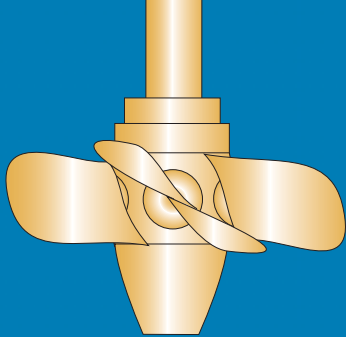




HYDRO 2009



Progress - Potential - Plans

INTERNATIONAL CONFERENCE AND EXHIBITION
Cité - Centre de Congrès, Lyon, France
26-28 October 2009

Organized by: **THE INTERNATIONAL JOURNAL ON
HYDROPOWER
& DAMS** & **NETWORK
Events Limited**

Co-hosted by: 
edf

Progress in refining planning methods for dams and hydro plants, in financing approaches, and in the technology at the heart of powerplants (to achieve efficiency, economy and safety) has led to a resurgence of activity worldwide. Public acceptance has also progressed considerably in recent years, with more widespread recognition of the inherent benefits of hydro.

Potential still remains, on a vast scale in many parts of the world, for new hydro development – in the regions where more capacity is most urgently needed. The potential for refurbishment and upgrading is also considerable worldwide, including in the HYDRO 2009 host country, France, where a major upgrading programme is now going ahead.

Plans to accelerate new hydro, pumped-storage and marine energy schemes, as well as to maximize the benefits of existing schemes by refurbishment, are clearly defined in many countries, and have recently been developing in others. Other vital aspect of planning to be discussed will be environmental protection, safeguarding the interests of local stakeholders, and adapting to the effects of climate change.

Experts representing the governments (ministries and utilities) from the leading countries for hydropower development (China, India, Nepal, Malaysia, Russia, Brazil, Iran, Ethiopia, Sudan, and many others) will exchange experience with those from countries with huge potential and development plans ahead. If you are involved in advancing sustainable hydro development, you should not miss HYDRO 2009.

Supporting Organizations include:



THE VENUE

Lyon is an elegant city with 2000 years of history. It was the former capital of Gaul, founded in 43 BC. The city has preserved many archaeological relics, one of the most important being the oldest theatre in France. There is also a superb collection of mosaics, sarcophagi, statues and artefacts, all of which are preserved at the Fourvières museum of Gallo-Roman civilisation. At the end of the middle ages and throughout the renaissance, the quarters of Saint-Georges, Saint-Jean and Saint-Paul formed the heart of the city, which was then famous for its silk trade (being one of the stages of the famous Silk Route). Houses decorated in Italian-style colours line the streets, and there are picturesque courtyards, wells and a magnificent cathedral. Lyon is also known as one of the most important gastronomic centres of France, and of Europe; we will ensure that HYDRO 2009 participants do not overlook this! Spectacular scenery surrounds the city, including some famous wine-growing areas. The HYDRO 2009 social programme will take full advantage of this.

The Lyon Congress Centre has been harmoniously integrated between the Rhône river and a 105 hectare park, by the Italian architect Renzo Piano, in a complex known as Cité Internationale, which contains three major hotels, cafés and a modern art museum.

Contact details: Cité - Centre de Congrès, 50 Quai Charles de Gaulle, 69463 Lyon Cedex 06, France
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Lyon - Saint Exupéry airport has regular flights to and from 54 international cities, and daily connections with 28 cities within France. The airport is located just 30 minutes away from the centre of Lyon. Lyon also connects by high speed train to all major French cities, (1 hr 55 minutes from Paris) and also London.



HYDRO 2009 MISSION

HYDRO 2009 will be the 16th annual Hydro Conference to be organized by Aqua~Media International, in partnership with NetWork Events. The events have progressively increased in size and scope, and typically bring together delegations from more than 70 countries. The majority of delegates represent owners and operators; others are consulting engineers, financial institutions, contractors, researchers, equipment suppliers, and various specialists involved in the planning process. There is thus a constructive exchange of experience between countries at various stages in their hydropower development programmes.

Previous conferences in this series have taken place in: Budapest, Hungary (1994); Barcelona, Spain (1995); Lausanne, Switzerland (1996); Portorož, Slovenia (1997); Aix en Provence, France (1998); Gmunden, Austria (1999); Berne, Switzerland (2000); Riva del Garda, Italy (2001); Kiris, Turkey (2002); Dubrovnik, Croatia (2003); Porto, Portugal (2004); Villach, Austria (2005); Porto Carras, Greece (2006); Granada, Spain (2007); and Ljubljana, Slovenia (2008).

High level delegations from developing countries will report on their needs and priorities; international finance institutes and development agencies set out their policies, and all those with a role to play in furthering well planned schemes join the debate. Plenary sessions feature keynote addresses and country reports; there are then several parallel tracks of sessions. These generally cover: planning, project finance and economics; environmental and social aspects; and technology (civil engineering issues, innovations and developments in electromechanical equipment). In addition, there are workshops, inter-active debates, and regular side events hosted by national and international professional associations. The Exhibition provides an opportunity to review recent developments in technology and design techniques.

A full cultural and social programme, including receptions, music, a conference dinner, and lunches served in the Exhibition area, will provide extra networking opportunities over the three days in Lyon (see details later in this brochure).



HYDRO 2009 OVERVIEW

PRE-CONFERENCE EVENTS		CONFERENCE AND EXHIBITION			POST-CONFERENCE EVENTS	
Saturday 24 October	Sunday 25 October	Monday 26 October	Tuesday 27 October	Wednesday 28 October	Thursday 29 October	Friday 30 October
From 10.00 hrs: Access to the Exhibition for deliveries	From 10.00 hrs: Conference Registration	08.30 hrs: Opening Plenary Coffee	08.30 hrs Parallel Sessions 10, 11, 12 & 13 Coffee	09.00 hrs African Ministerial Forum and Parallel sessions 21 & 22 Coffee	Study Tours* depart (see below)	
Workshop: 'Using Acoustic Tags to Track Fish' (see details below)		Parallel sessions 1, 2, 3 & 4 Lunch	Parallel Sessions 10, 11, 12 & 13 Lunch	African Ministerial Forum and Sessions 21 & 23 Lunch		
	12.00 - 16.00 hrs: Lyon tour, lunch and cruise 16.30 hrs BHA Networking reception (see details below) 19.00 hrs: Chairmen's Meeting 19.45 hrs: Briefing/Reception for Speakers + Chairmen	14.00 hrs: Parallel Sessions 5, 7, 8 & 9 Coffee Parallel Sessions 6, 7, 8 & 9 Welcome Reception Co-hosted by CNR <i>Hotel de Ville</i>	14.00 hrs: Parallel Sessions 14, 15, 17 & 19 Coffee Parallel Sessions 14, 16, 18 & 20 Evening free for private parties	14.00 hrs: Parallel Sessions 24, 25, 26 & 27 Coffee Plenary Closing Conference Dinner Hosted by EDF <i>Cuvage de Lacenas</i>	* Tour 1 returns 30 October Tour 2 returns 1 November Tour 3 returns 31 October (See details in this brochure)	

All Conference sessions and the HYDRO 2009 Exhibition will take place within the Centre de Congress - Cité Internationale. The rooms for each session will be announced later in an update of this bulletin. Lunches and coffee breaks will be in the Exhibition Halls.

HYDRO 2009 SIDE EVENTS



USING ACOUSTIC TAGS TO TRACK FISH: Saturday and Sunday 24/25 October 2009

This short course addresses all aspects of tracking fish movement (and other aquatic life, such as eel, shrimps and crabs) with acoustic tags, including three-dimensional tracking with sub-metre resolution. Acoustic tags are effective for estimating survival, monitoring migration patterns, and observing behaviour.

This course includes a variety of applications and a course manual. Tuition for the course is € 200 per student. Each class has 15 places available. To reserve your place, please email support@HTIsonar.com or visit http://www.htisonar.com/at_short_course_lyon.htm.



BHA NETWORKING RECEPTION: Sunday 25 October ~ 16.30 to 18.30 hrs, Lyon Congress Centre

The British Hydropower Association will be hosting a two-hour Networking Event, which will take the form of an informal cocktail reception. Short introductory remarks will be made by CEO, Prof David Williams, as well as by representatives of the British Embassy in France. British companies specializing in hydropower development will

be introduced and there will then be an opportunity for networking between them and others in the international hydropower community. Following the successful BHA receptions hosted in previous years, this promises to provide a good opportunity for a fruitful exchange of experience in a convivial atmosphere. The event will be supported by UK Trade and Investment.

The Reception will be open to all, but we request participants to indicate their intention to attend, when registering for the Conference.



CONFERENCE SESSIONS

MONDAY 26 OCTOBER - MORNING

Plenary Opening Session

Welcome to HYDRO 2009, Alison Bartle, *Hydropower & Dams, UK*

Opening Addresses

G rard Wolf, Senior Executive Vice President, EDF, France
Prof Jia Jinsheng, President, ICOLD

Keynote Addresses

- Energy payback trends: a guide for future development - *Luc Gagnon, Senior Advisor, Climate Change, Hydro-Qu bec, Canada*
- Are we getting it right, but too slowly? The impacts of project delays – *Judith Plummer, University of Cambridge, UK*
- Combatting energy poverty with community-based hydro - *Mark Tomlinson, Senior Fellow, World Economic Forum, Switzerland*

Session 1

Project Financing: Trends and Challenges

Chairman: J-M. Devernay, EDF, France

- Trends and challenges in hydro project financing – *J-M Devernay, Electricit  de France, France*
- The EIB's approach to financing hydro projects – *A. Boschi, European Investment Bank, Luxembourg*
- Establishing an Equitable Hydro Financial Benefits framework for host governments – *R. MacGeorge, Consultant, New Zealand*
- Overview of the Kafue Gorge Lower hydro project: an opportunity for investors and EPC contractors – *I. Phiri, OPPPI, Zambia; N. Saproiti, IFC, USA; and B. Trouille, MWH, USA*
- Presentations from the World Bank and African Development Bank (*speakers to be confirmed*)

Session 2

Hydraulic Machinery - I

Chairman: Prof H. Brekke, Consultant, Norway

- Lifetime and safety of hydro turbines – *Prof H. Brekke, Consultant, Norway*
- Problems with fresh water mussels in hydropower plants – *J.H.Gummer, Hydro-Consult Pty Ltd, Australia*
- A method for measurement of leakage through closed water turbine wicket gates – *A. Adamkowski and W. Janicki, Institute of Fluid Flow Machinery, Polish Academy of Science, Poland*
- Advanced turbine governors for the Porce III plant in Colombia – *N. Staropoli, IMPSA, Argentina*
- Jet quality and Pelton efficiency – *A. Abgottsson, P. Weibel and T. Staubli, Lucerne University of Applied Sciences and Arts, Switzerland; C. Bissel and E. Parkinson, Andritz Hydro, Switzerland; J. Leduc and F. Leboeuf, Ecole Centrale de Lyon, France*
- Estimation of mechanical stresses in Kaplan turbine distributors: the case of Coaracy Nunes, Brazil – *G. Lacemon, ISTIL, France; F.O.S. Sousa and A.C.G.C. Diniz, University of Brasilia, Brazil; F. Cutrim, Eletronorte, Brazil*
- Development and application of an advanced fish-friendly turbine – *S Amaral, G. Hecker and G. Allen, Alden Research Laboratory, USA; Dr D.A. Dixon, EPRI, USA; R. Fisher, Voith Hydro, USA*
- Advances in water-lubricated bearings for improved environmental friendliness and efficiency – *E. Godec, J. Virone and P. Gilson, Alstom, France*

Session 3

Hydrology, Floods and Preparing for Climate Change

Chairman: Prof L. Berga, Hon President, ICOLD, Spain

- Hydrological safety and adapting to climate change – *Prof L. Berga, Polytechnic University of Barcelona, Spain*
- Regional flood estimation: Romaine river study – *M. Barbet and M. Latraverse, Hydro-Qu bec; L. Perreault, G. Ratel, F. Guay and D. Tapsoba, IREQ; T. Ouarda and C. Charron, INRS-ETE, Canada*
- Inflow forecasting: practical experiences during implementation and operation – *B. S tther, Povel ASA; A. Tanem, Statkraft Energi AS Norway*

- Hydrometeorological prediction for the management of hydropower production on the Rh ne river – *D. Jouve and F. Storck, Compagnie Nationale du Rh ne, France*
- Which software for which 3D hydraulic simulation? Application to the Assessment of non-standard spillway discharge capacity? – *F. Laugier, E. Valette, B. Blancher and J. Pralong, EDF-CIH, France*
- Spillway capacity upgrade of the Gloriettes dam: Environmental integration and energy – *M. Bieri, M. Federspiel and J-L. Boillat, EPFL, Switzerland; T.B. Houdant and F. Delorme, EDF-CIH, France*
- SIMBA : Dam simulator for training operators in the management of hydraulic structures during a flood – *L. Del Gatto, P. Mazingue and E. Demay, EDF, France*
- Improving the reliability of CNR's spillways – *D. Feuillas and B. Mathex, Compagnie Nationale du Rh ne*
- Implementation of a flood emergency action plan for Cameroon – *E. McNeil and M-C. Bouillon, RSW Inc, Canada; P. Noubissi and E. Nzalli, AES Sonel, Cameroon*

Session 4

Education and Capacity Building

Chairman: F. Isambert, Consulting Engineer, France

- Disappearance of knowledge in the hydroelectric field – *L. Mivelaz and P. Jungo, Groupe ESA, Switzerland*
- Hydro experience knowledge transfer to young engineers: the Austrian approach – *G. Zenz, S. Semprich and R. Melbinger, Graz University of Technology, Austria*
- The nature of water power: A common language for hydropower education – *R. Stearnes and J. Femal, Foundation for Water and Energy Education, USA*

MONDAY 26 OCTOBER - AFTERNOON

Session 5

Commercial Aspects of Hydro Development

Chair: J. Plummer, University of Cambridge, USA

- Commercial aspects of hydro development: a changing scene – *C.R. Head, Consultant UK*
- The likely long-term competitive position of hydropower in energy markets – *Dr G. Doyle, Mott MacDonald, UK*
- The role of the lender's technical advisor in hydro projects – *E. Wolters, PB Power Renewable Generation Group, New Zealand*
- Managing financial risk through the use of dispute boards in procurement and construction contracts – *Dr C. Chern, Crown Office Chambers, UK*
- Development of the Toba Montrose hydroelectric project: A private power developer's experience – *M. G. Kroeker and P. A. Rapp, Plutonic Power Corporation, Canada*
- Assessment of US water power potential and development needs – *D. A. Dixon, M. Bahleda and M. A. Adonizio, Electric Power Research Institute (EPRI), USA*
- The BOT rehabilitation of seven hydro scheme in FYR Macedonia – *J. To snar, Hydropol Project & Management AS, Czech Republic*

Session 6

Debate based on the motion:

"This house considers that the less developed countries are being disadvantaged in developing their water resources through rules and guidelines conceived by richer nations"

Moderator: Chris Head, Consultant, UK

The debate will follow the format of the Doha Debates. The Moderator will introduce the motion and will invite the Proposer to speak first, after which he will question the Proposer. An Opposer will then be invited to make a statement, and will also be questioned by the Moderator. Seconders, of both the Proposer and the Opponent, will then have opportunities to speak, and both will be questioned briefly by the Moderator. The Motion will then be thrown open to the floor for discussion. Short panel discussions will be encouraged after each question or comment. At the end of the discussion there will be a vote on the Motion.

CONFERENCE SESSIONS

Session 7

Hydro Machinery - II

Chairman: J.H. Gummer, Hydro Consult Pty Ltd, Australia

- Numerical model test for a Francis turbine – *S. Kurosawa, Toshiba Corporation, Japan*
- Draft tube optimization – *T. Laverne and C. Buchi, Alstom, France*
- An application of self-lubricating bearings in Kaplan runner hubs – *P. Pereira, P. Schmitt and M Müller-Brodmann, Federal Mogul Deva, Germany*
- Reliability of composite materials for environmentally safe Kaplan turbines – *V.A. Demianov, S.V. Ivanov, C.Ya. Ilyin, Power Machines/LMZ, Russia*
- Sealing system technologies for hydro turbines – *A. Evans, A.W. Chesterton Co, USA*
- Simulation strategies to study Francis runner residual life with computational fluid dynamics and structural finite element analysis – *S. Houde and L. Marouicler, Hydro-Québec IREQ, Canada*
- Prototype measurements on casing flow and air entrainment into the tailwater of Pelton turbines – *Dr. A. Arch, Fichtner GmbH & Co. KG, Germany; Dr D. Mayr, Verbund – Austrian Hydro Power AG, Austria*
- Numerical study of cavitation on the surface of the guidevane in a hydropower unit at Three Gorges – *Yucheng Peng, Huazhong University of Science and Technology, China*
- Accuracy assessment of computational fluid dynamics tools to predict hydraulic turbine performance – *J.L. Kueny INPG, France; R. Lestriez, Numlérica, Spain*
- The influence of two different draft tube shapes on Francis turbine characteristics – *K. Yamaishi and T. Hashii, Nippon Koei Power Systems Co Ltd, Japan*
- Rotor-stator interaction in speed no load operation of pump-turbines – *M. Keller and Quanwei Liang, Andritz Hydro Ltd, Switzerland*

Session 8

Civil Works – Safety

Chairman: Dr A. Zielinski, Ontario Power Generation, Canada

- A global approach in the field of vision and geometric scanning for dam safety and durability – *D. Reith and H. Lançon, SITES*
- BioSealing, an innovative method for stopping seepage in dams – *Dr M. Blauw, Dr M.N. Latil and J.W.M. Lambert, Deltares, The Netherlands; M. Willner, INSOND Spezialtiefbau GmbH, Germany; S. Schusterr, TBS Waterconsult, Germany*
- Leakage detection based on temperature measurement with fibre-optic: methods and results – *P. Cunat, K. Radzicki, Y-L. Beck, Y-H. Faure, J-P. Fabre, J-R Courivaud and Prof J-J. Fry, EDF, France; Dr S. Bonelli, Cemagref, France*
- Increasing dam safety with multi beam sonar – *M. Bartsch and J. Deborg, SwedPower AB; M.O. Cederstrom, Vattenfall, Sweden*
- Measuring the erodibility of soil materials constituting hydraulic embankment structures: a key input for dam and dyke safety assessment - *J-R. Courivaud and J-J. Fry, EDF Hydro Engineering Centre, France; Dr S. Bonelli and N. Benhamed, Cemagref, France; P-L. Regazzoni and D. Marot, Institut Gem – UMR CNRS, France*
- GNSS/GPS/LPS-based online control and alarm system for natural and geotechnical analysis – *R. Jäger, M. Oswald, G. Younis and A. Hoscislawski, Hochschule Karlsruhe – Technik und Wirtschaft Germany*
- Restoration of dam safety and refurbishment of concrete buttress dams at the Storfinnforsen and Ramsele hydro plants in Sweden – *T. Helin, E.ON Vattenkraft Sverige AB, Sweden*
- Manually released stoplogs at Hydro-Québec – *S. Meunier, Hydro-Québec, Canada*
- Hydro-power structure affected by alkali-aggregate reaction: a case-study involving numerical re-assessment to help for long-term maintenance plan – *J-F. Seignol, LRPC, France; R. Leroy, Alpiq (EOS), Switzerland; L-I. Boldea, Stucky Ltd, Switzerland; B. Godart, Université Paris-Est, France*
- Field vibration concerning the dynamic stability of tainter gates at the Poe power dam – *K. Anami, Ashikaga Institute of Technology, Japan; N. Ishii, Osaka Electro Communication University, Japan; C. Knisely, Bucknell University, USA; T. Oku, Mayekawa MFG Co Ltd, Japan*
- Stability analysis on the reservoir bank slope at the Pubugou dam in China – *Xu Qing, Wuhan University, China*

- Can large reservoirs trigger earthquakes? The case of Wenchuan – *Prof. Zhang Chuhan, Tsing Hua University, China*

