, he was appointed in 1990 chief executive officer of EPAD, a public body responsible for planning the development of La Défense area near Paris (France). Mr. Maugard has more than 20 years management experience at the ministerial level in a variety of roles, including as deputy advisor to two Housing and Urban Planning Ministers. He is a graduate of the *Ecole Polytechnique* (France) and holds the title of Civil Engineer of Ponts et Chaussées.

Ms. Pirjo-Liisa Sinikka Koskimäki
(European Commission)

is currently Head of the Energy Efficiency Unit at the Directorate-General (DG) Energy and Transport of the European Commission. Her responsibility areas include energy efficiency policy in general, legal measures on buildings, combined heat and power, and energy services. Ms. Koskimäki has more than 10 years management experience at the European level as Head of different Units at DG Energy and Transport such as “Energy Technology Strategy, Dissemination, Promotion”, “Environment” or “Sectoral economies”. During this period, she has been responsible, *inter alia*, for the OPET network re-organization and opening to Eastern European countries; for the coordination of energy policy contributions to climate change and other environmental programmes; for the coordination of energy activities under Lisbon strategy; and for the conception and implementation of external communication on energy. At the national level, she held various positions from 1980-1991 within the Energy Department of the Finnish Ministry of Trade and Industry, including that of Head of Division for Energy Efficiency.

Dr. Stephen Treado
(USA)

is currently Associate Coordinator at the White House Task Force on Energy Security and Climate Change, Council on Environmental Quality, Executive Office of the President (USA). He is also Adjunct Faculty Professor at the University of Maryland (USA), where he obtained his Ph.D. in Mechanical Engineering in 1987. Prior to his current positions, Dr. Treado was Project Leader/Acting Group Leader at the NIST Building Environment Division. Regarding standardization activities, he participates in committees of, *inter alia*, the International Council for Research and Innovation in Building and Construction (CIB), the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and the Illuminating Engineering Society of North America (IESNA). Dr. Treado’s expertise and research interests include: building energy

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3 English translation: Building Scientific and Technical Center
4 UEAtc is the European network of independent Institutes, Centres or Organizations that are engaged in the issue of technical approvals for innovative construction products or services.
5 OPET: Organizations for the Promotion of Energy Technologies (OPET) network
6 NIST: National Institute of Standards and Technology
systems, including design, analysis and optimization of HVAC\(^7\), renewable energy technologies, daylighting, lighting and control systems; economic analysis and life-cycle costing of energy systems and applications; and development of sampling, testing and rating procedures and standards for equipment and systems.

Mr. Khaled Awad  
(UAE)

is Director of Property Development at Abu Dhabi Future Energy Company, the company driving the Masdar Initiative. Mr. Awad is currently overseeing the development in Abu Dhabi of the Masdar Zone, the first zero carbon and zero waste city in the world. Prior to his role in Masdar, Mr. Awad has been working in the construction industry in the Arabian Gulf for more than 22 years. He was the founder and CEO of various companies in construction and real estate, dealing with the supply and IT side of the industry as well as concept development of large scale projects. He is a member of the American Society of Civil Engineers (ASCE), the American Society for Testing and Materials (ASTM), a Fellow of the American Concrete Institute (ACI) and a Fellow of the Institute of Concrete Technology (ICT). He is an active member of several ACI committees, including the ACI Board Advisory Committee on Sustainability and was the recipient of the Henry Kennedy Award from ACI in April 2007.

\(^7\) HVAC: Heating, Ventilation and Air Conditioning
STANDARDS FOR ACCESSIBILITY TO/IN BUILDINGS AND PUBLIC PLACES

by Mrs. Cristina Rodríguez-Porrero Miret, Director, National Centre for Personal Autonomy and Technical Aids (CEAPAT) (Spain)

ISO International Standards support the improvement in quality, safety, security, environmental and consumer protection, thereby contributing to economic and social progress. Diversity is a reality in our society. The number of older persons and persons with different needs and situations is increasing, and ISO has successfully addressed the importance of being aware of the needs of older persons and persons with disabilities when developing standards.

