











International Conference and Exhibition



HYDRO 2024

Secure technology for turbulent times

Messe Congress Graz (MCG), Austria 18 to 20 November 2024

Organized by:

THE INTERNATIONAL JOURNAL ON

Supporting organizations include:



ATCOLD



Local partners:

Verbund

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Regular updates will be posted on our website and published in *Hydropower & Dams* Email: Hydro2024@hydropower-dams.com www.hydropower-dams.com



AUSTRIA WELCOMES HYDRO 2024

Austria has a long hydropower heritage, and more than half (about 60 per cent) of the country's electricity comes from hydro. There is nearly 15 GW of hydro capacity in operation, and Austria is Europe's most active country for pumped storage, with four new pumped-storage plants under construction, including Limberg III which will be visited on one of the post-Conference tours. Several more pumped-storage projects are planned, including Kaunertal (1015 MW) in the Tyrol, and Ebensee (170 MW) in Upper Austria.

Construction of small and medium-scale run-of-river schemes is meanwhile continuing, and Verbund is also focusing on upgrading and repowering existing plants, as well as testing new storage technologies.

GRAZ AS HOST CITY

Graz, the capital of Styria, Austria, is the largest city in the province, which is a green and heavily forested region on the eastern edge of the Alps. It is located in the Graz Basin, surrounded by mountains and hills to the north, east and west.

At the heart of its old town is Hauptplatz, the medieval main square. The narrow surrounding streets blend Renaissance and baroque architecture. A funicular leads up Schlossberg, and the Uhrturm, a centuries-old clock tower.

Across the River Mur, the futuristic Kunsthaus Graz exhibits contemporary art (all these will be visited during the excursion on Sunday 17 November).

Graz is a vibrant university town. Many experts from the worldrenowned TU Graz are frequent contributors to the HYDRO conference programmes each year, and will have much to present this time, including a possible visit to the hydraulic laboratory at the University on the evening of Tuesday 19 November.





THE EVENT FORMAT

The conference aims to bring together around 1200 international delegates from at least 75 countries to discuss all topical aspects of hydropower, dam engineering and pumped-storage development Speakers will address potential and prospects, challenges of the energy transition, new technology, safety and risk, project finance and environmental issues, in 30 technical sessions.

Messe Congress Graz (MCG) is a modern, state-of-the-art conference and exhibition centre in the middle of town, within walking distance of most of the selected conference hotels.

A major technical exhibition will be held alongside the conference, and there will be plenty of networking opportunities for exhibitors to make new contacts among the delegates from all parts of the world.

TRAVELLING TO AND AROUND GRAZ

Graz airport connects with 11 countries, as well as many Austrian cities, including the capital Vienna (flying time of 1 hour), and Munich, Germany. For those flying in to the major international airport in Vienna, there are two convenient options to reach Graz:

Inter-city train: There are regular train services from Vienna Airport to Graz, which take approximately 3 hours. The journey is scenic, providing views of picturesque landscapes. https://www.raileurope.com/en-gb/destinations/vienna-airportgraz-train Approximate price: € 40

Bus: Another option is to take a Flixbus. This service is convenient and economical, providing a good alternative for those who prefer road travel. https://www.flixbus.co.uk/bus-routes/vienna-graz Approximate price: € 25

Local transport in Graz: HYDRO 2024 delegates will be entitled to purchase discounted local transport tickets (≤ 10 , which is about 30 per cent of the regular price) via the registration site.





PRE-CONFERENCE EVENTS ON SUNDAY 17 NOVEMBER

Workshop on fish protection at hydro plants

Led by Prof Markus Aufleger, University of Innsbruck, Austria

This half-day workshop will address technical measures to improve fish protection and ensure safe fish passage from the area upstream of hydropower plants to the area downstream. Various typical intake situations at hydropower plants will be discussed, highlighting the different available technical solutions, their advantages, and disadvantages.

The workshop will target hydropower plant operators, engineering firms, and regulatory authorities. It will also include contributions from developers and researchers in the field.

Seminar on pumped storage

Led by Dr Miroslav Marence, IHE-Delft, Netherlands, and Anton Schleiss, Emeritus Professor, EPFL, Switzerland

As more intermittent renewable sources of energy come on line, the role and benefits of pumped storage are becoming increasingly important worldwide. Around 40 countries now have pumped-storage schemes under construction or planned, and there are varying degrees of experience worldwide. While pump-turbine technology is advancing rapidly, innovative approaches are also being adopted for project layouts and civil works, such as the repurposing of disused mines, a pilot scheme for underground pumped hydro, and the use of seawater, for example. Experts will present talks and encourage discussion on all these topics during this full-day event.

• Seminar on building information modelling (BIM) Led by international consultants and software specialists

Applications of BIM now encompass numerous aspects of hydro plant planning, site investigations, design, construction, operation, maintenance, safety andlifecycle management. To maximise knowledge and understanding of the role this technology will play in advancing hydro developments of the future, this seminar will comprise lectures and interactive panel discussions on key industry topics. Knowledge-sharing among international experts will be encouraged, on the successes and challenges of implementing BIM.