Session 9

Hydro Development in Latin America

Chairman: J. Rodrigo Morales, ICE, Costa Rica

- Expanding the Brazilian electric matrix with a focus on sustainability – *M. P. Zimmermann, Deputy Minister, Ministry of Mines and Energy, Brazil*
- Computational tool for long term hydro/thermal expansion studies in Brazil – *M.L. Viana Lisboa, L.G. B. Marzano, C.H. M. Saboya, M.E. Piñeiro Maceira, and A. C. Geber de Melo, CEPEL, Brazil*
- River basin hydro inventory studies in Brazil, taking into account social and environmental aspects – *F. da Serra Costa and co-authors, Electric Power Research Centre / CEPEL, Brazil*
- 'Offshore platform': A new concept for hydropower projects – *J.A. Muniz Lopes, President, Centrais Elétricas Brasileiras SA - Eletrobras, Brazil*
- Inclusion of a sustainable development approach in the design and engineering of the Aysen hydro project, Chile – *B. Canales and D. Roth, Hidro Aysen SA, Chile; R. Gonzalez, Ingendesa SA, Chile.*
- Extension of the Gabriel Terra hydropower plant, Paraguay – *B. Brusa-Pasque, L. Orצל, S. Jousserand, Compagnie Nationale du Rhône, France*
- Effective implementation of the right dam at Tocoma, Venezuela – *G. Martinez, EDELCA, Venezuela*
- Renewable energy for Costa Rica: developments and challenges for Central America – *J. R. Rojas M, Costa Rica*
- Corporate social responsibility: a case study relating to Peru - *B. Zdravkovic, Sinersa, Peru*

TUESDAY 27 OCTOBER - MORNING

Session 10

Panel Discussion:

Opportunities for Managing Risk and Uncertainty in Dam Engineering

Chairman: Dr H. Kreuzer, Consultant, Switzerland

Topics and Panellists:

1. Uncertainty and risk in hydrology – *Prof L. Berga*
 - Robustness of hydrological forecasts (impacts of climate change)
 - Spillway design
2. Uncertainty and risk during project development – *B. Tardieu*
 - Risk of curtailed upfront planning and pre-construction investigations (consulting engineer's view)
 - Design of dams under unfavourable site conditions
 - Views about contract types: private sector versus traditional financing
3. Uncertainty and risk in project funding – *A. Palmieri*
 - Risk of curtailing upfront planning and pre-construction investigations (World Bank view)
 - Managing risk of delays and cost overruns (World Bank's view)
 - Views about contract types: private sector versus traditional financing
4. Uncertainty and risk in construction – *J. Launey*
 - Robustness/threat of inexperienced contractors
 - Managing risk of delays and cost overruns (contractor's view)
 - Risk balance between stakeholders (off-loading of risk)
5. Uncertainty and risk in operation and management – *P.M. Lefevre*
 - Quality and training of O&M staff
 - Institutional risk factors: compliance to dam safety regulations
 - Safety of the small dam left in oblivion

Session 11

Upgrading and Refurbishment

Chairman: F. Griffin, Mott MacDonald, UK

Co-Chair, F. Coelho de Rocha e Silva, Mozambique/Portugal
Planning and managing refurbishment schemes

- Management of hydro plant refurbishment – *N.M. Nielsen, International Energy Agency; and N.K. Blaikie, Consultant, UK*
- Hydro plant management in Kenya: rehabilitation versus upgrading – *F.X. Makhau, Kenya Electricity Generating Company, Kenya*

CONFERENCE SESSIONS

- Focused rehabilitation work at the Piva plant in Montenegro – *H. Obermoser, Colenco Power Engineering Co Ltd, Switzerland*
- Successful cooperation between a power company, a turbine manufacturer and a university – *K-T. Fjaervold, Statkraft, Norway; P. Teppan, Andritz Hydro, Norway; and E. Kobro, NTNU, Norway*
- Software solutions for powerplant refurbishment – *A. Floutier, Dassault Systemes, France*

Upgrading and monitoring machinery

- Box Canyon and Cabinet Gorge: Upgrading turbines in the western USA – *A. Nichtawitz and C. Angerer, Andritz Hydro, Austria*
- Benefits of a digital condition monitoring system for efficient plant management: Cahora Bassa plant, Mozambique – *P. Maeder, G. Zurbruggen, D. Vez, L. Fromaigeat, Vibro-Meter SA, Switzerland*
- Experience with Francis rehabilitation projects – *N. Desy, A. Demers and A. Nichtawitz, Andritz Hydro Ltée, Canada*
- Large Francis upgrade in Spain: an example of successful collaboration – *E. V. Rosico Ramon and J. Llop Ribalta, Endesa Generacion, Spain; C. Aguerre Telleria and R. Tena Martinez, Voith Hydro, Spain*
- The Kiambere hydro plant upgrade project in Kenya – *S. Kimani and O. Skuncke, Kengen, Kenya*
- Ukrhydroenergo hydropower rehabilitation project – *Z. Gutina and O. Ulyanenko, UkrHydroEnergo (UHE), Ukraine; E. Branche and J-C. Rigaut, EDF, France*

Upgrading civil works

- Rehabilitation of the Tuilières dam – *P. Pissot and V Marmonier, EDF, France*
- Composite coatings to rebuild and upgrade metal and concrete surfaces at hydro plants – *P. Lenehan, A.W. Chesterton, Ireland*

Penstocks

- Diagnosis and overhaul of EDF's penstocks – *P. Claveirole and M. Salle, EDF, France*
- Rehabilitation of the Cleuson Dixence high pressure shaft – *P. Marietta, EDF-CIH, France; R. Berthod, Stucky SA, Switzerland; H. Détraz, Bonnard et Gardel, Switzerland; J-F. Nicod, Cleuson Dixence Construction, Switzerland*

Session 12

Small Hydro Development - I

Part One: Policy, Resources and Development Plans

Chairman: Prof Bernhard Pelikan, President, ESHA;
Co-Chair: Gema San Bruno, Secretary-General, ESHA

- Current ESHA activities and EU SHP projects – *G. San Bruno, Secretary-General, ESHA and Project Leaders*
- An overview of European support systems for renewable energy and consequences for hydropower development – *J.U. Haaheim, Statkraft Energi AS, Norway; O. Ulseth, Statkraft AS, Norway*
- Small hydropower development on the Rhône river – *J-P. Bois and L. Thureau, Compagnie Nationale du Rhône, France*
- Hydro and wind energy synergies: new hydropower in the Sil system – *M.A. Lopez Garcia and J. Riesco Canela, Iberdrola, Spain*
- FirstLook Hydro: an on-line tool for small-scale hydro resource identification – *K. Westrick and A.W. Wood, 3Tier Inc, USA; M.G. Bowness, 3Tier GmbH, Germany*
- Economy and ecology in future water management: contradicting or compatible? – *C. Orschler, EON Wasserkraft, Germany*
- Flims Water: hydropower in synergy with other water uses – *R. Stäheli and A. Faeh, Basler & Hofmann AG, Switzerland; Q.W. Schaer, Straub AG, Switzerland*
- Small hydro development in the French Alps: an example of the new trend in France – *C. Gabarrou and J. Legendre – ISL Ingénierie; F. Marchand, Sorea, France*

Part Two: Multi-dimensional Hydro

Chair: Anne Pénalba, President, France Hydroélectricité

- The Lonato small hydro plant: a successful exploitation of existing heads on an irrigation channel in northern Italy – *S. Mazzoleni and P. Giacomelli, Studio Frosio, Italy*
- New hydropower projects in existing hydraulic structures in Mexico – *A. Trelles-Jasso, Mexican Institute of Water Technology, Mexico*
- Micro-hydropower resources in water systems of southern Italy – *F. De Paola, G. Marini and S. Villani, University of Naples, Italy*
- Multidisciplinary ranking for new dam projects in Thessaly, central Greece – *Y. Thanopoulos, PPC/DHP, Greece*

- Small hydropower plants in the shadow of Mts Olympus and Athos – *Prof V.G. Stergiopoulos and A.V. Stergiopoulou, ASPETE, Greece; G.V. Stergiopoulos, GIS specialist, Greece*
- Hydropower production for Coimbra's sustainable mobility programme – *A. T. de Almeida, C. Inverno, J. L. de Almeida, J. Alfeu Sá Marques, University of Coimbra, Portugal*

Special Small Hydro Poster Presentation Lunch

Introduction: Gema San Bruno, Secretary-General, ESHA

- Challenges of micro hydro development in the private sector in Nepal – *G. P. Devkota, UCS, Nepal*
- Technical and economic evaluation of incorporating small hydro plants in distribution networks – *M. Rahimpour, M.A. Talebi and M.Hajy Aghababaei, Iran Water and Power Resource Development Company, Iran; M.R. Azadhosseini, Lar Consulting Engineers, Iran*
- Lower St Anthony Falls hydro matrix project – *M.L. Koleber, Paul C. Rizzo and Associates, USA; M. Würthele, Whitney Bailey Cox & Magnani, USA; A. Bihlmayer, Andritz Hydro GmbH, Austria; J. Viau, Brookfield Renewable Power, USA*
- Utilization of renewable resources in the rehabilitation of micro hydro plants – *V. Radulescu, University Polytechnica, Romania*
- Small hydro plants in the lower course of the Vrbas river – *R. Gilisic and I.D. Spasojevic, Energoprojekt Hidroinzenjering, Serbia*
- Presentations of EU SHP projects

Session 13

Hydro Development in Harmony with the Environment

Chair: Cecilia Tortajada, President, IWRA

- EMS as a tool for better environmental performance – *R.Y. Jenssen, Statkraft Energi AS, Norway*
- Fish habitat changes after impoundment – *Prapard Pan-Aram, EGAT, Thailand*
- Strategy adopted for fish conservation and habitat enhancement at the Kotlibhel project in the Himalayas, India – *G. Kumar and S.S. Bist, NHPC, India*
- Three-dimensional behavioural results from acoustically tagged salmon smolts approaching hydroelectric dams – *T. W. Steig, Hydroacoustic Technology, Inc, USA*
- The Alta river case: from conflict to environmental improvements – *A.M. Tvede, Statkraft Energy AS, Norway*
- The Rhône river: undergoing constant ecological changes – *C. Moiroud and M. Zylberblat, Compagnie Nationale du Rhône, France*
- Long-term impacts of dam operation on riparian ecosystems: a dynamic floodplain vegetation model as an assessment tool – *G. Egger and A. Exner, Umweltbüro Klagenfurt, Austria; K. Jorde, SJE Schneider & Jorde Ecological Engineering, Germany – R. Benjankar, Centre for Ecohydraulics Research, University of Idaho, USA*
- Preliminary design of the Fridão hydro development in Portugal – *D. da Silva, J. and L. Paixão, J. EDP; P. da Silva, A., COBA, Portugal*
- New approaches to environmental concerns concerning landscape restoration at hydroelectric plants in Brazil – *M.A.A. Porto and co-authors, Furnas, Brazil*
- Experiences with IHA sustainability assessment protocol as a verification tool for sustainable hydro development – *W. Gronbrekk and T.H. Bakken, DNV, Norway; E. Jimenez, UAM, Spain*
- Environmental flow regime for a new hydro project in the Río Verde, Mexico – *M.A. Gómez Balandra and R. Torres, Mexican Institute of Water Technology; M.P. Saldaña Fabela, National University of Mexico, and C. Lecanda Terán, CFE, Mexico*
- The Riacho Seco scheme as a candidate for carbon credits – *J.R. Juca Consultant, Brazil*
- Bogong delivers the promises – *P.H.J. Caplen, Sinclair Knight Merz, Australia*

TUESDAY 27 OCTOBER - AFTERNOON

Session 14

Hydro Development in Asia

Co-Chairmen: Prof Jia Jinsheng, President, ICOLD, and Vice President, IWHR, China; C.V.J. Varma, President, Council of Power Utilities, India

- Nam Theun 2: A large hydro scheme for sustainable development in Laos – *J.D. Méchali, O. Salignat and J-M Boutet, EDF, France*
- Progress and challenges in hydro development in India – *C.V.J. Varma, Council of Power Utilities, India*

CONFERENCE SESSIONS

- Review of the design and planning and its effects on construction of the 2000 MW Subansiri project in India – *B. Das, Soma Enterprise Ltd, India*
- Power exchange in India – *P. Kaul, NHPC, India*
- Hydrology of northern Pakistan and its significance for water resources development – *K. Gugesarajah, J. H. Meldrum and H. C. Ross-Russell, Mott MacDonald, UK*
- The 2700 MW Lower Siang project in AP, India – *R.L. Gupta, O.N. Bajpai and P.K. Alagh, Jaypee Group, India*
- Innovative methods adopted at the Baglihar project for restoration of the river diversion system – *N. Singh, Jaiprakash Hydropower, India*
- The challenge of hydro development in Indonesia – *N. Mulyanto and A. Yahmadi, PT PLN (Persero), Indonesia*
- Hydropower optimization: integrated reservoir operation on the Citarum river, Indonesia – *D. Gurusinga, H. Idrus and R. Mayasari, Jasa Tirta II Public Corporation – Indonesia*
- Nepal: the world's only hydro economy – *S. Acharya, Ministry of Water Resources, Nepal*
- Hydropower development opportunities in Nepal – *N. P. Timalsina, ITECO, Nepal*
- Hydroelectric profile of Pakistan – *Z. Ul-Hasan Z. Majeed and S. Er-Rahman, Hydro Planning Organization of WAPDA, Pakistan*
- Hydropower development in Turkey – *H.B. Yuksel and S. Fakioglu, DSI, Turkey*
- Hydropower potential of the Russian Federation: plans and challenges for its development – *A. Asarin, Hydroproject Institute, Russian Federation*
- Hydropower development in Sarawak: integrating a Tasmanian power development model – *Tan Sri Abdul Aziz Husain, Sarawak Energ Bhd, Malaysia; T. Chu, Hydro Tasmania, Australia*
- Cameron Highlands Batang Padang scheme: plant life extension and automation project – *Choy Gook Kun, SNC Lavalin Power Sdn Bhd, Malaysia; Z. bin Sulaiman, Tenaga Nasional Berhad, Malaysia*

Session 15

Developments in Electrical Engineering

Chairman: Dr Ralf Bucher, Lahmeyer International, Germany

- Computational analysis of the dynamics of vertical hydroelectric rotors using solid models – *F. Neumayer, M. Himmelreich and F. Ramsauer – Andritz Hydro GmbH, Austria*
- New model for lifetime prediction on generator active components – *T. Kunz and T. Klamt, Alstom Hydro, Switzerland*
- Ventilation improvements in Alstom hydro generators – *G. Hemery and T. Kunz, Alstom Hydro, Switzerland*
- Power system stability and out-of-step protection inclusion in the generator protection systems at the Alqueva hydro plant – *L. Martins, EDP, Portugal*
- Merowe, Sudan: the challenges of commissioning large machines and grid connection – *(Speaker to be confirmed)*
- On electromechanical interactions in hydropower generators – *Dr. M. Karlsson, Lloyd's Register ODS, Sweden*
- Up-to-date approaches to the hydro generator stators assembly taking into account their stress state – *V. Shkolnik, OJSC Power Machines Branch Electrosila, Russia*
- Experience with the development of endwinding corona protection systems – *T. Hildinger, T. E Lamas, M. J. Silva and J. F. Cordeiro, Voith Hydro, Germany*
- How standards can constrain an innovative pole design which may contribute to reducing CO₂-emissions in power generation – *T. Hildinger and A. Frank, VSH tgd, Germany; K. Reppe, Consultant, Germany*

Session 16

Operation, Maintenance and Powerplant Control

Chairman: B. Leyland, Consultant, New Zealand

- Enhancing value with the implementation of 'total productive maintenance' – *A. Bouamama, Office National de l'Electricité, Morocco*
- Creating new business opportunities when operation and maintenance are working hand in hand – *A. Løken, Statkraft Energi AS, Norway*
- hydroAMP – A condition assessment methodology for life-cycle asset management – *K. B. A. Sadiki, U.S. Army, Corps of Engineers*

- System dependent reliability centered maintenance strategy for hydropower plants of E.ON Wasserkraft – *J. Grantner, E.on Wasserkraft, Germany*
- Efficient design, construction and maintenance of hydropower plants in Turkey – *Dr-Ing. R. Haselsteiner, S. Heimerl, A. Arch and B. Kohler, Fichtner GmbH & Co. KG, Germany; R. Recla and C. Bilemez, Fichtner GmbH & Co KG, Turkey*
- The management of Cahora Bassa lake considering the compromise between the purposes of the dam and the safety downstream – *G. Jessen and H. Silva, Hidroelétrica de Cahora Bassa, Mozambique*
- When information technologies become an asset for the maintenance of hydro plants – *P. Rouart, M. Kocha and C Roulet, EDF, France*
- Early failure detection in hydro generation – *E. Tourte, J-L Ballester and S Andreucci, EDF, France*
- A model for predictive control of hydropower plants in a cascade development – *C. Dorée, Compagnie Nationale du Rhône, France; N. Jean-Baptiste, CEMAGREF/CNR, France*

Session 17

Small Hydropower Development - II

Chairman: Prof David Williams, CEO, British Hydropower Association, UK

Small hydro technology

- Laboratory development of small diagonal turbines for medium heads (20 - 100 m) – *V. Denis, A. Choulot and B. Reul, MHyLab, Switzerland*
- Micro and small hydro plant solutions – *G. Eugène and D. Chardonneau Schneider Electric, France; K. Ballaguy, DEIF, France*
- Quality standards and engineered reliability as bases for secured return of investments in small hydro powerplants – *J. Lampl, Kössler Gesellschaft mbH, Austria*
- The very low head turbine enters the industrial phase and confirms its low environmental impact – *M. Leclerc, MJ2 Technologies, France*
- Technological progress improves plans to maximise hydro potential – *G. Aggidis and E. Luchinskaya, Lancaster University, UK; D. Howard, Lancaster Environment Centre, UK*
- Mined ore slurry turbines – *P.H.J. Caplen and Dr J. Bremer, Sinclair Knight Merz, Australia*

Rural electrification

- Rural electrification and small hydro – *Jeong Hae-Jeong, Korea Water Resources Corporation, Korea*
- Study on feasible sites of small run-of-river hydropower project in Thailand: Case study in Nan River Basin, Thailand – *Taweep Chaisomphob and Pannathat Rojanamon, Thammasat University, Thailand; Thawilwadee Bureekul, King Prajadhipok's Institute, Thailand*
- The development of small hydropower plants in the Kurdistan region of Iraq – *H.A.M. Hawramany, Ministry of Electricity (KRG), Iraq*

Session 18

Small Hydro – Training Workshop

Moderators: Prof Bernhard Pelikan and G. San Bruno (ESHA), Prof David Williams (BHA), G. Glania (ARE) and B. Leyland (Consultant)

After introductory talks, the Moderators will lead an interactive discussion on small hydro development, with emphasis on the less developed countries. Key topics will be low cost technology and rural electrification.

Session 19

Responsible Planning: Community Involvement and Resulting Benefits

Chair: Karin Seelos, Statkraft Energi AS, Norway

- Assessing and addressing community vulnerability in hydropower projects – *M. Rowan, T. Streather and B. Vyas, Mott MacDonald, UK*
- Communicating with the public: moving from consultation to participation and social responsibility – *Dr S. Dhillon, Enviro-Dev, Norway*
- Hydropower projects versus (regional) plans: can regional dialogue processes make a difference? – *B. Verduzco Chávez, M. B. Valenzuela Varela and M. L. García Bátiz, Universidad de Guadalajara, Mexico*

CONFERENCE SESSIONS

- Project start-up: social and environmental challenges – *Dr. S. Sparkes, Norplan/ Multiconsult, Norway*
- Responsible planning: social and environmental issues and mitigation measures – *J. Foerster, Nam Theun 2 Power Company, Lao PDR*
- The resettlement of communities affected by Bui hydroelectric project, Ghana (case study of the Jama resettlement site) – *M. Wumbilla Salifu, Bui Power Authority, Ghana*
- Social benefits of the Merowe multipurpose scheme in Sudan – *Dr Ahmed El Tayeb, Dams Implementation Unit, Sudan*
- Community involvement in implementation of 60 MW Sondu-Miri hydro project in Kenya – *S.F. Mbogo, Kenya Electricity Generating Company Ltd, Kenya*
- The HCB environmental plan for safeguarding the interests of the company and local communities – *R. J. Guale and A. A. Mabjaia, Hidroelectric do Cahora Bassa, Mozambique*

Session 20

Workshop on Managing the Carbon Balance in Freshwater Reservoirs

Chairman: Dr Albert C. Geber de Melo, CEPEL, Brazil

There has been much discussion in recent years on the potential impact of freshwater reservoirs on the environment. Measurements, analysis and research have been carried out by various groups around the world on reservoir emissions in temperate and tropical regions. However, to date no consensus has been reached on measurement, assessment and management protocols and how to deliver consistent, credible and acceptable results.

The IEA Hydropower Implementing Agreement (IEA Hydro) has started a new Annex on 'Managing the Carbon Balance in Freshwater Reservoirs', to be managed by CEPEL, Brazil. The objectives of the Annex will be achieved through a comprehensive work programme to:

- increase knowledge of the reservoir emission processes;
- establish guidelines for planning studies on the carbon balances in reservoirs;
- standardize GHG flux evaluation methods; and,
- develop an accepted methodology to measure and manage the carbon balance in reservoirs.

This Workshop will focus on the background, experiences and findings gained to date, and what is required to manage, effectively and efficiently, the carbon balance in freshwater reservoirs.

A Panel will be chaired by Dr Albert C. Geber de Melo, Director General of CEPEL. Panellists will include: Jorge Damazio (CEPEL, Brazil); Luiz Pinguelli Rosa (COPPE/UFRJ, Brazil); Alain Tremblay (Hydro-Québec, Canada) and Jason Antenucci (University of Western Australia). The Workshop will conclude with an open discussion on the subject matter presented, and suggestions will be invited on how external parties can contribute to, and be involved with, the Annex work programme.

Session 21

Civil Works – Design and Construction Innovation

Chairman: Dr A. Hughes, Atkins Water, UK

Spillways, gates and tunnels

- Modelling, design and construction of the Piano Key Weir spillway and application at the Saint-Marc dam (EDF, France) – *F. Laugier, EDF-CIH, France; M.L. Ribeiro, EPFL, Switzerland*
- Innovations in automatic water-operated gates for hydro plant spillways – *S.V. Kovalev, G.F. Onipchenko and V.B. Rodionov, NIIES, Russia*
- Risk based selection of twin tunnels for the 775 MW Luhri hydroelectric project in India – *D. Powell and A. Chaudhary, Mott MacDonald, UK*
- Verification of head losses derived from in-situ roughness observations of unlined TBM tunnels in igneous rock – *K.M. Hakonardottir, Verkis Consulting Engineers, Iceland; G.G. Tomasson, Reykjavik University, Iceland; B. Stefansson, Landsvirkjun Energy, Iceland*
- Filling and pressurizing the headrace tunnel at Karahnjukar in Iceland – *K. Kaelin, Pöyry Infra Ltd, Switzerland; S. Olafsson and P.S. Leifsson, Verkis hf, Iceland*

Construction materials and methods

- Rehabilitation of the Aleko reservoir, Bulgaria, with a geomembrane – *Dr A. Scuero and Dr G. Vaschetti, Carpi SA, Switzerland*

- Construction of Nemiscau-1 dam: The first Asphalt core rockfill dam in North-America: a valuable experience for the design of larger similar structures in Northern-Quebec – *V. Alicescu and J.P. Tournier, Hydro-Québec, Canada*
- Design and construction of the Ermenek arch dam and hydro plant – *G. Zenz, Technical University of Graz, Austria; J. Linortner, R. Kohler, and B. Mayer, Pöyry, Austria*
- Dams for the Upper Tamega project – *A.R. Arroyo, Iberdrola, Spain*
- GRP pipe systems in hydropower and penstock applications: high performance – underestimated potential – *S. Garbe, Hobas, Austria*
- Deep cutoff walls constructed under dams with trench cutters – *P. Banzhaf, Bauer Spezialtiefbau GmbH, Germany*
- Koldam: a new hydroelectric project under construction on the Satluj river, India – *S. Heard and P. Gaudron, EDF, France*
- Software for planning and scheduling to reduce construction time – *A. Gunter, Sword CTSpace, France*

WEDNESDAY 28 OCTOBER – MORNING

African Ministerial Meeting on Hydro and Dams

The African Ministerial Forum, organized by ADEA, will take place for the first time within HYDRO 2009. Delegates from the two-day EURAFRIC Conference, which will follow HYDRO 2009, will also attend this Meeting. High level delegations from about 20 African countries will debate issues of importance for their countries in the field of water and energy development. Topics will include multipurpose dam development, hydroelectric potential, technical issues, rural electrification, financing needs and strategies, capacity building and technology transfer, and environmental and social aspects.

Speakers will include:

H.E. Blaise Compaore, President, Burkina Faso; • H.E. Bruno J.R. Itoua, Minister of Energy and Water, Congo, and President of AMCOW; • H.E. Sylvain N'Doutingai, Minister of State for Mines, Energy and Water, Central African Republic; • Jean-Chrysostome Mekondongo, Minister of State for Energy and Water, Central African Republic; • H.E. Samuel Sarr, Minister of Energy of Senegal; • Igor M. Diarra, Minister of Energy and Mines, Mali; • H.E. Mahamat N. Hassane, Minister of Petroleum and Energy, Chad; • H.E. Sacca Lafia, Minister of Energy and Water, Benin; • H.E. Samuel N'Dayiragije, Minister of Water, Energy and Mines, Burundi; • H.E. Jean-Bernard Sindue, Minister of Energy and Water, Cameroon; • H.E. Vincent Essono-Mengue, Minister, Gabon; • H.E. Damipi Noupokou, Minister of Mines, Energy and Water, Togo; • Parviz Koochafkan, Director of the Environment Division, FAO; • Mohammed S.O. Merzoug, High Commissioner, OMVS; • Benjamin NDala, Secretary-General, CICOS; • Jean-Louis Gagnaire, Vice President responsible for International Affairs, Region Rhône Alps; • Jean-Michel Daclin, Vice President – International Relations, Grand Lyon; • Jean-Pierre Vial, Senator, Vice President, Conseil General de Savoie, France.

Session 22

Developments in Marine Energy Systems

Co-Chairman: F. Louis, EDF, France; Niels Nielsen, International Energy Agency

- Unleashing renewable energies from the ocean: experience in developing new cutting-edge technology to benefit from the forces of osmosis and tidal currents – *Ø.S. Skråmestø and P. Hersleth, Statkraft AS, Norway; K. Seelos, Statkraft Energi AS, Norway*
- Progress report on ocean energy technologies – *Dr J. Wellepp, Voith Hydro Holding GmbH & Co KG, Germany*
- Upgrade of 4.4 MW hydro facility with zero-head hydrokinetic turbines placed in the tailrace – *W.F. Krouse and M.R. Stover, Hydro Green Energy, USA*
- Tidal power from barrages: background to 50 years of maturing technology – *J.G. Warnock, Monitor (International) Ltd, UK*
- Advantage of reversible pumping operation at tidal hydropower plants – *P. Thackray, Independent Consultant, UK*
- The Nelson river estuary: existing physical conditions described using targeted surveys and numerical modelling – *M-H. Briand and K. Ng, RSW Inc, Canada; K. Sydor and T. Aziz, Manitoba Hydro, Canada; S. Lorrain and S. Leclair, Environnement Illimité, Canada*
- Concepts of large-sized hydro units for tidal power stations – *V.A. Demianov, I.M. Pylev, S.G. Grigorian, Power Machines LMZ, Russia*

CONFERENCE SESSIONS

- Paimpol-Bréhat: development of the first tidal current array in France – *P. Brun, A. Barillier and L. Terme, EDF, France; S. Barr, Open Hydro, Ireland*
- Examples of new solutions for huge tidal plants in six countries - *F. Lempérière, Hydro Co-op, France*
- New technologies for tidal powerplants in Russia – *I.N. Usachev, Scientific Research Institute of Energy Structures (JSC NIIES), Russia*

Session 23

Pumped-Storage Technology and Developments

Chairman: Bruno Trouille, MWH Global, USA

- New opportunities for pumped storage – *J. Pautz, Andritz Hydro, Austria*
- Influence of the market structure on pumped-storage installed capacity: benchmarking analysis – *D. Surla, EDF, France*
- Benefits of variable speed pumped-storage units in mixed islanded power network during transient operation – *C. Nicolet, Power Vision Engineering sàrl; Switzerland; Y. Pannatier, Y. B. Kawkabani and J.-J. Simond, Laboratory of Electrical Machines, EPFL, Switzerland; F. Avellan, Laboratory for Hydraulic Machines, EPFL, Switzerland; A. Schwery, Alstom, Switzerland*
- Kops II on the grid: first experiences and lessons learned – *G. Gökler, Vorarlberger Illwerke AG, Austria*
- Pumped-storage technology for heavy duty water pumps: the 90 MW Beni Haroun pumps – *J-M Henry, L. Melet and H. Marin, Alstom Hydro, France*
- Refurbishment and new build activities at the Waldeck 1 pumped-storage plant during part-load operation – *M. Rau, E.on Wasserkraft, Germany*
- Optimization of power cavern design for pumped storage plants: separated machine/trafo versus single cavern solution – *P. Steyrer, Pöyry Energy, Austria*

WEDNESDAY 28 OCTOBER - AFTERNOON

Session 24

Managing Problems of Reservoir Sedimentation

Chairman: Sultan Alam, Consultant, France

- Study of sand-induced erosion of hydro turbines in Nepal – *T.R. Bajracharya, Tribhuvan University, Nepal; C.B. Joshi and R.P. Saini, Alternate Hydro Energy Centre, India; O.G. Dahlhaug, NTNU, Norway*
- Comparison of grain size distributions derived from automated grain sizing and traditional methods – *G. Harb, J. Schneider and W. Dobler, Graz University of Technology, Austria*
- Development of a sediment-resistant Francis runner – *O.G. Dahlhaug, NTNU, Norway*
- Integrated approach to reservoir sedimentation management – *M. Kouris, Sarti SpA, Italy; G. Albergo, University of Molise, Italy*
- Regional cooperation in sediment management at hydro projects – *O. Dione and P. Karki, The World Bank*
- Sediment management in hydropower reservoirs: a target state approach – *S. Menu, E. Valette and R. Thévenet, EDF, France*
- A new method for restoring morphological continuity in reservoirs – *R. Bundesmann, DB Hydro GbR, Germany*
- Upper Stave hydroelectric project: Validation and optimization of hydraulic design using numerical and physical modelling – *M. Villeneuve, LaSalle Consulting Group, Canada; E. Parkinson, Andritz Hydro, Switzerland; P. Duflon, Andritz Hydro Canada, Canada; B. Hughes, Northwest Hydraulic Consultants, Canada*

Session 25

Optimizing Hydro Operation in the Grid

Chairman: Øivind Johanssen, Deputy Director, Ministry of Energy and Petroleum, Norway

- Modelling hydro power operations and planning in electricity markets – *S. Vilela, H. Azevedo and M.N. Tavares, REN Servicos SA, Portugal; P. Thimmspuram, A. Booerud and G. Cozelmann, Argonne National Laboratory, USA*

- Experience from a successful implementation of an advanced optimization tool for short-term production planning in a large-scale hydro system – *K. Fodstad and T.J. Larsen, Statkraft Energi AS, Norway*
- Optimizing hydro capacities for smarter generation mix scheduling – *J.-C. Passelegue, D. Jeandemange, S. Ammari, Areva T&D Automation, France*
- Wind power and pumped storage: an ideal match? – *B. Børresen, Rainpower Norway a.s., Norway*
- Short-term optimization of hydro generation: tools developed by EDF – *D. Rioual, EDF, France*
- Changing operating conditions in Norwegian hydro plants in the past decade – *T.M. Welte and E. Solvang, SINTEF Energy Research, Norway*
- Major challenges for a hydropower producer operating in a deregulated electricity market – *N. O. Tangvik, Powel ASA, Norway*
- A model of renewable energies' integration in the electrical market – *B. Mathex and F. Storck, Compagnie Nationale du Rhône, France*
- Reliable power delivery from a dedicated powerplant to a single user Kárahnjúkar power station in Iceland – *H.T. Helgason, S.I. Olafsson, and K.M. Sigurjonsson, Verkis Consulting Engineers, Iceland; A. Benediktsson, Landsvirkjun, Iceland*

Session 26

Flow Measurement: Techniques and Experience

Chairman: Prof T. Staubli, HTA, Lucerne, Switzerland

- Verification of Gibson flow measurement – *P. Ševčík, OSC Ltd, Czech Republic*
- Field experience with acoustic scintillation flow measurement: One step further in the recognition of ASFM as valid method – *J.V. Llobet, Union Fenosa, Spain*
- Turbine flow measurement in low-head plants with acoustic scintillation (cases in France, Spain, Canada and USA) – *B. Reeb, EDF-DTG-MPSH, France*
- Hydro-Québec's experience with ASFM: continuous flow monitoring – *G. Proulx, Hydro-Québec; D. Lemon, ASL AQFlow Inc, Canada*
- Turbine flow measurement in short-intakes of low-head plants with acoustic scintillation in Canada, France and Spain – *J. Buermans, D. Lemon and J. Lampa, ASL AQFlow, Canada*
- Multipath acoustic discharge measurement in non-standard situations – *P. Gruber and M. Widmer, Rittmeyer Ltd; T. Staubli, Lucerne University of Applied Sciences and Arts, Switzerland*
- Multipath clamp-on acoustic flow meter – *J. Skripalle, HydroVision, Germany*

Session 27 Africa

Current Developments in Africa

Chairmen: A. Nombre, Burkina Faso; (Co-Chair to be confirmed)

- Hydropower development starts with capacity building: a case study from the Nile Basin region – *P.Boeriu and J. Luijendijk – UNESCO-IHE, The Netherlands; M. Sherif, HRI, Egypt*
- Nile Basin Initiative: cooperative assessment study of the Eastern Nile power trade programme – *C. Viladrich, P. Brun, and Dr F. Moustafa, Electricité de France*
- Low cost technologies to improve reservoir storage for local communities – *A. Nombre, Burkina Faso ; J. P. Vigny and F. Lempérière, Hydro Coop, France*
- Construction of 400 MW Bui hydro project: a tool to bridge the development gap between northern and southern Ghana – *A. Boye Osafo-Kissi and K. Sarpong Akosa, Bui Power Authority, Ghana*
- Assessing the hydro potential of Central Africa – *J. Kenfack, M. Fogue, and T. Tamo Tatietsé, Ecole Nationale Supérieure Polytechnique, Cameroon; A.G.H. Lejeune, Université de Liège, Belgium*
- Kafue Lower hydro project, Zambia: The effects of estimated climate change on projected output – *Dr P. J. Mason, MWH, UK*
- Hydro development in Nigeria: a review of current projects and future plants – *I. Ekpo, Federal Ministry of Water Resources, Nigeria*
- Research and development activities on small hydropower: a case study from Ethiopia – *B. Abate, University of Jimma, Ethiopia*

ACCOMPANYING PERSONS' PROGRAMME



Monday 26 October

The day will begin with short tour of some important sights in Lyon, including the ancient Roman Theatre (the oldest theatre in France) and the Musée de la Civilisation Gallo Romaine. The museum is on the hill of Fourvière, from which there is a spectacular panoramic view across to the Alps. Lunch will be in a traditional restaurant in town.

In the afternoon there will be a visit to the exceptionally picturesque medieval town of Pérouges. There will be a tea party at the 'Ostellerie', with a tasting of sparkling rosé wine of Montagnieu and Galette Pérougienne.

Tuesday 27 October

This trip will be a 'Beaujolais wine tour' in a scenic region south of Lyon.

The first visit will be to the medieval village of Oingt, overlooking the valley d'Azergues.

The Romanesque cloisters and a convent will be seen. There will then be a tasting of Cotes de Brouilly wine, at Chateau de la Chaize, followed by lunch in a local restaurant. In the afternoon there will be a visit to the Wine Museum in the village of Romaneche-Thorins, with a chance to learn about the history of producing and transporting the wine, manufacturing the corks, as well as the bottling, labelling and marketing processes.

At the end of the visit there will be a chance to taste the vintage wines of George Duboeuf in the grand ballroom.

Wednesday 28 October

There will be a local tour known as the 'Painted wall circuit', featuring various frescoes and artistic features of Lyon. The trip will also include a visit to Les Halles de Lyon, a covered market where the renowned chefs of Lyon go shopping. There will be a tasting of some fine gastronomic products, followed by a three-course lunch in the traditional 'Bouchon' Lyonnais. In the afternoon, there will be a visit to the Crois-Rousse district, to demonstrate Lyon's history as the city of silk. The group will be welcomed at Maison des Canuts, which shows the chain of manufacturing, from silk thread to woven silk tissue. There will be a demonstration of how the Canuts (silk workers) used to work on Jacquard mechanical looms. Some free time will then be available for shopping before returning to the hotels in time for the Conference Gala Dinner at the Cuvage de Lacenas.



SOCIAL PROGRAMME

Sunday 25 October (12.00-16.00 hrs) - For all participants

A short sightseeing tour will take place in the old part of Lyon, starting along the Rhône quays, with a view of the Opéra, City Hall, Universities and Hôtel Dieu. There will then be lunch in a traditional restaurant, followed by a one-hour cruise on the Saone or Rhône river

Monday 26 October - Evening

The HYDRO 2009 Welcome Reception, co-hosted by Compagnie Nationale du Rhône, will take place in the Hotel de Ville, a spectacular historical building in the centre of town.

The Mayor of Lyon will greet participants. Then a light supper will be served, and music from the renaissance period will be provided by Les Pennons de Lyon.

Wednesday 28 October - Evening

The Conference Gala Dinner, hosted by Electricité de France, will take place at Le Cuvage de Lacenas, a beautiful and rustic wine producing establishment in the country, about 40 mins from Lyon by coach. A tasting of wines from the Beaujolais region will be possible before dinner.

There will be music and other entertainment during the evening.



STUDY TOURS

Three post-Conference Study Tours are being arranged for HYDRO 2009 participants. They offer much diversity, with a chance to see large hydro and pumped-storage schemes high in the Alps, an RCC dam under construction on the beautiful island of Corsica, or a drive through the scenic countryside of Provence, visiting run-of-river hydro plants and a major control centre.

Tour 1 – Alpine region

2 days (Thursday 29 October and Friday 30 October)

This trip will depart early on **29 October** for visit to the Pierre Benite run-of-river plant, south of Lyon, operated by Compagnie Nationale du Rhône. The group will then travel on to visit EDF's Grand Maison dam and 1800 MW pumped-storage plant, and the Hydrelec Museum, where lunch will be served. There will then be a visit to the La Bathie hydro plant. The underground plant is supplied by several reservoirs via a 13 km-long tunnel. Six Pelton units operate under a head of 1209 m.

In the evening there will be a guided tour of the medieval village of Confians. Dinner and the overnight stay will be in Albertsville.

On **30 October**, the day's activities will begin with a visit to a cheese producing factory (with a chance of sampling cheese with local wine). There will then be a visit to the spectacular 150 m-high Roselend multiple arch buttress dam, which impounds a $186 \times 10^6 \text{m}^3$ reservoir. Lunch will be in Bourg St Maurice. In the afternoon, the group will continue to the Malgovert hydro plant, also operated by EDF. Its reservoir is impounded by the Tignes arch dam (see photo below, left), the highest of its type in France at 180 m. The reservoir capacity is $235 \times 10^6 \text{m}^3$. Output from the plant is close to 1000 GWh/year. Delegates will hear about the challenges which were faced during the construction of this major scheme at high altitude. The return to Lyon will be in the evening.



Tour 2 – Southern France and Corsica

4 days (Thursday 29 October to Sunday 1 November)

On **29 October**, the group will travel by coach from Lyon to the Péage de Roussillon low-head run-of-river plant, operated by Compagnie Nationale du Rhône. After this visit, the tour will continue down to Marseille, stopping en route for lunch and sightseeing in Pont du Gard (the Pont du Gard aqueduct is shown below). At Marseille, in the early evening, the group will board a ship for the cruise down to Corsica's capital, Ajaccio (below right); dinner and accommodation will be on board.



On **30 October**, there will be a visit to the Tolla dam on the Prunelli river, and the Pont de la Vanna pumped-storage plant. Lunch will be near Cauro, followed by sightseeing in Bonifacio (see photo above left). Dinner and the overnight stay will be in Bonifacio.

On **31 October**, the group will visit the site of the Rizzanese RCC dam, under construction near Propriano. The 40 m-high dam will impound the reservoir for a 54 MW hydro scheme. The headrace will be 6000 m-long, and the operating head will be 415 m. The scheme is scheduled for completion in 2012.

After the visit the group will travel on to Propriano, taking the Col de Bavella route, and stopping to view the peaks of Bavella. The group will board a ship in Propriano, for dinner and the overnight return cruise to Marseille, arriving at 08.00 hrs on the following morning.

On **1 November**, after arrival in Marseille, participants will either be transferred to the railway station, for return by TGV (high speed train) to Lyon or Paris, or will have the option to return by coach to Lyon, arriving around 14.00 hrs.

Tour 3 – Alps and Provence

3 days (Thursday 29 October to Saturday 31 October)

On **29 October**, the group will travel by coach, via Grenoble, to the 1800 MW Grand Maison pumped-storage plant operated by EDF. There will be a tour of the facilities, and the Hydrelec Museum. Lunch will be in the village of Oz. In the afternoon, the tour will continue south towards Briançon, with a visit to the Vauban citadel. The overnight stay will be in Les Bartavelles, near Embrun.

The first visit on **30 October** will be to the Serre Ponçon dam and hydro plant. The reservoir was created to control flows after disastrous flooding during the 19th century. There is also a hydro plant, which produces about 700 GWh/year. Lunch will be in Manosque. There will then be an inspection of the Sainte Tulle hydro monitoring and control centre. The tour will then continue to Chateauneuf du Pape, for dinner and the overnight stay, with a wine tasting en route.

On **31 October**, on the way back to Lyon, there will be a visit to the Donzère-Mondragon run-of-river scheme, operated by Compagnie Nationale du Rhône. The arrival in Lyon is scheduled for around 14.00 hrs.



INTERNATIONAL STEERING COMMITTEE

H.I. Aker
S. Alam, France
J. Antunes Sobrinho, Brazil
I. Araki, Japan
E.M. Baardsen, ADB
E. Bellendir, Russian Federation
L. Berga, Spain
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T. Kunz, Switzerland
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R. Lafitte, Switzerland
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B. Mathex, France
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K. Seelos, Canada
J-J. Simond, Switzerland
B. Tardieu, France
J. Thanopoulos, Greece
S. Tickodri-Togboa, Uganda
B. Trouille, USA
M.S.D. Tsoy, Russian Federation
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OFFICIAL CARRIER

AIR FRANCE / KLM will be the Official Carriers for HYDRO 2009. Discounts will be available on a wide range of fares, between the dates 19 October and 8 November, for passengers travelling to Lyon in Economy or Business class. A 10% discount will apply to non-restrictive public fares, and 5% on restrictive discounted fares. HYDRO 2009 delegates wishing to explore this option should visit:

<http://w9.traveldoo.com/mice/connect.jsf?eid=07926AF>

To locate the nearest Air France / KLM sales point, visit:

www.airfrance.com

The following reference should be quoted when making a booking:

GGAIRAFEVENTNEGO

Event ID: 07926AF



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PARTENAIRES OFFICIELS OFFICIAL PARTNERS

HYDRO 2009 EXHIBITION AND SPONSORSHIP

As usual at the annual Hydro Conferences, a major Technical Exhibition will take place alongside the HYDRO 2009 Conference. All lunch and refreshment breaks will take place in the Exhibition Hall. About 160 companies active in the hydro profession will have the opportunity to display their products and services.

The Hydro Conferences are renowned for their high-level international participants from all parts of the world (more than 70 countries). The Exhibition provides a unique opportunity for all those playing a role in world hydropower development.

Exhibition space is sold in units of 6 m² (multiple units are available for large displays or groups of companies wishing to form a national pavilion).

The price for each unit, € 2700, covers: the fabricated stand, including the framework, panels suitable for mounting posters, a name sign, a table, two chairs, and two spotlights. Additional furniture may be ordered directly from our recommended supplier.

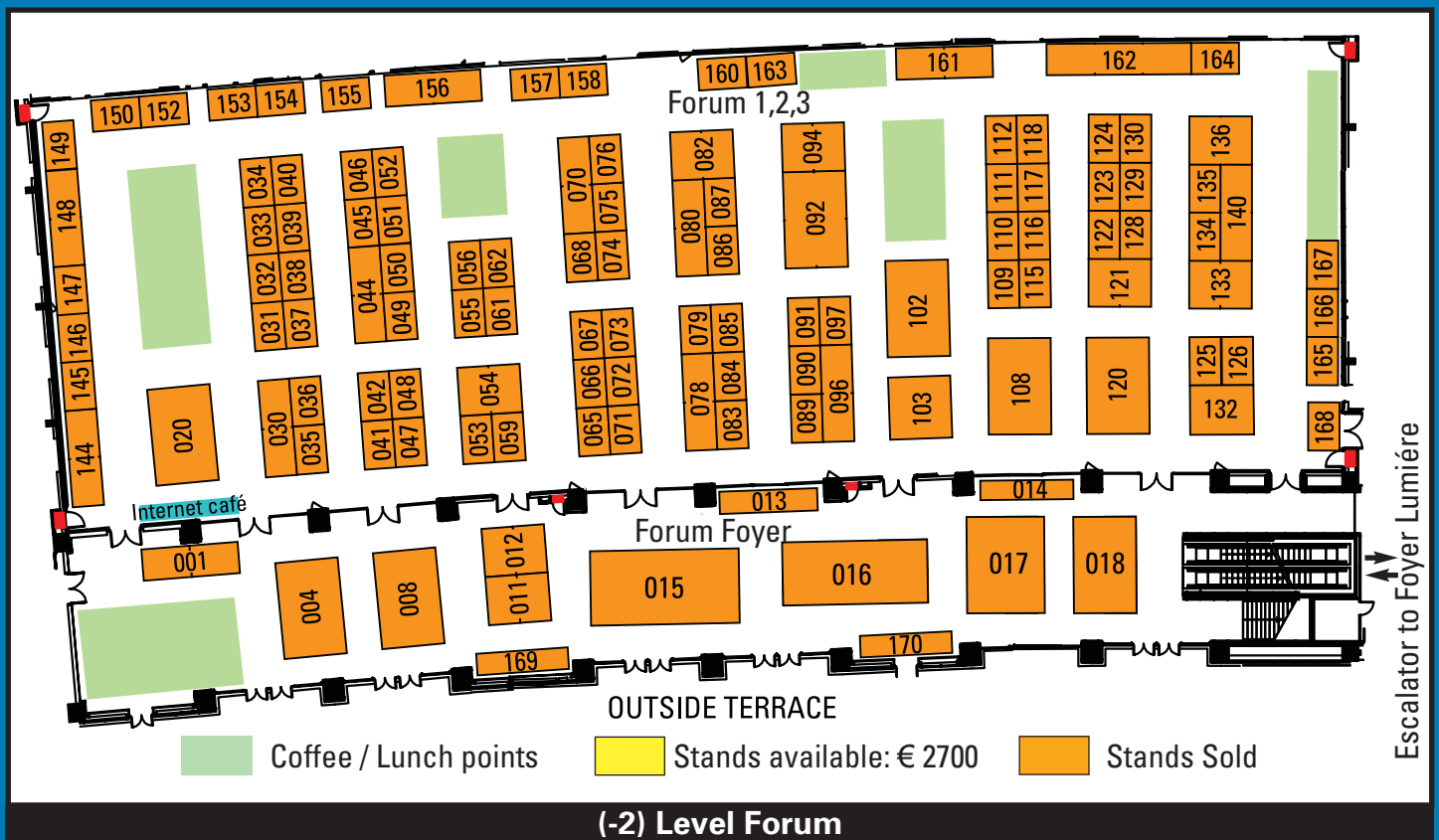
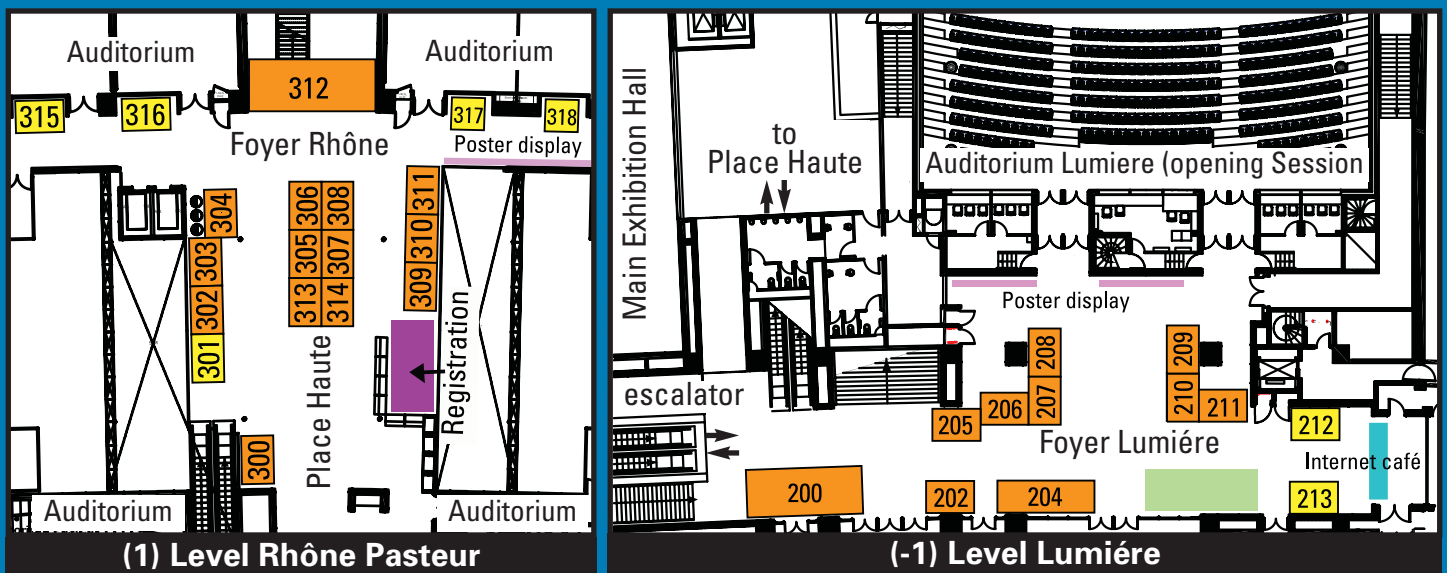
Various opportunities are available to sponsor meals, apéritifs, receptions and coffee breaks; this is a pleasant and memorable way of bringing your company to the attention of the international delegates. For further details of the Exhibition and/or sponsorship opportunities, please contact:

Mr Gaël Bozec

Email: sales@hydropower-dams.com

Tel: + 44 (0) 20 8773 7250 ~ Fax: + 44 (0) 20 8773 7255

Aqua-Media International PO Box 285, Wallington, Surrey SM6 6AN, UK



HYDRO 2009 EXHIBITORS

ABB AG Power Generation, Austria	• 094	Water Power & Dam Construction, UK	• 303
Acotec N.V., Belgium	• 032	ISL Consulting Engineers, France	• 147
Adams Schweiz AG	• 310	James Walker, UK	• 001
ADEA & Group of French Companies	• 312	Jeumont Electric, France	• 020
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Agudio SpA, Italy	• 313	Kinematics Inc., USA	• 208
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Andino Hydropower Engineering Ltd	• 038	Leroy-Somer, France	• 307
Andritz Hydro, Austria	• 015	LHG - GleitlagerKomponenten GmbH & Co. KG., Germany	• 047
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ASL AQFlow Inc, Canada	• 062	Lombardi SA, Switzerland	• 149
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HYDRO 2009: Progress – Potential – Plans

INTERNATIONAL CONFERENCE AND EXHIBITION

Lyon, France, 26-28 October 2009

REGISTRATION FORM

(Deadline for early booking discount - 14 September 2009)

This registration form is a self-billing order form, which should be sent to **NetWork Events Ltd** with payment for all items booked on the form.

By completing this form you are agreeing to the Booking Conditions. Fees are payable in EUROS (€).

It is important that each conference / exhibition participant completes a separate form

PLEASE REMEMBER TO E-MAIL A HEAD-AND-SHOULDERS PORTRAIT PHOTOGRAPH WHEN YOU REGISTER

(This will be used on a delegate recognition board in the congress centre)

Title: (Mr/Mrs/Ms/Dr/Prof/etc)	Given name:	Family name: (Surname)
Name as it should appear on badge: (To ensure that the order of your names is correct)		
Job title:		
Organization:		
Organization's postal address (inc. zip / post code and country):		
Tel (inc. country code):	Fax (inc. country code):	
E-mail address:	Mobile Tel: (This will be kept strictly confidential)	
Data Protection: <input type="checkbox"/> I do not wish any contact details to be passed to a third party.		

If you are attending the EURAFRIC PARTNERS Forum on 29 & 30 October AND any part of HYDRO 2009 - please send your full details to NetWork Events Ltd for special arrangements. Do NOT complete the rest of this form.

HYDRO 2009 ATTENDEES: FEES (EUROS)

	Until 14 Sep 09	From 15 Sep 09	Total Euros (€)
FULL PARTICIPANT FEE: Includes attendance of conference and exhibition; pack containing all documentation; CD of conference papers and printed volume of abstracts; morning and afternoon refreshments; lunches during the conference; evening social programme.	Euros (€) 940	Euros (€) 1030	
REDUCED PARTICIPANT FEE: For <u>existing</u> subscribers to <i>Hydropower & Dams</i> Subscriber No	870	1030	
REDUCED PARTICIPANT FEE + NEW H&D SUBSCRIPTION: (6 issues from No.5, 2009 + Atlas + Maps) NB: If booking early, you gain a saving of more than 40 per cent on the price of a new subscription	1020	1150	
SPEAKER FEE: Fee includes all facilities as described above for Full Participant, plus additional evening reception on Sunday 25 October. NB: This fee applies to <u>one</u> person per paper (main author or presenter)	550	550	
FIRST EXHIBITOR: (One Full Participant Fee included per 6m ² exhibition stand booking) Stand No.....	Free of charge		-
SECOND EXHIBITOR FEE: (Covers attendance of conference sessions, CD of conference papers, evening social programme and lunches) - applies to one person per 6m² exhibition space Stand No.....	680		
EXHIBITION ASSISTANT FEE: (Includes exhibition attendance, lunches, refreshments and evening social programme, but <u>not</u> attendance of the conference sessions) - applies to one person per 6m² exhibition space Stand No.....	400		
ACCOMPANYING PERSON FEE: (For family members or friends not attending the conference) fee includes three excursions with lunch, and the evening social programme. NB: Accompanying persons who do not register by completing this section are not able to attend lunches or social events. Name as it should appear on badge (inc. title Mrs/Miss/Mr/Dr/etc):	400		

I will be participating in the HTI "Acoustic Tags for Fish" Workshop - Saturday 24 and Sunday 25 October <i>This workshop should be booked direct with HTI Hydroacoustic Technology Inc, Seattle - web: www.HTIsonar.com</i>	Yes <input type="checkbox"/> No <input type="checkbox"/>
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LYON CITY SIGHTSEEING TOUR, LUNCH AND RIVER CRUISE - 12:00-16:00 hrs Sunday 25 October NB: Bookings must be firm, as refunds will not be possible I wish to book places at €82 per person	82 per person
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VISA REQUIREMENTS: If you require a VISA to attend the conference please provide us with the following passport details as soon as possible. (All details will be kept strictly confidential)	
Participant: Full Name (as written on passport)	Date of issue:/...../.....
Expiry Date:/...../.....	Passport Number:
Nationality:	
Accompanying Person: Full Name (as written on passport)	Date of issue:/...../.....
Expiry Date:/...../.....	Passport Number:
Nationality:	

PLEASE TOTAL THE COSTS ON THIS PAGE AND CARRY THEM OVER TO THE SECOND PAGE	EUROS (€)
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Hydro 2009 - Booking Conditions

The Conference **HYDRO 2009: Progress - Potential - Plans** is organized jointly by **The International Journal on Hydropower & Dams** and **NetWork Events Ltd.**

Registration and Payment

The total fees for conference registration, accompanying persons' programme, accommodation and study tours (if applicable) should be calculated and totalled in the 'Total Euros €' column on the second page of the registration form.

Payment can be by credit card or by bank transfer. Once your booking form is received, you are liable for full payment or cancellation fees.

- If you are paying by bank transfer, the registration form can be faxed to NetWork Events Ltd (please attach a copy of the bank transfer instruction). All bank charges must be paid by you.

- If you are paying by credit card, we can accept Visa or Mastercard (we regret that we do not accept payment by American Express or Diners Card).

You can also register on-line at www.networkevents.ltd.uk/events/hydro2009
A letter and invoice showing confirmed reservations and the total cost will be mailed to you to confirm your registration.

Accommodation

The conference organizers have reserved high standard accommodation in 4* and 3* categories (see registration form) some within walking distance of the Lyon Congress Centre. Please indicate on the registration form the hotel and room you require: single occupancy (one person), double-occupancy (two persons) and your check-in and check-out dates. Payments for accommodation booked by the HYDRO 2009 Secretariat must be paid in advance to NetWork Events Ltd. Please read the cancellation terms set out below.

Conference and Accommodation Prices

The conference and study tours are subject to minimum numbers as follows: the conference, 120 paying participants; the study tours and accompanying persons' programme, 20 paying participants. In the unlikely event, that fewer than the minimum number of participants make reservations for any component of the conference (including the tours), the organizers reserve the right to cancel that component and to refund the price, or alter the content (within reason) and/or the price for that component.

Cancellations

Participants wishing to cancel reservations must inform NetWork Events Ltd in writing by fax or email. Cancellation charges will be payable as shown in the Table. Full substitution of delegates, and all their booked items, after a reservation has been made is acceptable at any time, with no extra fee payable, except in the case of the Study Tours where late substitutions may not be possible and full cancellation charges may apply. Any necessary refunds (see Table below) will be made after the conference.

Liability/Insurance

All reservations made by the organizers in respect of services provided by hotels, and companies providing transport, are made by the organizers as agent, not as principal. The organizers accept no responsibility for death, injury, loss or accident, delay arising from any act or default of any person, or any other matter arising in connection with such services or transport. The organizers make no warranty in this connection. All services provided are subject to UK and local laws, and HYDRO 2009 has been organized based on UK law. The organizers cannot accept responsibility for loss or damage to personal property; delegates and exhibitors are therefore strongly advised to take out adequate personal insurance to cover such risks. The organizers reserve the right to amend any part of the conference programme or arrangements if necessary. In the very unlikely event that it is necessary to cancel any of the conference arrangements, an appropriate refund will be made and thereafter the liability of the organizers will cease.

Passport and Visa Requirements for France

France is a member of the European Union and a signatory of the Schengen Agreement. It is the responsibility of all conference participants to check their own passport and visa requirements. Please contact the French Embassy in your country if in doubt about requirements. Some information about visa applications can be found at: www.diplomatie.gouv.fr - then click on the heading 'Going to France'.

Invitation Letters

If you require an official letter of invitation from the organizers to facilitate your visa application, please let us know at the time of registering, and send us full details of your passport - see Registration Form. In many cases, a letter from the host country may also be required. Electricité de France, one of the HYDRO 2009 supporting organizations, has kindly offered to help with this process. NB: We can only issue visa invitations to those registering for the Conference.

It is important to allow plenty of time for the processing of your visa.

Date cancellation received	On or before 14 September 2009	From 15 to 26 September 2009	On or after 27 September 2009
All fees (Conference + Exhibition)	10% of fee is forfeited	50% of fee is forfeited	No refund
Study tours	10% of fee is forfeited	No refund unless place can be resold	No refund
Accommodation	One night's accommodation charge is forfeited	No refund of the accommodation as charged in the confirmation invoice, unless the organizers are able to resell the accommodation, whereupon there will be a cancellation charge of the cost of one night's accommodation per room booked. Refunds will be made after the Hydro conference	

HYDRO 2009 REGISTRATION DISCOUNT FOR H&D SUBSCRIBERS

Reduced registration fees for HYDRO 2009 are available for subscribers to Hydropower & Dams
For details of subscribing to H&D, contact Maria Flintan: subs@hydropower-dams.com
If you do not already hold a personal subscription to the journal, you may order one at the same time as booking for the conference, and benefit from the **€70 discount** on the early booking fee.

HYDRO 2009 CONTACT DETAILS

For enquiries concerning registration and accommodation, contact:
Mrs Linda Wells, NetWork Events Ltd, The Old Manor House, Compton, West Sussex PO18 9EX, U.K.
Tel: +44 (0)23 9263 1331 • Fax: + 44 (0)23 9263 1797
Email: hydro2009@networkevents.ltd.uk

NB: Registration forms and payment must be sent to NetWork Events Ltd.

On-line registration at: www.networkevents.ltd.uk/events/hydro2009

For further details of the programme, please contact:
Mrs Margaret Bourke, Hydropower & Dams, PO Box 285, Wallington, Surrey SM6 6AN, U.K.
Tel: + 44 (0)20 8773 7244 • Fax: + 44 (0)20 8773 7255
Email: hydro2009@hydropower-dams.com • Website: www.hydropower-dams.com