Accessibility makes life easier and facilitates the participation of many different users interacting with products, buildings and their environments. Without accessible designs many people will be discriminated and unable to access, understand, or use buildings and their facilities. This affects working places, administrative buildings, houses, shops, museums, training places, hotels, travelling and tourism environments, and all types of social, cultural, political and economical activities. Ensuring the rights of persons with disabilities and older persons is not possible without accessibility.

Accessible and usable buildings are designed for a diversity of situations, and the results are beneficial to society as a whole. Adapting a building once it is finished is much more expensive than designing right from the beginning of the process a building that is accessible. Accessibility must be an integral part of the life-cycle process of the building (planning, programming, design, construction, operation, technologies and services, administration and maintenance). Accessibility is not only related to physical limitations, it must consider many other situations and design-for-all principles.

Standards can greatly assist in promoting the concept of accessibility, and with the extension of tourism, International Standards are particularly topical on this issue. For more than 10 years AENOR has developed Spanish Standards including accessibility requirements in different sectors and now leads several European and International works, e.g. holding the Secretariat for the ISO Subcommittee on Accessibility and usability of the built environment.
In light of the world environment today, the security of buildings, and especially super-tall buildings, has taken on even greater significance.

Building owners need to ensure that their buildings are safe, that users feel safe and that access and movement are not adversely affected.

The Burj Dubai tower currently under construction is used as an example of how these issues are addressed in the tallest building in the world.

The presentation will cover;

- The context and background of the Burj Dubai tower
- Special security challenges for the tower
- The standards used and solutions developed to meet those challenges, with an international team of design and construction experts
EARTHQUAKE RESISTANT BUILDINGS

by Prof. Jun Kanda, Socio-Cultural Environmental Studies, The University of Tokyo (Japan)

1 What happens in the event of earthquakes?
We have learned a lot of lessons from past earthquakes. Nevertheless, we still find many disasters caused by earthquakes in recent years. The Wenchuan earthquake, in May 2008, caused disasters in hillside towns in China. The required safety demand for schools is being discussed. In Japan, the Kobe earthquake in January 1995 almost devastated the modern city of Kobe by crashing old wooden houses. Every earthquake shows a new type of consequence even now and we communicate to improve our built environments.

2 Design codes evolve after earthquakes
In Japan, we introduced a design horizontal force after the Kanto earthquake, in 1923. Design regulations as minimum requirements of the law have been applied to all buildings since 1950. Details of reinforced concrete were revised in 1970. The deformation capacity concept was introduced in 1980. Design response spectra were defined in 2000 for performance-based design. Buildings with base-isolation have become common in Japan and other countries. Damages are minimized but still exist.

3 Design determines the seismic safety
Earthquake occurrence can only be estimated probabilistically and the intensity is estimated from our existing knowledge. Nature alone does not cause disasters but buildings and civil structures cause disasters when they collapse. How safe is safe enough depends on socio-cultural situations. The economy also influences safety standards. Engineering information is not commonly understandable to the public. Communication on risks may help mutual understanding.

4 Role of International Standards
Each country has developed seismic regulations based on its experience. Only professional engineers can make safety appropriate, but there are many barriers such as the economy, the function, the aesthetics and even the ability of engineers. International Standards for the safety of structures play a great role in harmonizing national codes and making them transparent. ISO 2394\(^1\) provides the principle of structural safety and ISO 3010\(^2\) describes the seismic actions for structures.

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\(^1\) ISO 2394 General principles on reliability for structures
\(^2\) ISO 3010 Basis for design of structures -- Seismic actions on structures
The full benefits of intelligent building are realized through utilization of advanced information technologies. This talk will discuss what intelligent building technologies are and how information technologies contribute to the functional integration of all building systems. Interoperability among different devices and systems can be accomplished through standardization. The contribution towards current standardization activities of ISO/TC 205\(^1\) on integrated communication infrastructures for building automation and control systems will be introduced.

Intelligent building technologies are obviously available, but not widely adopted yet. Many challenges and initiatives are needed for the use of these technologies to become widespread. Recommendations to increase the widespread, successful and valuable application of intelligent building technologies will be discussed. Finally, the advent of novel wireless communication technologies and their impact on the IT infrastructure of intelligent building systems will be discussed.