Training workshop on small hydro Led by Vincent Denis, Myhlab, Switzerland and Pierre Duflon, Andritz Hydro, France

The full day Small Hydro Workshop will see some changes this year. While the objective of providing the technical bases for the evaluation and realization of small hydro plants remains the same, new presenters from the industry and of the consulting worlds will extend the field of applications to small pumped storage, to the hybridization of energy production with other renewable and intermittent sources plus batteries, and to the stabilization of small networks. A reminder of the basics of hydraulics and its classic applications, illustrated with numerous examples, will lead participants towards applications complementary to the sole production of energy. Participation will be encouraged with some group exercises.

CONFERENCE INTERNATIONAL STEERING COMMITTEE

M. Abebe, Ethiopia D. Aelbrecht, France H.I. Aker, Türkiye M. Aufleger, Austria L. Berga, Spain P. Boeriu, UNESCO-IHE R. Boes, Switzerland D. Brox, USA R. Bucher, Germany R.C. Charlwood, USA G. Cloete, Namibia T. Coe, UK V. Denis, Switzerland L. Deroo, France D. Develay, Belgium J-M. Devernay, France M. De Vivo, France

P. Duflon, France M.R.H. Dunstan, UK P. Erbisti, Brazil P. de Félix, France J. Freitas, Portugal R. Grether, Germany K. Grubb, UK P. Gruber, Switzerland J. Gummer, Australia W. Hakin, Australia H. Harreiter, Austria M. Heiland, Germany A. Hughes, UK R.E. Israelsen, USA Ø. Johansen, Norway K. Jorde IEA (Austria) H. Kling, Switzerland

A. Kumar, India T. Kunz, Switzerland F. Lempérière, France K. Laksiri, Sri Lanka L. Lia, Norway M. Lino, ICOLD (France) Liu Heng, China E. Malicka, Poland M. Marence, The Netherlands P. Mason, UK J. Mayrhuber, Austria L. Mouvet, Switzerland A. Nombre, Burkina Faso A. Noorzad, Iran H. Obermoser, Switzerland M.A. Oliveira, Portugal A. Palmieri, Italy

D. Paschini, France B. Pelikan, Austria J. Plummer Braeckman, UK B. Popa, Romania P. Pradhan, Nepal P.J. Rae, Canada J. Reynolds, UK M. Rogers, USA F. Coelha da Rocha e Silva, Portugal A. J. Schleiss, Switzerland S. Sparkes, Norway J. Teyssieux, France 0. Westberg, Norway D.A. Williams, UK Xu Zeping, China K-T. Yum, Republic of Korea G. Zenz, Austria

HALF-DAY CITY EXCURSION WITH LUNCH

To provide an opportunity for all international participants to have a chance to learn about the rich history and vibrant culture of Graz, as usual we have organized a city excursion, which will be on Sunday 17 November.

There will be time to register for the conference before joining the tour at 11.00 hrs, and participants can be back in good time for any evening meetings or activities.

This will begin with a guided walking tour (or coach tour in the event of bad weather), and a chance to view the traditional architecture of the old town, and to visit to the famous Schlossberg (castle). Graz has been



CONFERENCE PROGRAMME OVERVIEW

awarded UNESCO World Heritage status. Many historical buildings have been meticulously renovated, to make them accessible to the public.

There will be a coffee stop at the Murinsel restaurant (on the river), and lunch will be taken together.

The afternoon will conclude with entrance to the modern Kunsthaus Graz, known locally as the 'friendly alien' because of its appearance, see below, which is in stark contrast to its traditional surroundings, Its design and construction was part of the 2003 European Capital of Culture celebrations.

Delegates may opt to leave the tour there, and spend time at leisure viewing the paintings, or return as a group to the Congress Centre.



| Sunday 17 November | Monday 18 November | Tuesday 19 November | Wednesday 20 November |
|---|---|--|---|
| 08.00 hrs • Access to exhibition for those with custom stands • Registration opens | 08.30 hrs Opening Plenary Session Welcome to the Conference and Opening Addresses (Aqua~Media, ICOLD, IEA, Verbund, ATCOLD) | 09.00 hrs Session 10: Africa: Potential and plans Session 11: Artificial intelligence - I Session 12: Safety of dams and hydro plants | 09.00 hrs Session 22: IEA work programmes Session 23: Fish protection Session 24: Operation, maintenance, upgrades |
| | Coffee (10.30-11.00 hrs) | Coffee (10.30-11.00 hrs) | Coffee (10.30-11.00 hrs) |
| 09.30 hrs • Small Hydro Workshop • BIM Seminar • Pumped-storage Seminar • Workshop on Fish Protection (rooms to be announced) | Session 1: FPV and hybridization Session 2: Hydro machinery - I Session 3: Civil works - Design and upgrades | Session 13: Cross-border schemes Session 14: Artificial intelligence - II Session 15: Disaster risk management | Session 25: Penstocks Session 26: Managing sedimentation Session 27: Electrical engineering - I |
| 11.00 hrs Departure of cultural excursion in Graz with lunch 14.00 -19.00 hrs Exhibition set-up for all exhibitors 19.00 hrs Meeting of Chairpersons 19.45 hrs Briefing for Chairpersons and Speakers (Room 15, MCG) 20.15 hrs Reception for Chairpersons and Speakers (Seifenfabrik, a historical building in Graz, formerly a soap factory) | Lunch (12.30-14.00 hrs) | Lunch (12.30-14.00 hrs) | Lunch (12.30-13.30 hrs) |
| | Session 4: Financing hydropower development Session 5: Hydro machinery - II Session 6: Civil works construction | Session 16: Pumped storage - II Session 17: The EU iAMP initiative (hydropower digitization) Session 18: Spillways, gates and valves | Session 28: Small hydro and marine energy Session 29: Environmental and social issues Session 30: Electrical engineering - II |
| | Coffee (15.30-16.00 hrs) | Coffee (15.30-16.00 hrs) | Coffee (15.00-15.30 hrs) |
| | Session 7: Contractual and legal aspects Session 8: Pumped storage - I Session 9: Sustainable dams | Session 19: Pumped storage - III Session 20: Climate, hydrology and floods Session 21: Tunnels and underground caverns | Closing Plenary Session Key outcomes from the sessions Welcome to HYDRO 2025 and ICOLD 2025 |
| | Evening: Welcome Reception Stefanien Hall and Beethoven Foyer (Old) Congress Centre, Graz | Networking party in the Exhibition areas (Apéritifs and snacks after the sessions) | HYDRO 2024 Closing Dinner Messe Congress Graz (transformed from its daytime use!) |

All Conference sessions and the Exhibition will be at the Messe-Congress Graz. Transport will be organized to the Speakers' Reception on Sunday, and the Welcome Reception for all participants on Monday. Coffee break times shown here are approximate, and may alter slightly depending on the final length of the sessions.

Monday 18 November - Morning

Plenary Opening Session

Dopening addresses from AMI, ICOLD, IEA, Verbund, ATCOLD and others.

- - - Coffee Break and Opening of the Exhibition - - -

Session 1: FPV and hybrid projects

Co-chairs: Luc Deroo, ISL, France; Dr K. Laksiri, CEB, Sri Lanka

- An economic model for revenues of the joint operations of Génissiat hydro plant and a battery Q. Boucher, R. Guillaume and F. Grand Perret, SuperGrid, France; V. Piron and B. Graff, CNR, France
- Designing a floating solar powerplant: Analysing historical reservoir data for safe mooring and site selection *R. Suarez Barrera, Multiconsult, UK*
- Evaluation of a hybrid PSP, PV and BESS system concept Dr S. Kadam and T. Eiper, Andritz Hydro GmbH, Austria
- Solar-hydro hybrid optimisation studies to improve dry season generation in Liberia - B. Hakin, T.C. Yancy, Liberia Electricity Corporation Project Implementation Unit (PIU), Liberia; S. Lacroix, Artelia Group, France; M. Lacey, WestGlen Consult, UK
- The use of static frequency converters for combining pumped storage with BESS *D. Etxebarrieta, Ingeteam, Spain*

Session 2: Hydraulic machinery - I

Chairperson: Prof Cécile Munch-Alligné, HES/SO, Switzerland

- A comparative analysis of the vibration behaviour of tilt-pad and spring-pad bearings in hydropower turbines - S. Kandukuri, V. Shanbhag and R. Schlanbusch, NORCE Norwegian Research Centre AS; Grunde Olimstad, Å Energi AS, Norway
- Coupling monitoring of vibrations and dynamic efforts in hydro turbine operating rings for sustainability and performance of hydroelectricity – J. Cavalier, A. Alarcon, F. Hars, O. Mousseeff and P. Maruzewski, EDF Hydro, France
- Non-intrusive monitoring of erosive cavitation C. Badina, O. Ernst, P. Maruzewski, EDF-DTG, France; C. Ioana, GIPSA LAB; R. Fortes-Patela, LEGI, France
- Customized design optimization of a Francis turbine with massive erosion damage: Development of a high-load and part-load runner J. Schiffer and H. Jaberg, Jaberg & Partner GmbH; H. Benigni, University of Technology Graz, Austria; R. Prirschl and I. Giersemehl, Kochendörfer Hydro, Germany
- CaVision monitoring and quantifying the cavitation level in hydro powerplant components O. Pacot, S. Cosandey, P. Roduit, D. Wannier, and C. Münch-Alligné, HES-SO Valais/Wallis, Switzerland; S. Stojanovic-Roth, L. Mayencourt and S. Cosandey, Hydro Exploitation SA, Switzerland
- Towards enhanced hydropower efficiency: Entropy-based analysis of flow losses in the Asomata powerplant's Francis unit - Dr. I.E. Ohiemi and A. McNabola, Trinity College Dublin, Ireland
- Enhancing hydropower efficiency and safety: Lessons from global projects R.D. Aftab and T. Pendrey, Stantec, UK; R. Israelsen, Stantec, USA

Session 3: Civil engineering design and upgrades

Chairperson: Michael Rogers, Stantec, USA and Hon President, ICOLD

- Mitigating the Champagne effect: A novel intake structure design for advanced-CAES energy storage in Australia - Robert Klar, I. Mora-Robles and R. Fritzer, ILF Consulting Engineers Austria GmbH; D. Brown and A. McGillis 2HYDROSTOR, Canada
- The Masinga dam heightening project on the Tana river in Kenya -M-L. Petitpain, S. Shaiek and X. Mayau, ISL, France; S. Erpicum, Université de Liège, Belgium, ISL, France
- Increasing storage capacity at the Sans Souci dam in Mauritius F. Del Rey, Hydroplus, France; S. Mazard, ISL, France
- Automatic tailwater regulation for increasing head in low to medium head hydropower plants - E. Mazzocchi and S. Sayah, Lombardi Consultants; M.R. Camarena, Hydro PowerPlus International, Canada
- Special concrete for highly corroded areas in hydraulic structures D. Niepmann, Imerys Murg GmbH, Germany

--- Lunch Break in Exhibition Hall ---

Monday 18 November - Afternoon

Session 4: Panel - Financing hydropower development

Chairperson: Luciano Canale, European Investment Bank, Luxembourg

Opening presentation:

Challenges in financing hydropower: The EIB lending approach - L. Canale, EIB, Luxembourg

A panel discussion will follow on the financing of both greenfield schemes and upgrades. The focus will be on innovative financing approaches. The panel of speakers will represent key players in hydropower financing, including public and private lenders, industrial sponsors, transaction advisors, corporate financiers, and experts in financial security (risk guarantees).

Session 5: Hydraulic machinery II

Chairperson: Daniel Paschini, EDF, Peru

- Experimental lab investigation of hydroabrasion damage in a Pelton turbine bucket-base F. Fahrni, T. Staubli, E. Casartelli, Lucerne University of Applied Sciences and Arts, Switzerland
- Stegenwald hydro plant: A classical vertical Kaplan turbine with concrete half spiral in horizontal arrangement with straight draft tube - H. Benigni, TU Graz; J. Schiffer, Jaberg & Partner GmbH; G. Penninger and H. Badura, Verbund Hydro Power GmbH; C. Witti and M. Pühringer, Global Hydro Energy GmbH, Austria
- Innovative applications of hydro turbines in existing infrastructures: Bridging sustainable energy solutions with advanced material technology -F. Altendorfer, Gugler Water Turbines GmbH, Austria
- Augmenting hydropower digitalization with optimum sensors for turbine condition monitoring - B. Paudel and A. McNabola, Trinity College Dublin, Ireland; B. Maheshwari and M. Crespo Chacon, Easy Hydro Solutions Ltd, Ireland
- ▶ Innovative PID governor upgrade for reaching SFC regulation stability at the Alpaslan plant D. Dolenc, J. Pekolj, U. Ješe, Litostroj Power, d.o.o., Slovenia
- Numerical Investigation of the effect of hub and shroud contours on Francis turbine performance O. Bendeş, B. Yilmaz, F. Koç and M. Demir, Türkiye Elektromekanik Sanayi A.Ş. (Temsan), Türkiye; J. Schiffer, Jaberg & Partner GmbH; H. Benigni, TU Graz, Austria
- Revolutionizing low-head hydropower: The promise of turbulent vortex turbines S.A. Legesse, W.J. Buydens, and L. Berben, Turbulent Hydro NV, Belgium; M.A. Marence, IHE-Delft, The Netherlands
- Hydraulic imbalance and blade crack detection in a 32 MW horizontal Francis turbine supported by ISO 13373-7 - E. Lima, T. Kleis, R. Matos, E. Ancini, T. Matsuo and M. Nishioka, AQTech Power Prognostics, Brazil

Session 6: Civil engineering case studies

Chairperson: Dr Gerald Zenz, TU Graz, Austria, and President, ATCOLD

- Applications of geomembranes in the heightening of dams G. Vaschetti, V. Verdel, and M. Scarella Carpi Tech, Switzerland
- Forming on the limits J. Haas, Doka GmbH, Austria
- Diaphragm walls, both as seepage barrier and for protection of the spillway at Montegrande dam (Dominican Republic) - M. Baltruschat, J. Sobrino, Bauer Spezialtiefbau GmbH, Germany; B. Luz, Bauer Foundations Corp., USA
- InSAR: Monitoring individual dams and clusters of reservoirs: The cases of Lei Valley (Italy) and Fragant valley (Austria) - S.R. Presezzi, TRE Altamira, Italy
- SITCOM: a tool for predicting the behaviour of hydraulic structures J-B Guaus and E. Buchoud, EDF, France
- Repairing canals under flowing water: Sibelonmat[®] and Sibelonzip[®] - G. Vaschetti, A. Jackson and V. Verdel - Carpi Tech, Switzerland

--- Coffee Break in Exhibition Hall ---

Session 7: Contractual and legal aspects

Chairperson: Peter J. Rae, Consultant, Canada

Future trends in hydropower project structuring, the relative merits of different contractual arrangements, and legal aspects, will be among the topics to be addressed by international experts in the profession. Presentations will include:

- Risk management and mitigation for IPPs in long-term hydropower construction projects under the BOOT model - A. López Ortiz and J. Ahmad, Mayer Brown International LLP, UK
- Legal and institutional aspects for hydropower development in Nepal - G.P. Kayastha, Chilime Engineering and Services Co Ltd; S.P. Shrestha, Laxmi Shrestha & Co (Pvt) Ltd, Nepal
- (Other papers to be announced shortly)

Session 8: Pumped storage - 1

Chairperson: J. Mayrhuber, Verbund, Austria (TBC)

- The Limberg IIII project in Austria T. Etzer, Verbund; H. Eichiner, AFRY; P. Ganeider, ARGE PSW Limberg III, Austria
- Loch Kemp storage, a new 600 MW pumped storage hydro on the shores of Loch Ness, Scotland - T. Clegg, Fichtner, UK; B. Stabel, Fichtner, Germany
- Feasibility study and business model for the Mujib pumped-storage scheme in Jordan - R. Fritzer and J. Bliem, ILF Consulting Engineers Austria GmbH, Austria; L. Qoaider, H. Sa'deh, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Jordan
- Enabling pumped storage at an existing 60 MW power station in Spain - C. Herrero Prada, Iberdrola Renovables, Spain; B. Nennemann, Andritz Hydro Canada Inc, Canada
- Extension of the Kruonis pumped-storage plant B.M. Wilczek, H. von Büren, Fichtner GmbH & Co KG; E. Martinaitis, AB Ignitis Gamyba, Lithuania
- Pumped-storage solutions for small hydropower M. Schober, Gugler Water Turbines GmbH, Austria
- Application of digital governors in reversible hydro plants: Challenges faced in the field *C. Bühler, S. Pellegrini; A. Alves Jr, and M.A. Ferreira, Reivax S/A, Switzerland*

Session 9: Sustainable dams

Co-Chairs: Dr Malcom Dunstan, MD&A, UK; and Marco Conrad, AFRY, Switzerland

ICOLD's Technical Committee T (Prospective and new challenges for dams and reservoirs in the 21 Century) has been tasked to develop an initiative focused on 'sustainable dams'. This work integrates inputs and coordination with other relevant Technical Committees of ICOLD including the ongoing work of Technical Committee D (Concrete dams). One of the goals is to draw the attention of dam engineers to the analysis and assessment of the sustainability of dams in their full life cycle, taking into consideration the three basic domains: environmental, social and economic. This session, led by members of the various Technical Committees and by selected external experts, will report on key findings identified so far and ongoing plans for further work ahead.

Tuesday 19 November - Morning

Session 10: Africa

Chairperson: Michael Abebe, Eastern Nile Regional Technical Office (ENTRO), Ethiopia; Co-chair to be announced

The session will provide a discussion and update on the potential, plans, and current schemes underway throughout the African continent, including Ethiopia, Uganda, Nigeria, Mozambique, Cameroon, Liberia and others.

All presentations will be announced shortly, and will include:

- Overview of Ethiopia's current developments and plans *M. Abebe, ENTRO, Ethiopia*
- Optimisation study for the development of the hydroelectric potential of the Sanaga basin in Cameroon Dr T. Nsangou, A. Simplice Towa, G. Sipeuhou Simo, J. Chamberlain Mbarga, Electricity Development Corporation (EDC), Cameroon
- Assessment of the generation deficit of Cameroon's power sector: Contribution from additional hydro or solar capacity J. Kenfack, SolarHydrowatt Sarl; L. Djoumessi Sonhafouo, ENEO and A. Bouba Oumarou, ARSEL, Cameroon

Session 11: The roles of artificial intelligence - BIM

Chairperson: Pravin Karki, World Bank

- Integrated BIM design for the construction phase at the Limberg III pumpedstorage plant in Austria - M. Lang, Tractebel Engineering GmbH, Germany
- BIM for the future: The case of Snowy 2.0 *N. Kostraby, Snowy Hydro Ltd, Australia*
- BIM Power of data: The real added value S. Oettinghaus, Tractebel Engineering GmbH, Germany
- BIM, and BIM in hydropower: From a revolutionary tool to every-day use - C. Lawton, D. Viero, J. Stephen Riley, M. Leite Ribeiro, Gruner Stucky Ltd, Switzerland
- Leveraging BIM for the upper reservoir at the Happurg pumped-storage plant - A. Bauer, F. Moosbrugger, S. Krstic-Peric, C. Seidl and M. Smesnik, AFRY Austria GmbH, Austria

Session 12: Dam safety

Chairperson: Michel Lino, President of ICOLD and ISL, France

- The Mtkvari hydropower project in Georgia: Dam safety upgrade of a project under execution - M. Aykut, S. Micheloud, G. Negrinelli, M.P. Bieri, L. Galdava, and T. Kopadze, Gruner Stucky Ltd, Switzerland
- Dam safety management at Bakun hydro plant in Sarawak, Malaysia - Ting Tiew Whong, Jonathan Tiong Kung Yew, Sarawak Energy Berhad, Malaysia
- Instrumentation of the Xayaburi hydro plant for safety evaluation - Bhak Rakbamrung, Sippawut Tavaranun and Dr M. Raeder, CK Power Public Company Ltd, Thailand
- Advancing dam and powerplant safety T. Deprez and M. Sims, Ecocoast, UAE and UK
- Improving underwater dam safety through waterproofing and strengthening of masonry and concrete dam - R. Pandey and Soumyadip Pramanik, Dynasoure Concrete Treatment Pvt Ltd, India
- Lessons learnt at Kariba dam: Automatic and manual measurements for dam monitoring - A. Arigoni, A. Mellal, I. Fent, and B. Quigley, Gruner Stucky SA, Switzerland; M. Munyaradzi, S. Mhlanga, A. Nkweendenda, and S.D. Mukuwe, Zambezi River Authority, Zambia
- Dam monitoring and dispatch centre for hydro power plants on the Drin river in Albania - K. Vrdoljak and B. Pavlović, Končar Engineering Ltd., Croatia; F. Bundo, Korporata Elektroenergjitike Shqiptare Sh.a., Albania,

--- Coffee Break in Exhibition Hall ---

Session 13: Cross border and regional projects

Chairperson: Jean-Michel Devernay, Consultant, France

An increasing number of transboundary schemes, especially in Asia and Africa, are bringing huge economic benefits to countries, as well as boosting regional development based on the use of clean renewable energy.

Presentations from several parts of the world will look at some of the complexities which may arise, and the success stories which result from cross-border collaboration.

- Harnessing Nepal's hydropower potential: A catalyst for cross-border energy collaboration in South Asia A. Nepal, USAID Urja Nepal Program, Nepal
- (Other papers to be announced shortly)

Session 14: The roles of artificial intelligence - digital twins

Chairperson: (to be announced)

- Advances in deep learning for fluid mechanics for predicting complex water flow phenomena in water structures - M. Takáč and F. Adjailia, DimensionLab s.r.o, Slovakia; P. Breza, RFB s.r.o.; M. Ružička and B. Kršák, Technical University of Košice, Slovakia
- Developing an advanced machine learning framework for predictive maintenance in hydropower plants: Targeting mechanical equipment failures - B. Maheshwari and M. Crespo Chacon, Easy Hydro Solutions Ltd; B. Paudel and A. McNabola, Trinity College Dublin, Ireland
- Novel digital twin framework for determining design flows for dam safety *K. Foster, DHI AB, Sweden*

- Benefits of a digital twin during the commissioning of the high-head 880 MW Gouvães pumped-storage powerplant - C. Landry, M. Dreyer, and C. Nicolet, Power Vision Engineering Sàrl, Switzerland; L. De la Torre Abietar and R. Chacón Llorente, Iberdrola, Spain; R.W. Richter and G. Zenz, Graz University of Technology, Austria
- Benefits of digital twins for hydro plants M. Matschl, T. Nemetz Ocean-Maps GmbH, Austria
- Fighting off corrosion at EDF Hydro: Clever solutions and promises of robots J. Schwach, EDF-CIH, France

Session 15: Disaster risk management

Chairperson: Prof John M. Reynolds, Consultant, UK

- Integrated geohazard assessments in managing risks for hydropower projects in glacierised high mountain environments: Implications for insurance - Prof J.M. Reynolds, Reynolds Geo-Solutions Ltd, UK
- ▶ Hydropower in the Himalayas: Approaches to overcoming natural hazard risks - Dr N. Chapplow, Climate Change and DRM, The World Bank Group
- (Other papers to be announced shortly)

--- Lunch Break in Exhibition Hall ---

Tuesday 19 November - Afternoon

Session 16: Pumped storage II

Chairperson: Dr Miroslav Marence, IHE-Delft, Netherlands

- Risk assessment of the middle block of the Vianden pumped-storage plant -F. Luszczak and W. Schitter, AFRY Austria GmbH, Austria; T. Hollerich and G. Nosbusch, SEO, Luxembourg
- Decentralized pumped-storage solutions D. Fleck and E. Wielinger, Andritz AG, Austria and P. Duflon, Andritz Hydro, France
- Designing Snowy 2.0 to meet the demands of the future energy market in Australia - J. Dymond, S. Shah, Snowy Hydro Ltd, Australia
- Design and construction of the Hatta pumped-storage hydropower plant - F. Naeher, D. Leitzig, Consortium: Strabag-Ozkar-Andritz, UAE
- Emergent risks in the pumped hydropower sector and approaches for management, B. Tilbury SMEC, Australia
- HiDeStor hidden storage potential using medium and small pumped-storage powerplants - Pr. Dr. C. Münch-Alligné, Dr. O. Pacot, L. Moret, HES-SO, Switzerland; Ing. V. Denis, A.Bullani and Ing. A. Choulot, Mhylab, Switzerland
- Increasing system adequacy with integration of pumped storage: Renewable energy to reduce thermal generation to meet RE targets in Thailand M. Thanaphon, and T. Nat, EGAT, Thailand

Session 17: Digital solutions for operation and maintenance of existing hydropower

Co-chairs: Ewa Malicka, TRMEW, Poland; and Ingo Ball, WIP, Germany

Hydropower represents one sixth of global electricity generation and provides a significant contribution to grid flexibility and security, as it can modulate generation very rapidly and be stopped and restarted smoothly.

The current hydro fleet in the EU is aging, and it is estimated that 50 per cent of it will require upgrade actions by 2030. In particular, modernisation related to digitalisation is required in the short to medium term, to provide enhanced services, increase grid flexibility, environmental and socio-economic sustainability and to foster the green and digital transitions in Europe. In this session, three EU-funded projects which are working on this topic, will be described, including their objectives, approaches, and results already achieved.

- Digital solutions for existing hydropower operation and maintenance: Three European sister projects *Prof A. McNabola, Trinity College Dublin, Ireland*
- Predictive maintenance modelling of hydro turbines *B. Paudel, Trinity College Dublin, Ireland*
- Application of computational fluid dynamics in digitalization I.E. Ohiemi, Trinity College Dublin, Ireland

- Flow and available power prediction and forecasting model development *Prof B. Popa, POLI, Romania*
- Digital twin and a decision-making tool for hydro plants A. Zompras, Acceligence Ltd, Cyprus; and N. Crippa, MAS Consulting Srl., Italy
- Hybridization modelling (power-to-hydrogen) S.R. Carro, CARTIF, Spain

Session 18: Spillways, gates and valves

Chairperson: Dr Peter Mason, Damsolve, UK Co-chair to be announced

Spillways:

- The hydraulics of 3D aerators with lateral enlargements N. Lama, Hydro Lab Pvt Ltd, Nepal
- Effects of flood duration on scour within dissipaters downstream of dams and hydropower outlets - S. Maleki, Bechtel, Australia; V.Fiorotto, Formerly, University of Trieste, Italy
- Dam flood routing capability: an example of reservoir discharge facilities rating curves determination through dedicated CFD simulations - S. Citterio, C. Fregoni, C. Frosio and L. Papetti, Frosio Next S.r.I., Italy

Gateworks:

- Hydrodynamic test of spillway radial gates at Hidroituango dam in Colombia - J.D. Vera R., J. Eduardo Guerra L., EPM; J.D. Jaramillo, R&DC; F. Botero, Universidad EAFIT; J.F. Santa, Universidad Nacional; S. Sosa Palacio, EPM, Colombia
- Increasing the safety of the Limberg III powerplant: Numerical investigation of emergency shut-off valves - S. Höller and H. Jaberg, Prof. Jaberg & Partner GmbH; H. Benigni, TU Graz; P. Dörig, Adams Schweiz AG, Austria
- Application self-lubricating bearings in spillway radial gates P. Pereira, Federal-Mogul DEVA GmbH, Germany; T. Siguemoto, Engineering Consultant, Brazil
- Characterization of the dynamic response and accumulated fatigue damage of radial gates subjected to flow induced vibration - E. Cerezo, M. Rodríguez and D. Galbally, Innomerics SL; A. Suárez, Iberdrola Generación SA, Spain

--- Coffee Break in Exhibition Hall ---

Session 19: Pumped storage III

Chairperson: Prof Bogdan Popa, National University of Science and Technology Politehnica Bucharest, Romania

- Optimizing ranking and development scenarios for traditional and seawater pumped storage: A multi-criteria analysis approach - J. Alterach, A. Abbate, M. Volonterio, Ricerca sul Sistema Energetico - RSE S.p.A., Italy
- Verification on technologies to the seawater pumped storage hydropower, based on actual operation of Okinawa plant - Y. Nakahara, Y. Ando and Y. Yoshino, Electric Power Development Co Ltd, (J-POWER), Japan
- Innovative dam design for low-head seawater pumped hydropower storage in the North Sea, Lasantha Jayasinghe Arachchige, Delft University of Technology; - M. Marence, IHE Delft Institute for Water Education, The Netherlands
- Salt water: Challenges and opportunities P. Duflon, M. Mayr and E. Wielinger, Andritz, France
- Potential and feasibility of large scale pumped storage in the Middle East - T. Pinchard, EDF-CIH, France
- Optimal pumped hydropower projects, a tailor-made, automized screening algorithm; application and results in the United Kingdom - S. Schroers, P. Thapa, S. Palt and P. Schäfer, Fichtner GmbH & Co KG, Germany,
- Grid stability and dynamic power regulation of units A. Lechner, Andritz Hydro GmbH, Austria

Session 20: Climate and hydrology

Chairperson: (to be announced)

- Remote sensing based river inflow and flood forecast system at the Koldam hydro station *R. Prasad Ahirwar, L. Junas and S. Puri, NTPC, India*
- Climate change: Extreme precipitation and El Niño Occurrences affecting Sarawak's hydropower reservoir operation - Chia Fuk Jing and S. Nadya, Sarawak Energy Berhad, Malaysia

- ▶ EDF HYDRO engineering and its multiple skills at the service of hydroelectric operators in supporting their operational management: A case study in Mexico D. Puygrenier, EDF-Hydro CIH, France; A, Valery, EDF-Hydro DTG; R. J. Mendoza Blancarte, CFE, Mexico
- Seasonal water inflow forecasts for hydropower operation and maintenance practices: a case study - M. DallAmico, Waterjade Srl, Italy
- The impact of El Niño Southern Oscillation (ENSO) on the Zambezi basin and its implication for water availability for hydropower generation in the hydro year 2023/24 J. Matola and M. Mahunguana, Hidroeléctrica de Cahora Bassa (HCB), Mozambique
- Detection of climate change trends in electricity production for Brazilian hydropower system - J.M. Damazio, M.A. Santos, L.K. Takashi, Federal University of Rio de Janeiro/COPPE, Brazil
- Hydrology impacted by climate change and IHA Resilience Assessment on the Masinga dam heightening project, Kenya - N. Molin, M-L. Petitpain, ISL Ingénierie; P. Biedermann, Alpage SARL, France
- Water inflow analysis based on climate change scenarios: Case studies for hydropower revamping - M. DallAmico, Waterjade Srl, Italy

Session 21: Tunnels and tunnelling

Chairperson: Dean Brox, Consultant, Canada

- Optimization of underground powerhouse (caverns) for pumped-storage projects J. Mayrhuber, G. Penninger, E. Wagner, C. Rieder and K. Zikulnig, Verbund Hydro Power GmbH, Austria
- Behaviour and the development of potential failure modes for existing hydro electric rock tunnels constructed in seismically active regions - A. I. Bayliss, Stantec, Canada
- Coupled transient stress-seepage analysis of shotcrete-lined hydrotechnical tunnel *M. Marence, IHE Delft, The Netherlands*
- ▶ Key principles for the planning, design, construction, operations, and inspection of hydropower tunnels: 2024 update from lessons learned in the industry *D. Brox, Dean Brox Consulting Ltd., Canada*
- The plugging of Ituango's right diversion tunnel: An innovative solution for an unprecedented problem N.A. Londoño, G. J. Lacouture, Integral SA, Colombia

Wednesday 20 November - Morning

Session 22: IEA session

Co-Chairpersons: Alex Beckitt, Hydro Tasmania and Interim Chair, IEA Hydro; and Klaus Jorde, ExCo Secretary, IEA Hydro

The session will include an update on current IEA Hydro activities, and priorities in the current work programme. After an overview of IEA's perspective on global hydro prospects, there will be presentations on some of the specific tasks of IEA working groups, for example on various environmental topics, the development of large catchment areas, and innovative approaches to hydro developments and upgrades. Details of the speakers and presentation titles will be announced shortly. Contributions will include input from Norway and China.

Session 23: Fish protection

Chairperson: Dr Markus Aufleger, University of Innsbruck, Austria

- Fish protection and guidance at hydropower intakes with novel curved bar rack-bypass systems: lessons learnt from two Swiss case studies *I. Albayrak, D. F. Vetsch, R.M. Boes, VAW, ETH Zurich, Switzerland; C. Leuch, Hunziker, Zarn and Partner AG, Aarau, Switzerland*
- How to model the transport of total dissolved gas downstream of hydropower outlets - S. Sabil, M. Carolli, H. Sundt, SINTEF Energy Research; M. Szabó-Mészáros, Budapest University of Technology and Economics, Hungary
- Comparative study of fish passage conditions via test rig experiments: Propeller versus double-regulated Kaplan turbines - P. Romero-Gomez, R. Peyreder, Andritz Hydro GmbH, Austria; and, Z.D. Deng, Pacific Northwest Nat. Laboratory, USA
- Innovative design and development of PIT system: Unveiling a first project in the Mekong river, Lao PDR - Thanasak Poomchaivej, Nattavit Thanakunvoraset, Suthathip Khongthon, M.E. Raeder, CK Power Public Company Ltd, Thailand

- Innovative electric fish barriers: concepts and examples of application - B. Brinkmeier, HyFish GmbH, Austria; and Prof M. Aufleger, University of Innsbruck, Austria
- Monitoring results and operational experience of the new fish pass 'Fishcon lock' B. Mayrhofer, Fishcon GmbH, Austria
- Meeting eel survival requirements through runner replacement and upgrades
 S. Watson and A. Schneider, Natel Energy, USA
- Innovative design of stilling basins downstream of dams and hydropower outlets considering fish protection - S. Maleki, Bechtel, Australia; V. