



IHA World Congress on Advancing Sustainable Hydropower Bulletin

A Summary Report of the International Hydropower Association (IHA) World Congress on Advancing Sustainable Hydropower

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SUMMARY OF THE INTERNATIONAL HYDROPOWER ASSOCIATION WORLD CONGRESS ON ADVANCING SUSTAINABLE HYDROPOWER: 29-31 MAY 2007

The International Hydropower Association (IHA) World Congress on Advancing Sustainable Hydropower convened at the Talya Convention Centre, Antalya, Turkey, from 29-31 May 2007. The congress was preceded by a training course on hydropower sustainability assessment, held on 27 May, and a field and networking tour of the Manavgat River Basin, held on 28 May. A hydropower exhibition also took place concurrently with the congress.

The event was the IHA's inaugural international congress, providing a forum for dialogue between hydropower companies, investment and development banks, non-governmental organizations (NGOs) and other stakeholders involved in the development and operation of hydropower projects for discussion of: technical hydropower innovation; social and environmental performance; the role of the public and private sectors; social responsibility; and certification of good practice in the hydropower sector.

Participants to the congress addressed various topics, including: the potential and progress of renewable energy; hydropower development and technical innovation; national perspectives on hydropower development; the social and environmental performance of hydropower; the role of the public and private sectors in hydropower development; business and social responsibility; and certification of good practice in the hydropower sector. Over the course of the three days, more than 320 participants, representing governments, industry, international organizations, financial and legal entities, conservation NGOs and research institutions, took part in the congress.

This report consists of a brief history of the IHA and multilateral energy initiatives, and a summary of congress proceedings.

A BRIEF HISTORY OF THE IHA AND SUSTAINABLE ENERGY INITIATIVES

INTERNATIONAL HYDROPOWER ASSOCIATION:

The IHA was formed under the auspices of the UN Educational, Scientific and Cultural Organization (UNESCO) in 1995 as a forum to promote and disseminate good practice and further knowledge of hydropower. It is governed by a Board, which comprises 18 elected members, up to six co-opted members and one Executive Director.

The IHA aims to advance the role of hydropower in meeting global water and energy needs by: championing continuous improvement and sustainable practices; building consensus through strong partnerships with other stakeholders; driving initiatives to increase the contribution of renewables, especially hydropower; and increasing awareness of the role that hydropower can play in sustainable development as an important source of renewable energy. Key initiatives include: providing guidance on hydropower through the IHA Sustainability Guidelines and a Sustainability Assessment Protocol; rewarding excellence through the IHA Blue Planet Prize; sharing knowledge through the development of a website on good practice (<http://www.sustainablehydropower.org>); and working towards certification in the hydropower sector.

Sustainability Guidelines: Considering sustainable development to be a fundamental component of social responsibility, sound business practice and natural resource

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management, the IHA developed its Sustainability Guidelines to provide a framework for good practice in hydropower. The guidelines were initially based on recommendations drawn from a five-year study conducted by the International Energy Agency (IEA), involving more than 100 experts from lending agencies, government departments, public utilities, private companies and research institutes. Following the subsequent publication of the World Commission on Dams Report in November 2000, the membership of the IHA decided to extend on this previous work to help define hydropower in the context of sustainability. The IHA Sustainability Guidelines promote greater consideration of environmental, social, and economic sustainability in the assessment of new energy supply options, new hydro projects and the management and operation of existing hydropower facilities. They were formally adopted during a meeting of the IHA Council in November 2003.

Sustainability Assessment Protocol: The IHA Sustainability Assessment Protocol was developed primarily to assist IHA members in assessing performance against criteria described in the IHA Sustainability Guidelines. The protocol addresses new energy projects and provides general guidance on consideration of sustainability issues. It can be used as part of preliminary due diligence reviews of proposed new energy projects, new hydropower projects and operating hydropower facilities that rely on objective evidence to support a “sustainability score” against 20 sustainability aspects of processes and performance. The Sustainability Assessment Protocol underwent extensive trialing and modification over more than two years before being approved by the IHA Board for adoption in July 2006.

MULTILATERAL INITIATIVES ON SUSTAINABLE ENERGY: Energy emerged as an issue of environmental concern when Agenda 21 and the Rio Conventions were being implemented in the 1990s. In July 2000, leaders of the Group of Eight major industrialized democracies (G8) met in Okinawa, Japan, for the G8’s twenty-sixth Summit. At this meeting, the G8 established a Renewable Energy Task Force to identify actions to promote a change in the supply, distribution and use of renewable energy in developing countries. In 2001, the Task Force concluded that renewable energy resources can sharply reduce local, regional and global environmental impacts, as well as energy security risks.

The ninth Session of the UN Commission on Sustainable Development (CSD-9), held from 16-27 April 2001, at UN Headquarters in New York, addressed matters related to energy, transport and the atmosphere. The meeting was preceded by comprehensive preparations on energy issues, including meetings of the *Ad Hoc* Open-Ended Intersessional Group of Experts on Energy and Sustainable Development, and regional intersessional meetings. CSD-9 recognized, *inter alia*, that the Millennium Development Goals (MDGs) would not be met without increased access to modern energy services.

Prior to the World Summit on Sustainable Development (WSSD), held in Johannesburg, South Africa, from 26 August to 4 September 2002, UN Secretary-General Kofi Annan proposed energy as one of the key areas to be addressed at this meeting. At its completion, the WSSD encouraged the development of new “Type II” initiatives, which are voluntary public-private partnerships (PPPs) aimed at advancing

implementation on the ground. Several of these Type II initiatives were launched in the area of energy for sustainable development.

The International Conference for Renewable Energies (*renewables* 2004) took place from 1-4 June 2004, in Bonn, Germany. The conference consisted of nine plenary sessions, including a multi-stakeholder dialogue and a ministerial segment. The ministerial segment included three ministerial roundtables that considered: policies for renewable energy market development; financing options and strengthening capacities; and research and policy development, and institutions.

CSD-14, which met from 1-12 May 2006, at UN Headquarters in New York, was tasked with reviewing progress in the areas of energy for sustainable development, industrial development, air pollution/atmosphere and climate change. The meeting was dominated by the energy agenda, with discussions focusing on energy security, the impact of oil and gas prices, and the respective roles of renewable energy technologies, fossil fuels, nuclear power and the climate change regime post-2012. CSD-14 adopted a Chair’s Summary which included reference to: access to energy for the poor and poverty alleviation in developing countries; participation of all stakeholders in long-term energy strategies in support of sustainable development; the impacts of increasing energy prices; the need for energy diversification; and incentives for providing clean energy services.

REPORT OF THE CONGRESS

The IHA Congress on Advancing Sustainable Hydropower took place from 29-31 May 2007. Throughout the meeting, participants listened to presentations, and panel and roundtable discussions. On Tuesday, 29 May, two roundtables, of Energy Leaders and Water Leaders respectively, convened. A panel discussion on climate change was also held. On Wednesday, 30 May, panel discussions took place on: the potential and progress of renewable energy; technical innovation; national perspectives; and the social and environmental performance of hydropower. On Thursday, 31 May, there were panel discussions on PPPs, business and social responsibility and certifying good practice. The congress closed on Thursday afternoon with an IHA General Meeting.

SESSION 1: OPENING ADDRESSES

Co-Chair of the opening session, Doğan Altınbilek, IHA President, welcomed participants to the congress and, noting that approximately 2 billion people worldwide lack access to electricity, emphasized that hydropower can contribute to meeting the MDGs, especially in Africa and Latin America. He explained that the IHA was founded in 1995, under the auspices of UNESCO’s International Hydrological Programme, and



Doğan Altınbilek, IHA President

highlighted recent achievements, including the development of the IHA Sustainability Guidelines and the IHA Sustainability Assessment Protocol.

Highlighting the potentially negative impacts of climate change on countries' water systems, opening session Co-Chair Haydar Kocaker, Director General, Turkish State Hydraulic Works, addressed the need for water resources to be managed, planned and protected in a sustainable manner through a multidisciplinary approach. He highlighted recent legislative developments that provide the private sector with incentives for investing in hydropower and said that renewable energy resources, including hydropower, have to "become the engine of the energy train."

Louis Berga, President, International Commission on Large Dams (ICOLD), explained that 20% of the world's electricity is generated through hydropower and that reservoirs play a significant role in flood management. Berga highlighted the correlation between a country's stock of dams and hydropower infrastructure on the one hand, and its socioeconomic development on the other. He said that policy decisions on hydropower should be taken within a framework of integrated water management (IWM) and that a combination of structural and non-structural actions is necessary to improve efficiency.

Peter Lee, President, International Commission on Irrigation and Drainage (ICID), explained that agriculture and hydropower involve productive uses of water with significant multiplier effects. Lee said both the IHA and the ICID must work to increase the social benefits of hydropower and to decrease its environmental impacts. He stressed that increasing the reliability of water supply would lead to increased productivity and that water storage is an effective way of increasing reliability. Lee suggested that the IHA and the ICID collaborate to promote storage and multiple uses of water.

Manfred Konukiewitz, Deputy Director General, Federal Ministry for Economic Cooperation and Development (BMZ), Germany, said renewable energy, including hydropower, is important to the European Union (EU) for providing adequate, reliable, clean and sustainable energy. He highlighted the potential of dams to increase economic development and energy access in developing countries, but also noted the possible negative impacts of large hydropower projects, calling for inclusive planning processes. Konukiewitz emphasized that where large hydropower projects occur, there is potential for corruption, and urged people to strive individually and collectively for a world without corruption.

Simon D'Ujanga, Minister of State, Minerals and Energy, Uganda, said that although Africa is well endowed with renewable resources, less than 8% of its population has access to electricity. He highlighted the key challenges to developing hydropower in Africa, including the considerable "up front" financial resources required for hydropower projects, the long project cycle and the opposition of some stakeholders to hydropower development. He explained that, against this backdrop, the Forum of Energy Ministers



Simon D'Ujanga, Minister of State, Minerals and Energy, Uganda

in Africa (FEMA) held a Ministerial Conference on Energy Security and Sustainability, in Maputo, Mozambique, from 28-30 March 2007, to deliberate on energy security and sustainability.

Anita Utseth, Deputy Minister, Ministry of Petroleum and



Anita Utseth, Deputy Minister, Ministry of Petroleum and Energy, Norway

Energy, Norway, explained that access to energy is a priority development issue and said the key challenge is exploiting domestic natural resources for energy supplies. Utseth identified greenhouse gas (GHG) emissions and energy supply security as the key energy-related challenges. She said that hydropower could provide substantial volumes of clean and renewable power, and

that the Kyoto Protocol provides opportunities for hydropower through the Clean Development Mechanism (CDM) and Joint Implementation.

Alaaddin Yuksel, Governor of Antalya, Turkey, thanked the IHA for hosting the congress in Antalya and welcomed participants to the city. He explained that in Turkey, water is considered the source of all life and civilization. He discussed the relationship between humans and the environment, stressing that the natural environment both provides for and limits human development.

SESSION 2: ENERGY LEADERS ROUNDTABLE

The Energy Leaders Roundtable was chaired by Sureyya Yucel Ozden, President of the World Energy Council (WEC), and facilitated by Jack Whelan, Independent Consultant, IHA. Opening the session, Sureyya Yucel Ozden said energy is an essential element for socioeconomic development, noting that energy should be acceptable, accessible, affordable, clean, and environmentally benign. He said that hydraulic schemes, including dams, will remain of fundamental importance to humanity for providing food, water and energy throughout the twenty-first century, and that humanity should do its best to use water resources efficiently.

Milton Catelin, Chief Executive, World Coal Institute, highlighted the need to address the two major concerns of the twenty-first century, namely, providing adequate and secure energy supplies that are affordable, and mitigating the harm caused by consuming energy in inappropriate ways. Noting that coal is abundant, well distributed globally, affordable, safe, reliable and easy to store, Catelin said that coal provides 40% of the world's electricity; highlighted coal's role in poverty alleviation; and called for the large-scale development of carbon capture and storage (CCS) to mitigate coal's contribution to climate change.

Jerry Marks, Climate Change Consultant, International Aluminum Institute (IAI), provided a consumer perspective on energy use and explained that production of aluminum is increasing, as is aluminum recycling. Marks explained that aluminum producers have been successful at reducing process emissions, but that the production process is still energy intensive, such that producers are becoming interested in reducing electricity emissions. He also emphasized the IAI's interest in hydropower development.

Peter Rae, Chairman, International Renewable Energy Alliance, explained that investment in renewable energy recently surpassed investment in information technology. He explained that coal use would continue, but that its production is becoming cleaner. Rae urged participants to consider ways in which they could work together to maximize production efficiency and to accelerate hydropower availability. Terry Moss, Generation Manager, Eskom, discussed: changing the energy mix in South Africa to reduce the reliance on coal and to increase the use of nuclear and renewable energy; the potential for hydropower in Africa, noting the formulation of large schemes; the IHA Sustainability Guidelines; the water-energy nexus; carbon credits and the benefit of CDM participation; and the development of environmental initiatives, such as underground coal gasification.

Explaining that according to the Millennium Ecosystem Assessment, freshwater species are the most threatened, Jamie Pittock, Director, WWF (World Wide Fund for Nature), stressed the importance of conserving rivers. He described the results of a WWF modeling exercise on technologies for climate change mitigation and presented its six key solutions as: decoupling energy services demand from energy production; stopping forest loss and degradation; accelerating the development of low emission technologies; using flexible fuels; developing hydropower storage and infrastructure; displacing coal with natural gas; and progressing the development of CCS. He also welcomed the IHA initiative on sustainable hydropower development.

Noam Lior, Editor-in-Chief, *Energy: The International Journal*, said that the international economy has proven to be resilient to change, and that the ratio of resources to production has remained constant. He said renewable energy must be both affordable and clean, and explained that the highest growth in renewable energy has been in solar and wind, but that some biomass, small hydropower and geothermal technologies show similar potential. He highlighted space power as an important future consideration, for "Plan B," and citing Stephen Hawking, said "space is the key to human development and survival."

DISCUSSION: Panelists addressed increasing cooperation among energy sector stakeholders in tackling energy supply and consumption issues. They also considered the feasibility of CCS and ways to reconcile the provision of energy that is clean, affordable and appropriate with the development of policy frameworks that favor renewable energy.

KEYNOTE ADDRESS

Doğan Altınbilek presented Suleyman Demirel, former President of Turkey, with an IHA Outstanding Achievement Award for his work in the field of hydropower development. Former President Demirel accepted the award and welcomed participants to the congress. He provided a history of hydropower development in Turkey, explaining that in 1950 there were only three



L-R: IHA President Doğan Altınbilek and Suleyman Demirel, former President of Turkey

dams and that by 2007 there were over 200, with 50 more now under construction. He also underscored the importance of hydropower as an alternative to carbon intensive electricity generation.

SESSION 3: WATER LEADERS ROUNDTABLE

The Water Leaders Roundtable was co-chaired by Turkey's former President Demirel, and Doğan Altınbilek. Jürg Gerber, CEO of the World Business Council for Sustainable Development (WBCSD), introduced and facilitated the session. Noting that 1.1 billion people lack access to safe water, 2.4 billion people lack access to sanitation and 1.6 billion people lack electricity, Louis Berga said that electricity infrastructure, hydropower and dams are essential for a country's economic and social development. He then addressed the need to develop new energy policies, including those on hydropower.



Jürg Gerber, CEO of the World Business Council for Sustainable Development (WBCSD)

Berga highlighted components of the Beijing Declaration on renewable energy for sustainable development, agreed to by 78 ministers and government representatives on 8 November 2005, including its reference to the important role played by hydropower in world electricity supply.

Peter Lee said that to increase the productivity of water, it is necessary to step outside the constraints of water resources management, to also examine food security, livelihoods and job security, and to improve water storage, which must include the participation of all stakeholders.

David Harrison, Water Resource Consultant, The Nature Conservancy (TNC), highlighted the need to move toward IWM and, in doing so, to balance structural and non-structural approaches. He stressed that hydropower should be considered within an overall system of energy and that sustainability should not be approached on a project-by-project basis. Harrison also noted that TNC is committed to working collaboratively to address ecological systems through eco-regional planning.

Donal O'Leary, Senior Advisor, Transparency International, outlined his organization's work in governance and in developing a "water integrity network." He explained that corruption affects every stage of the project cycle and that the most vulnerable points relate to land acquisition and the environment. He identified project risk assessments and project governance improvement plans as tools to address these issues. Refaat Abdel-Malek, Vice President, IHA, emphasized the need to select an energy source based on its viability within a region, instead of applying one energy option to all situations. Doğan Altınbilek noted the dedication of IHA members to following the IHA Sustainability Guidelines, which address important aspects of sustainability for hydropower projects.

DISCUSSION: Turkey's former President Demirel said that dams should only be developed where they are needed and where they are technically and economically feasible. He also noted the need for good river basin planning, based on

dependable, correct data correlated over approximately 50 years, and said that developing dams is not a goal, but a means for ensuring the welfare of people.

SESSION 4: CLIMATE CHANGE

This session was facilitated by Roger Gill, Executive General Manager, Hydro Tasmania, and chaired by Petru Boeriu, Consultant, Institute for Water Education, UNESCO, who said there is increasing evidence of climate change and climate vulnerability, that international attention has shifted to adaptive strategies and that organizations are calling for the development of relevant methodologies and guidelines. Henk van Schaik, Director, Cooperative Programme on Water and Climate, UNESCO Institute for Water Education (UNESCO-IHE), quoting



Roger Gill, Executive General Manager, Hydro Tasmania

from the Stern Review, said the worst effects of climate change could be avoided if action is initiated immediately. He encouraged “climate proofing” and suggested that countries look at the recent findings of the Intergovernmental Panel on Climate Change (IPCC) and identify vulnerabilities at the basin, national and sub-national levels. He also suggested that the IHA initiate a specialist group on water, climate and hydropower.

Andrew Scanlon, Climate Change Specialist, IHA, discussed the greenhouse footprint of hydropower and the related carbon cycle. He also highlighted recommendations from the UNESCO Workshop on GHG Emissions from Freshwater Reservoirs, held in Paris, France, from 5-6 December 2006. Dolf Gielen, Senior Energy Analyst, IEA, outlined the IEA’s Alternative Policy Scenario, which indicates that hydropower will remain the primary renewable power source for the next three decades. Noting the already low level of carbon dioxide emissions from hydropower, he suggested that there is little room for improved emission reductions from new hydropower technologies.

Malcolm Keay, Director, Energy and Climate Change Study, WEC, outlined a WEC study on energy and climate change and the acceptability, accessibility and availability of certain technologies. He emphasized that electricity represents the largest single source of emissions and that low emission electricity is feasible. Keay highlighted the study’s conclusions, including that: current government policies have not been successful at reducing emissions; each country needs to adopt an energy portfolio appropriate to its own circumstance; and electricity should be “decarbonized”.

DISCUSSION: Participants addressed: the need to examine the validity of excluding large-scale hydropower projects from the CDM; the role of civil engineers in directing the structural changes necessary for adapting to climate change; and the IPCC’s involvement in risk assessments and cost benefit analyses of the ability of hydropower to reduce risks of flooding and drought arising from climate change. Responding to Henk van Schaik’s suggestion, the IHA announced it had initiated a working group on climate and hydropower.



Panel on Renewable Energy - Potential and Progress

SESSION 5: RENEWABLE ENERGY - POTENTIAL AND PROGRESS

The session was co-chaired by Peter Rae, who provided an outline of “REN21,” a global policy network for renewable energy, and Noam Lior, who stressed the need to be forthright in adopting renewable energy. Z. Atilla Akalin, Board Member, Turkish Hydropower Association, discussed the technical and financial capacities of hydroelectricity and wind power. He said Turkey is currently using one quarter of its technical capacity, but that two thirds could be used under available financial capacity. He also noted the current lack of data on wind capacity in Turkey.

Dolf Gielen said that bioenergy comprises 10% of today’s total energy use, although 90% of that still takes the form of traditional biomass that is inefficient and polluting. Gielen highlighted the primary markets of biofuels as bioethanol, which accounts for 90% of global biofuel use, though second generation ethanol is preferable but not yet technologically feasible, and biodiesel. He predicted that by 2050, primary biomass will account for 19% of total primary energy use, half of which will be for biofuels. Isao Yukawa, Vice President, International Solar Energy Society, explained that solar energy production has grown by approximately 40% annually since 2002, with Japan, Germany and the US as the main producers. He then discussed the work of the Kyocera Solar Center, based in Kyoto, Japan, on the production of photovoltaic technologies.

Bjarni Bjarnason, Director, International Geothermal Association, provided an overview of geothermal energy, the use of geothermal energy in Iceland and a programme on deep geothermal drilling. Describing geothermal energy as pure, renewable and terrestrial, he explained that the heat stored in the Earth’s crust represents 5 billion exajoules and that 0.1% of this would satisfy global energy consumption for 13,500 years. Tanay Sidki Uyar, Vice President, World Wind Energy Association, explained that there was a “technology break” in the development of renewable technologies as they were not mature enough to supply industrial needs, so that fossil fuel technologies were developed instead. He said wind was the first economically feasible renewable energy technology, but that for further technological development, renewables need government investment. Uyar urged participants to tackle problems collaboratively and to avoid transferring obsolete technologies to other parts of the world.

Roger Gill said that Asia, Africa and South America have the greatest hydropower growth potential due to their need for energy supply and the availability of water storage. Gill emphasized the importance of applying sustainability science to hydropower, and underscored the inappropriateness of simplistic policies that have not allowed for extensive storage



of hydropower renewable energy nor recognized the synergies, through storage, between hydropower on the one hand, and wind and solar on the other.

Sarah Adams, Manager, Global Village Energy Partnership, said her organization focuses on providing access to energy in periurban and rural areas through financing, and technical and business development assistance. She discussed progress in renewable energy use, noting that they are suitable for remote areas and off-grid applications, and highlighted an example of a micro hydropower project in Orissa, India.

DISCUSSION: Participants discussed the need to monitor the social impacts of biomass projects and to reduce the price of solar technology. In response to a question about how to replicate successful cases of wind and geothermal applications in developing countries, Sidki Uyar said that it takes political will, with Bjarni Bjarnason highlighting the UN Geothermal Training Programme, conducted in Iceland, which invites participants from developing countries. Closing the session, Peter Rae emphasized that humanity already has the necessary renewable energy sources and technologies available to answer the challenges of climate change, the MDGs and sustainable development.

SESSION 6: HYDROPOWER DEVELOPMENT - TECHNICAL INNOVATION

Terry Moss chaired the session and introduced the panelists, and Jack Whelan, facilitated the discussion. Henri Jacquet-Francillon, Deputy Director, Électricité de France (EDF), discussed tidal power, which he said is a “forgotten source” of renewable energy. He compared tidal power potential with solar, wind and conventional hydropower, and said tidal power, using multiple basin schemes, is an excellent source of base-load energy. Henri Jacquet-Francillon highlighted joint tidal and offshore wind projects as key potential opportunities.

Jochen Weilepp, Head of Ocean Energy, Voith Siemens Hydropower Generation, said humankind is in a pioneering age

for wave and tidal technologies, or “lunar power.” He explained that wave power potential exists mainly in the northern hemisphere, and that his company’s first commercial project was in Spain. Outlining that wave power machinery operates on an oscillating



Jochen Weilepp, Head of Ocean Energy, Voith Siemens Hydropower Generation

water column principle, he said the turbine used in this machinery mimics the principles of bird flight. Alejandro Fernandez, Asltom Power Hydro, discussed his company’s mini hydropower standardization programme, noting that mini hydropower has a wide range of turbine types, so that ongoing challenges include mastering the technology, reducing the costs and ensuring reliability. He emphasized that the programme allows Alstom to: deliver improved quality and more reliable mini hydropower units; deliver equipment with shorter delays; and optimize the overall cost of the power station.

Alexander Schwab, Andritz VATEch Hydro GmbH, discussed the innovation and demand for pumped storage hydroelectricity power stations, saying that although utilization of this technology was declining, it is currently experiencing a resurgence in Europe, owing to increased power demand and its ability to smoothen energy supply and demand.

Cai Zhiguo, Division Chief, Three Gorges Project Corporation, provided an overview of the world’s largest, and China’s most sustainable, hydropower project. He explained that the project aims to control flooding and generate power, and that environmental concerns are being



Alexander Schwab, Andritz VATEch Hydro GmbH

managed through an integrated management system, including: water quality from low temperature down-rush; ecological flow; and gas over-saturation. Bernhard Pelikan, President, European Small Hydropower Association, discussed his organization’s small-scale hydropower research on, *inter alia*: the optimization of small plants; multi-purpose schemes; and administrative and legal barriers. He provided a review of the IHA Sustainability Assessment Protocol and suggested that it be revised to be made more applicable to small-scale hydropower.

DISCUSSION: Participants addressed the financial viability of tidal power, with some suggesting large schemes are more affordable than small schemes, and that multiple-basin schemes may deliver irregular power generation. Participants also discussed the economics of the wells turbine, noting that when incorporated into an already developed port, it could match the cost of offshore wind turbines. Discussion also focused on the potential for pumped storage to back up wind at a global scale, and the use of mines for storage. On market drivers for pumped storage, some participants mentioned price differences in energy within the Scandinavian region. The IHA confirmed that its Sustainability Guidelines would be implemented for a two-year trial period, before being revised.

SESSION 7: HYDROPOWER DEVELOPMENT - NATIONAL PERSPECTIVES

This session was facilitated by Jean-Michel Devernay, EDF, and chaired by Alessandro Palmieri, Lead Dam Specialist, World Bank, who emphasized the importance of synergies and cooperation among countries and renewable energy providers. Noting the New Energy Policy for Europe, including the comprehensive Energy Partnership with Africa, the EU Energy Initiative, and the Infrastructure Trust Fund, Irene Freudenschuss-Reichl, Ministry of Foreign Affairs, Austria, discussed the energy-related activities of the Austrian Development Cooperation. She highlighted energy efficiency and renewable energy projects in Southeastern Europe, Asia, Africa and Central America and noted bilateral and regional hydropower projects in Albania and Bhutan.



Panel on Hydropower Development - National Perspectives

Anita Utseth said that 99 % of Norway's electricity is produced using hydropower, and that due to an increase in energy consumption, Norway is diversifying its renewable energy mix and implementing energy efficiency programmes. Atilla Atac, Turkish State Hydraulic Works, discussed his organization's role in Turkey's energy policy and administrative structures. He said the objectives of Turkey's energy legislation are to: increase transparency; develop a regulatory body; promote a competitive market; and provide a reliable electricity supply to consumers.

Simon D'Ujanga outlined Uganda's energy supply and explained that 93% of the country's energy is provided by biomass. He explained that Uganda faces an acute power shortage, its small hydropower plants are being affected by the current drought, and that diesel is being imported to augment supply during peak times. D'Ujanga summarized the latest developments in the national power sector, including the creation of an energy fund and a renewable energy policy. Israel Phiri, Ministry of Energy and Water Development, Zambia, explained that this is an exciting time in Africa, and specifically in Zambia, as after years of little international or national governmental interest in hydropower energy generation, many new projects, including small hydropower projects, are being funded.

Sundershan Kumar Garg, Chairman, National Hydro Power Corporation, India, said that the Government of India is focusing on addressing the gap between the power sector's growth rate of 6.5 % and the 10% growth rate of Gross Domestic Product (GDP). He noted the need to develop hydropower, given increasing demand for energy, and highlighted hydropower's related challenges.

DISCUSSION: One participant suggested that developed countries promote hydropower in developing countries by setting money aside for investment in developing countries. Irene Freudenschuss-Reichl confirmed that Austria is initiating an Austrian development bank that would lend funds to Africa. Session Chair Palmieri underscored the challenge of delivering successful hydropower projects in Africa.

SESSION 8: HYDROPOWER - SOCIAL AND ENVIRONMENTAL PERFORMANCE

This session consisted of case studies on: environmental criteria for hydropower development; partnership approaches to restoring areas impacted by hydropower activities; resettlement issues; and integrating environmental flow considerations into hydropower projects. Andrew Scanlon facilitated the session, while Manfred Konukiewicz acted as Chair, noting that in "good hydro" projects, environmental and social management are mainstreamed.

CASE STUDY 1: ENVIRONMENTAL CRITERIA FOR HYDROPOWER DEVELOPMENT IN THE MEKONG RIVER BASIN: Marc Goichot, Director, Integrated River Basin Management, WWF, presented on a project conducted jointly by the Asian Development Bank (ADB), the Mekong River Commission (MRC) and WWF in the Mekong region to develop environmental criteria for hydropower development projects. He explained that the project is in the planning stage and that the next step will be to identify a pilot project.

CASE STUDY 2: A PARTNERSHIP APPROACH IN RESTORING THE KAFUE FLATS: Ramos Kamanga, Head, Hydrology Department, Zambian Electricity Supply Company, described a partnership to restore the Kafue Flats, a diverse area of Zambia housing sugar cane, cattle rearing, fishing, a site protected under the Ramsar Convention on Wetlands, and endemic species. He said the environmental impacts caused by dam development included changes in flooding and recession regimes and increased water conflicts.

CASE STUDY 3: RESETTLEMENT ISSUES IN CHINA: Noting that 86,000 dams were built between 1950 and 2006, causing the relocation of 15 million people, Shi Guoqing, Professor, National Research Center for Resettlement, China, emphasized that resettlement is one of the largest impacts of hydropower, and therefore successful resettlement is vital. He explained the legal framework and policies for hydropower resettlement, and highlighted key factors for successful resettlement, including a suitable compensation standard and income restoration for affected people.

CASE STUDY 4: INTEGRATING ENVIRONMENTAL FLOW CONSIDERATIONS IN THE YANGTZE RIVER

RIVER: David Harrison, TNC, described ways to integrate environmental flow considerations into hydropower projects in the Yangtze River to more closely mimic the natural hydrograph, thereby minimizing impacts on biodiversity and ecosystems. He said that a sustainable power strategy in the Yangtze River region could, *inter alia*, take advantage of synergies between monsoon high runoff and high summer season energy demand.



David Harrison, The Nature Conservancy

PANEL DISCUSSION: Pradeep Perera, ADB, discussed the promotion of benefit sharing in the Mekong River Basin region. He explained "Nam Theun 2" is a project where US\$1 million is spent annually on poverty reduction activities within Laos. Michael Fink, GTZ, said his organization is working toward practical initiatives to improve environmental and social performance, and highlighted the example of collaboration in the Mekong region as an important step towards a long-term planning approach. Michael Waters, MRC, explained that the MRC advocates an environmental flows approach and also seeks to incorporate social and economic issues. He said that because national legislation cannot be



applied to transboundary hydropower projects, voluntary approaches, such as the IHA Sustainability Guidelines, are important.

Bjorn Wold, Director, Norwegian Water Resources and Energy Directorate, explained that Norway's positive experience of hydropower development was due to a firm legal framework, the involvement of all stakeholders and transparency throughout the process. James Phiri, WWF Zambia, emphasized that new dams in Zambia should not involve the same environmental mistakes as those that occurred in the Kafue Flats, and that WWF is assisting in this regard. Alberto Calcagno, UNEP, emphasized the importance of disseminating practices on: stakeholder participation; compliance; benefit sharing; resettlement; and flow changes to contribute to the sustainable management of hydropower.

DISCUSSION: Direm Özkam, representing the affected population from the area of the proposed dam in the Murza Valley, said the dam violated the IHA Sustainability Guidelines as stakeholders were not consulted. Another participant from the region underscored the importance of listening to NGO representatives, but also highlighted the Turkish Government's allocation of funding towards cultural studies. Alexander Schwab, representing Andritz VATEch HydroGmbH, the company constructing the dam, responded, explaining that the process had been transparent, that all residents had been consulted and that all information is available on its website. Doğan Altınbilek stressed that the IHA Sustainability Guidelines are voluntary and that the IHA cannot assess compliance.

Participants also discussed: dialogue as a way forward for sustainable hydropower; the importance of finding synergies between hydropower and environmental flows that do not negatively affect hydropower output and environmental performance; the need for strategic environmental assessment of hydropower sites; and safeguarding and developing parts of river basins.

Session Chair Konukiewicz highlighted key points arising from the discussion, including: that the hydropower sector is entering new areas that need to be incorporated into dam decision making and project development and management; the difference between benefit sharing and compensation in terms of resettlement; that correlating flow patterns and opportunity costs allows for better balance in hydropower projects; and that achieving the IHA Sustainability Guidelines is challenging and that criticism regarding non-compliance must be acknowledged.

SESSION 9: COMMON APPROACHES TO HYDRO DEVELOPMENT - ROLE OF THE PUBLIC AND PRIVATE SECTORS

Jack Wheelan facilitated the session and Jean-Michel Devernay, IHA Vice President, chaired the session, explaining that one objective was to identify how to remove barriers

to financing for hydropower projects. Gil Maranhão Neto, Director, SUEZ Energy Brasil, described the challenges of developing hydropower projects in Brazil. He said these included: social and environmental factors; engineering, procurement and contractor (EPC) agreements; regulatory aspects; and PPPs, as there are no successful PPPs in Brazil.

Ole Gran, Director of Project Finance, SN Power, Norway, outlined that SN Power undertakes projects outside of Norway, and is 50% owned by Stratkraft and 50% owned by Norfund, the Norwegian investment fund for developing countries. He stressed that private investors require a level playing field, that barriers to investment are often related to market access and that donors could address this by funding transmission lines. Vyatcheslav Sinyugin, Chief Executive Officer, Hydro OGK, discussed the development of the hydropower sector in Russia, highlighting its strategic plan for electric power capacity generation through to 2020. He explained that reform of Russia's electric power industry along with the processes of market liberalization are sending positive signals to private investors, and he highlighted PPPs as effective mechanisms for hydropower development.

Lutz Blank, Group Head of the Environment Department, European Bank for Reconstruction and Development (EBRD), said that allocating risk to EPC contracts are "not the panacea," and that although hydropower projects are financially and politically alluring, they can be high risk given their environmental and social impacts. He emphasized that the EBRD wishes to focus on "intelligent project development," with clear due diligence criteria, transparent legal requirements and better public involvement. Patric Shirzadi, Senior Project Manager, Kreditanstalt für Wiederaufbau (KfW), discussed the development bank's activities and outlined investment risks to hydropower, including: fuel availability; damage to reputation; political considerations; and currency fluctuations. Shirzadi explained that in areas lacking private investment, KfW provides grants, debt financing and equity, and has the capacity to lend in a country's local currency.

Dana Younger, Senior Adviser, International Finance Corporation (IFC), explained that the IFC takes private funds from capital markets and on-lends them to projects. He said foreign investors, local partners and governments view IFC involvement as a form of political risk insurance. Younger highlighted the IFC plan to increase investment in renewables by 20% annually. He also cited a project, using solar and hydropower, based on the conjunctive use principle, where IFC assisted in mobilizing resources from the Global Environment Facility (GEF).

Janak Karmacharya, Head, Clean Energy Development Bank of Nepal, emphasized the need for political stability, good governance, and a strong regulatory framework for



Manfred Konukiewicz, Deputy Director General, Federal Ministry for Economic Cooperation and Development (BMZ), Germany



Panel on Common Approaches to Hydro Development - Role of the Public and Private Sectors

private sector confidence. He discussed energy demand and deficits in Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka, and explained the activities of Nepal's Clean Energy Development Bank, which provides lending services to the private sector. Budak Dilli, General Director of Energy Affairs, Ministry of Energy, Turkey, discussed opportunities and difficulties in hydropower development in his country, noting Turkey's increased energy consumption of 9% over the past year. He explained that after the Government of Turkey instituted a renewable energy law providing incentives for private sector investment, 955 hydropower projects were initiated.

Morton Svelle, Policy Director, Sustainable Economic Development, NORAD, outlined NORAD's work in promoting good governance, achieving macroeconomic stability and reducing risks. He identified the causes of bottlenecks in hydropower activities in Africa as: a lack of bankable projects and public funding; environmental and social concerns; and inadequate regional coordination. He outlined policy instruments being considered, including: allocating overseas development assistance to PPPs; mobilizing CDM project finance; and providing small-scale demand side financing.

DISCUSSION: Some participants discussed the need to "decarbonize" energy in the face of climate change and increasing energy demands. Others questioned how to factor in the increasing costs of cement, steel and copper, which impact downstream costs. Some participants lamented the lack of projects in Africa and questioned why hydropower projects cost three times as much on that continent. Participants discussed risk allocation through EPC and power purchase agreements, with some noting that transferring risk through EPC agreements is not practicable due to cost. Session Chair Devernay noted: the strong link between the financing challenge and sustainability; the role of the public and private sectors in stimulating investor confidence; that not all countries are equal in terms of economic stability and that international finance institutions must consider this; and the need to highlight the benefits of hydropower.

SESSION 10: BUSINESS AND SOCIAL RESPONSIBILITY

Myriam Truchon, Director, Environment and Sustainability, Hydro-Québec, chaired the session and discussed recent developments in corporate social responsibility, including the International Standards Organization (ISO) 26000 process to identify universal guidelines on social responsibility. She outlined Hydro-Québec's "social responsibility journey," and introduced the panel. Jürg Gerber said the WBCSD is a coalition of 190 leading companies with a shared commitment to sustainable development, noting that business is not divorced from the rest of society. He emphasized the WBCSD's support for the development of global standards for corporate social responsibility and highlighted its Water Scenarios project, inviting businesses to examine their water footprint.

Rosalyn Hees, Senior Advisor, Transparency International, discussed the business case for combating corporate corruption, noting that corruption harms a company's reputation, damages internal corporate culture, and increases costs. She highlighted her organization's business principles for countering bribery, including zero tolerance, and emphasized the need for compliance, commitment, and benchmarks for monitoring



Panel on Business and Social Responsibility

progress. Amanda Banks, Sustainable Energy and Environment Manager, Hydro Tasmania, explained that corporate sustainability reporting protects the long-term economic health of a company and supports short-term share market performance. She highlighted Hydro Tasmania's experience of self-assessment using the IHA Sustainability Assessment Protocol as the basis for scoring its performance, noting that a sustainability report is now incorporated into the company's annual report.

Laurent Bellet, Head, Environmental and Social Department, EDF, outlined EDF's transition from a state-owned company to a private one. He also described the use of the IHA Sustainability Assessment Protocol to undertake an internal audit, explaining that the results of reviews of two hydropower schemes were in line with international standards, but that an external audit was necessary and that this would be the next step. Marie d'Haurt, Partner, CAP Conseil, discussed a project using satellite images to reinforce sustainability indicators in hydropower projects. She said the project focused on four indicators that were well informed by satellite images, namely, population dynamics, biodiversity, land use and erosion. She underscored that the use of satellite imagery is promising, but is rarely a sufficient source of information for a complete assessment of sustainability.

Tormod Schei, Senior Advisor, Environment and New Energy, Stratkraft, explained that Stratkraft's vision is to become a leader in environmentally friendly energy. He said Stratkraft supports a standard to assess the sustainability of potential projects and to inform investment decisions. In regard to the IHA Sustainability Assessment Protocol, he said Stratkraft has been testing it in Europe and Laos and finds the quantitative nature of the tool helpful. Siba Prasad Sen, Technical Director, National Hydro Power Corporation of India, noted the growing trend of corporate social responsibility and said that the purpose of dams construction would change from building hydroelectric projects, to providing for the social and economic development of the people living around dams.

DISCUSSION: Participants discussed: the certification of companies; the possibility of renegotiating lending rates; using independent auditors to engage external financiers; and using the IHA sustainability protocol in developing countries. One participant questioned if Hydro Tasmania is incorporating its sustainability assessments in all activities and Amanda Banks said such a tool had not yet been developed. Chair Truchon summarized the session, commenting that she was pleased with the wide use of the IHA Sustainability Assessment Protocol.



SESSION 11: PANEL DISCUSSION ON CERTIFYING GOOD PRACTICE

Anita Utseth who explained that certification is a way for hydropower to gain credibility, chaired the session, while Refaat Abdel-Malek was its facilitator. Richard Taylor, Executive Director, IHA, said the IHA's sustainability initiatives included development of: the Sustainability Guidelines and Sustainability Assessment Protocol; the Blue Planet Prize; and a sustainable hydropower website. He said the IHA has worked to demonstrate, evaluate and quantify sustainable performance and that certification is



Richard Taylor, Executive Director, IHA

the next step. Pål Mellquist, Director, International Centre for Hydropower, noted that sustainable performance of hydropower is not a static process, given changing knowledge, politics and economics, and that it is favorable to have good practice rules that are suitable for situations, flexible and able to handle different project sizes and cultures. Mellquist also emphasized the need to make such guidelines self evident and simple.

André Abadie, Director, Sustainable Finance, explained that private sector financial institutions are developing policies and frameworks towards sustainability, such as the Equator Principles, developed by the international banking sector for use in investment projects. Abadie also said that as financial institutions increasingly view certification schemes as demonstrations of sustainable practice, certification schemes should be considered, but that they should be mapped against the Equator Principles for consistency.

Jeff Opperman, Technical Advisor for Water Management, TNC, explained that certification recognizes excellence and sends a signal to consumers and lenders. He said the IHA Sustainability Guidelines and Sustainability Assessment Protocol are an excellent initiation of a common vision. Opperman said his organization would work with the IHA towards their universal application, perhaps through certification, and stressed the need to address certification in the planning stage and on an eco-regional scale.

Kristine Waeringsaasen, Senior Energy Adviser, NORAD, discussed certification from the donor perspective, and stressed the principle of national ownership and the need for adequate national legislation. She advocated public participation and transparency to ensure that all interests are considered, and said the sustainability protocol is interesting and useful, but that each project is unique. Øistein Aarnes, Head of Utilities Department, Det Norske Veritas (DNV), highlighted a number of cross industry certification and auditing systems, including the ISO 14001, as well as industry specific schemes. He described key considerations for a hydropower certification regime, including identifying the incentives and drivers of the scheme and linking with other standardization efforts, noting that certification should create confidence and trust.

DISCUSSION: Participants addressed: the challenge of making certification schemes both simple and quantitatively accurate: whether the company or the project should be certified; the need for certification to move away from being

only a checklist; and the benefits of certification schemes, with some noting the example of certification by the Forest Stewardship Council, which grants greater access to capital and better financing terms. Session Chair Utseth summarized the discussion and expressed hope that there would be many Blue Planet Prize candidates in the future.

SESSION 12: CLOSING SESSIONS AND IHA GENERAL MEETING

Doğan Altınbilek chaired the session, noting that 67 people completed the training course held prior to the congress, and that 320 participants, representing 43 countries, attended the congress itself. Jürg Gerber highlighted the diverse discussions and summarized the opening addresses, the energy leaders roundtable, the water leaders roundtable, and the session on climate change. He underscored the need for collaboration between the public and private sectors and the need for technologies to be adapted to local needs. On energy, he concluded that the conference sessions indicated that various energy sources would be required, and that renewable energy should be clean and affordable. He highlighted that the IHA had initiated dialogue in convening a working group on climate and hydropower, in collaboration with UNESCO.

Peter Rae summarized the sessions on: the potential and progress of renewable energy; hydropower development and technical innovation; national perspectives of hydropower development; and social and environmental performance within the hydropower sector. He said these sessions reached agreement that hydropower can be regarded as renewable and sustainable. Noting that hydropower currently supplies 17% of the world's electricity needs, he stressed that this is only one third of its potential, and recalled suggestions to develop hydropower in conjunction with other renewables, such as solar. Rae said it is generally accepted that improved technologies and operations and economies of scale will continue to reduce prices. He suggested that future discussions should concentrate on increasing the rate of construction and deployment to meet the demand for renewables.

Roger Gill summarized the content of sessions on: common approaches to hydropower development and the role of the public and private sectors; business and social responsibility; and the panel discussion on certifying good practice. He said new connections were occurring between participants. Stating that there had been a "sea change" in the acceptability of hydropower by bankers, he noted a confluence of interest between banks and the IHA in implementing sustainable projects. Gill highlighted the support of the WBCSD for a global standard for social responsibility, and the congruence of interests of the TNC and the IHA, as significant.

Richard Taylor provided the IHA's General Meeting and Activity Report for 2005-2007, which includes its governance framework, work programme, the election of Board Members for the period 2005-2007, and its financial report. He described IHA activities, including participation in the fifth World Water Forum, to be held from 15-22 March 2009, in Istanbul, Turkey, the UNEP Dams and Development project, the African Ministerial Conference on Hydropower and Sustainable Development, and the UNESCO Workshop on GHG Emissions from Freshwater Reservoirs. Taylor invited participants to become members of the IHA and thanked participants and IISD Reporting Services, supported by Hydro-Québec and Manitoba Hydro.

Doğan Altınbilek announced that he would not seek another term as president, and expressed thanks to all for making the congress a success. On behalf of Loïc Fauchon, President, World Water Council, Aliya Hajee, Communications Officer, IHA, presented a message, noting that the main themes of the congress are essential topics and would be at the center of the preparatory process for the fifth World Water Forum. Richard Taylor highlighted Doğan Altınbilek's considerable involvement in the evolution of the IHA into an agency fully committed to sustainable hydropower, before IHA President Altınbilek closed the congress at 5:18 pm.



Aliya Hajee, Communications Officer, IHA

UPCOMING MEETINGS

FOURTH DUBROVNIK CONFERENCE ON SUSTAINABLE DEVELOPMENT OF ENERGY WATER AND ENVIRONMENT SYSTEMS:

This conference will take place from 4-8 June 2007, in Dubrovnik, Croatia. As sustainable development requires special attention to transport challenges, the main theme of the conference will be transport, and will include consideration of: transport structure innovation; hybrid vehicles; transport system efficiency; the development of new fuels, such as biofuels, hydrogen and electricity; and pollution controls. For more information, contact: Professor Zvonimir Guzovic; fax: +385-1-615-6940; email: dubrovnik2007@fsb.hr; internet: <http://www.dubrovnik2007.fsb.hr/>

SEVENTH WORLD GENERAL ASSEMBLY OF THE INTERNATIONAL NETWORK OF BASIN ORGANIZATIONS:

This meeting will take place from 7-9 June 2007, in Debrecen, Hungary. It will be organized around four strategic topics for the implementation of river, lake and aquifer basin management: prevention and management of the extreme climate phenomena of floods and droughts; transboundary basin management; monitoring, monitoring networks, reporting and inter-calibration; and preparation of action plans for basin organizations and their financing. For more information, contact: Permanent Technical Secretariat; tel: +33-1-44-90-88-60; fax: +33-1-40-08-01-45; e-mail: inbo@wanadoo.fr; internet: http://www.inbo-news.org/ag2007/index_eng.htm

THIRD INTERNATIONAL GREEN ENERGY

CONFERENCE: This conference will convene from 18-20 June 2007, in Västerås, Sweden. It will seek to provide a multi-disciplinary setting to exchange the latest technical information, research and developments. For more information, contact: Professor J. Yan, Chair of IGEC-III; tel: +46-21-10-13-67; fax: +46-21-10-13-70; e-mail: yanjy@ket.kth.se; internet: <http://www.igec.info>

SIXTH INTERNATIONAL CONFERENCE ON SUSTAINABLE TECHNIQUES AND STRATEGIES IN URBAN WATER MANAGEMENT: This conference will take place from 25-28 June 2007, in Lyon, France. The meeting's theme deals with sustainable and alternative solutions for wet-weather flows management in urban and

suburban areas. For more information, contact: Elodie Brelot; e-mail: novatech@graie.org; internet: http://www.novatech.graie.org/a_index.htm

WATERPOWER XV: This meeting will take place from 23-26 July 2007, in Chattanooga, USA. Its main theme is "Advancing Technology for Sustainable Energy," and its goal is to move the industry forward and to create a forum in which individuals and companies participating in hydro activities can share new ideas, technologies, approaches and solutions to continue to build hydropower. For more information, contact: HCI Publications; tel: +1-816-931-1311; fax: +1-816-931-2015; email: info@hcipub.com; internet: <http://www.hcipub.com/wp/index.asp>

SIXTH INTER-AMERICAN DIALOGUE ON WATER MANAGEMENT: STRENGTHENING PARTNERSHIPS AND BUILDING THE BASIS FOR ACHIEVING THE MILLENNIUM DEVELOPMENT GOALS:

This meeting will convene from 12-17 August 2007, in Guatemala City, Guatemala. It will gather together a wide array of stakeholders and practitioners to consider the theme of water management in the Americas. Issues to be discussed include: agriculture and food security; gender and inter-generational issues and water; and transboundary basins and aquifers. For more information, contact: Carlos R. Cobos; tel: +502-2385-4492; fax: +502-2334-1990; e-mail: dialogo6@rirh.net; internet: <http://d6.iwrn.net/>

SECOND IASTED INTERNATIONAL CONFERENCE ON WATER RESOURCES MANAGEMENT (WRM 2007):

This meeting of the International Association of Science and Technology for Development (IASTED) is scheduled for 20-22 August 2007, in Honolulu, USA. Its purpose is to act as an interdisciplinary forum for decision makers, academics and professionals interested in the development and application of technology to ensure the sustainable use and management of water resources. For more information, contact: IASTED Secretariat; tel: +1-403-288-1195; fax: +1-403-247-6851; e-mail: calgary@iasted.org; internet: <http://www.iasted.org/conferences/home-578.html>

TENTH INTERNATIONAL RIVER SYMPOSIUM AND ENVIRONMENTAL FLOWS CONFERENCE:

This conference will occur from 3-6 September 2007, in Brisbane, Australia. The goals of the symposium include: providing attendees with a better understanding of innovations and best practice around the world in improving ecosystem health while continuing to meet human demands for water; explaining the state of ecological science concerning the flows required to protect biodiversity; sharing information about innovative policy approaches for water resource management that support environmental flows; and discussing management issues related to the implementation of environmental flow recommendations. For more information, contact: Emily Smigrod; tel: +61-07-3034-8230; fax: +61-07-3846-7660; e-mail: emily@riverfestival.com.au; internet: <http://www.riversymposium.com>

FOURTEENTH GERMAN DAM SYMPOSIUM AND SEVENTH ICOLD EUROPEAN CLUB DAM SYMPOSIUM:

This joint event will take place from 17-19 September 2007, in Munich, Germany. The main topic of the meeting will be "Dams in Europe - Tasks and Challenges." For more information, contact: Jana Radoi, Congress Management

and Marketing, GmbH; tel: +49-3641-353-3221; fax: +49-3641-353-321; e-mail: talsperre@conventus.de; internet: <http://www.conventus.de/talsperre>

THIRD INTERNATIONAL YELLOW RIVER FORUM ON SUSTAINABLE WATER RESOURCES MANAGEMENT AND DELTA ECOSYSTEM MAINTENANCE:

This forum will be held from 16-19 October 2007, in Dongying City, China. The main topics of the forum include: integrated water resources management and emerging trends; sustainable water resources exploitation for sound ecosystems; protection and rehabilitation of the delta ecosystem; and delta ecosystem and exploitation. For more information, contact: Tong Yifeng; tel: +86-371-660-2-2479; fax: +86-371-660-2-4477; e-mail: iyrf@yellowriver.gov.cn; internet: <http://218.28.41.9/vh/hhgjlt3/Eindex.htm>

TWENTIETH WORLD ENERGY CONGRESS: This meeting will take place from 11-15, November 2007, in Rome Italy. The main topic of the congress is "The Energy Future in an Interdependent World," and it will also focus on social issues that developing and emerging countries face in relation to the international energy market, and sustainable progress for industrialized countries. For more information, contact: the World Energy Council; tel: +44-20-7734-5996; fax: +44-20-7734-5926; email: info@worldenergy.org; internet: <http://www.worldenergy.org>

THIRTEENTH CONFERENCE OF THE PARTIES TO THE UNFCCC AND THIRD MEETING OF THE PARTIES TO THE KYOTO PROTOCOL: This conference will be held from 3-14 December 2007, in Bali, Indonesia, and will coincide with the twenty-seventh meetings of the subsidiary bodies of the United Nations Framework Convention on Climate Change (UNFCCC) and the *Ad Hoc* Working Group on Further Commitments from Annex I Parties under the Kyoto Protocol. COP 13 and COP/MOP 3 are also expected to be accompanied by a UNFCCC Dialogue on Long-Term Cooperative Action on Climate Change and various other events. For more information, contact: UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.int; internet: <http://www.unfccc.int>

FOURTH ECRR INTERNATIONAL CONFERENCE ON RIVER RESTORATION: This meeting of the European Center for River Restoration (ECRR) is scheduled to place from 16-21 June 2008, in Venice, Italy. Its objectives include disseminating experiences from European, as well as non-European, case studies and sharing the most promising applied research solutions for integrated river restoration projects and interventions. For more information, contact: Francesco Pra Levis; tel: +39-041-61-5410; fax: +39-041-61-5410; e-mail: ecrr@cirf.org; internet: <http://www.ecrr.org/pagina/documents/ecrr4conf.pdf>

THIRTEENTH WORLD WATER CONGRESS: This congress will be held from 1-4 September 2008, in Montpellier, France. Its main theme will be "Global Changes and Water Resources: Confronting the Expanding and Diversifying Pressures." The congress will aim to enhance knowledge and raise global consciousness of the impact of global changes on water resources. For more information, contact: International Water Resources Association (IWRA); tel: +33-4-67-61-29-48; fax: +33-4-67-52-28-29; e-mail: wwc2008@msem.univ-montp2.fr; internet: <http://wwc2008.msem.univ-montp2.fr/>

FIFTH WORLD WATER FORUM: This meeting will be held from 15-22 March 2009, in Istanbul, Turkey. Organized every three years by the World Water Council in collaboration with the authorities of the host country, this is the largest international event in the field of water. The main theme of the fifth forum will be "Bridging Divides for Water." For more information, contact: World Water Council Secretariat; tel: +33-4-91-99-41-00; fax: +33-4-91-99-41-01; email: m.giard@worldwatercouncil.org; <http://www.worldwatercouncil.org/index.php?id=6>

CLIMATE CHANGE AS A GLOBAL CHALLENGE: This meeting will be held at UN headquarters in New York, though the dates are yet to be confirmed. For more information, contact: Office of the President of the General Assembly; tel: +1-212-963-7555; fax: +1-212-963-3301; internet: <http://www.un.org/ga/president/61>

GLOSSARY

ADB	Asian Development Bank
CCS	Carbon capture and storage
CDM	Clean Development Mechanism
CSD	UN Commission on Sustainable Development
EDF	Électricité de France
EPC	Engineering, procurement and contractor
FEMA	Forum of Energy Ministers in Africa
GHG	Greenhouse gas
IAI	International Aluminum Institute
ICID	International Commission on Irrigation and Drainage
ICOLD	International Commission on Large Dams
IEA	International Energy Agency
IFC	International Finance Corporation
IHA	International Hydropower Association
IPCC	Intergovernmental Panel on Climate Change
IWM	Integrated Water Management
MDGs	Millennium Development Goals
MRC	Mekong River Commission
PPPs	Public-private partnerships
TNC	The Nature Conservancy
WBCSD	World Business Council for Sustainable Development
WEC	World Energy Council
UNESCO	UN Educational, Scientific and Cultural Organization



On Monday, 28 May 2007, over 100 participants spent the day on a guided tour of hydropower and cultural sites in the Antalya region.