\(^1\)ISO/TC 205 Building Environment Design
BUILDINGS FOR A SUSTAINABLE FUTURE – STANDARDS FOR SECURITY, SAFETY AND ACCESSIBILITY IN BUILDINGS (afternoon session)

Biographical sketches of the moderator and speakers

MODERATOR

Dr. Khaleel Ibrahim Al-Hosani
(UAE)

has over 20 years of professional experience in teaching Civil Engineering courses for graduate and undergraduate students at the UAE University where he worked as a Consultant and Advisor of the Campus Development Department. He has also over 12 years of practical experience in the field of engineering as a General Manager of public works departments at the government of Abu Dhabi involved in project management and managing tender and construction documents. Dr. Al-Hosani’s extensive experience encompasses diagnoses and rehabilitation of building structures. He has worked as a consultant in many low-cost housing and government building projects in the Emirate of Abu Dhabi and was awarded a project for solid waste management for the greater Abu Dhabi Municipality. Moreover, Dr. Al-Hosani has analyzed and written technical reports for many projects in the UAE, and co-operated in establishing regulations and rules for bylaws of building codes in municipalities.

SPEAKERS

Mrs. Cristina Rodríguez-Porrero Miret
(Spain)

became the Director of the National Centre for Personal Autonomy and Technical Aids (CEAPAT), a division of IMSERSO1, in 1994. Mrs. Rodríguez is also the President of the Spanish Network for e-Accessibility and Design for All (REDeACC) and the Vice-President of the International Commission on Technology and Accessibility (ICTA). She represents or has represented her Ministry at the United Nations International Conference on Human Rights for People with Disabilities; the former European Conference of Ministers of Transport (ECMT); the e-Accessibility Group of the European Commission (ESDIS eEurope); and the Group of Experts on the impact of new technologies for people with disabilities and elderly people of the Council of Europe. She is familiar with international and national standardization activities as a participant in the work of ISO/TC 22/SC 262 and of various national technical committees related to accessibility and technical aids.

1 IMSERSO: Instituto de Mayores y Servicios Sociales (Institute of Older Persons and Social Services) by the Ministry of Labour and Social Affairs
2 ISO/TC 22/SC 26 Accessibility of vehicles to the physically handicapped
Mr. Greg Sang  
(UAE)

is currently the Project Director overseeing all aspects of Burj Dubai Tower’s design and construction. Prior to moving to Dubai in 2004 to work on Emaar Properties’ Burj Dubai Tower, he had worked for a variety of contractors, consultants and developers in Hong Kong since 1990. Mr. Sang graduated in 1989 with a degree in civil engineering from the University of Auckland (New Zealand).

Prof. Jun Kanda  
(Japan)

has been a Professor at the University of Tokyo since 1996. Prior to joining the University of Tokyo as an Associate Professor in 1980, he was a Structural Engineer in Takenaka Corporation. His research interests include structural safety and reliability, probabilistic modelling of loads on buildings and earthquake engineering. Prof. Kanda is a member of the editorial boards of the Journal of Structural Safety and Journal for the Structural Design of Tall and Special Buildings. He was awarded the Prize of the Architectural Institute of Japan (AIJ) 1996 for technical papers. He was Vice-President of this Institute from 2006 to 2008. As Chair of ISO/TC 98/SC 3\(^3\) since 2001, Prof. Kanda is familiar with international standardization activities.

Prof. Seung Ho Hong  
(Korea, Rep. of)

has been within the Department of Electronics, Information and Systems Engineering at the Hanyang University since 1992. He has worked in the area of communication networks for building automation, and published numerous journal papers for the performance analysis of building automation and control systems and its applications on heating, ventilation and air conditioning (HVAC), lighting, fire detection and monitoring of buildings. He has also participated in international standardization activities, including ISO/TCs 184\(^4\) and 205\(^5\). In 2007, he established the Ubiquitous Sensor Networks Research Center (USNRC) which was chartered by a Regional Establishment, Government of Korea, and is extensively involved in the research of Wireless Sensor Networks (WSN), in particular regarding its applications on building and home automation.

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\(^3\) ISO/TC 98/SC 3 \textit{Loads, forces and other actions}  
\(^4\) ISO/TC 184 \textit{Automation systems and integration}  
\(^5\) ISO/TC 205 \textit{Building environment design}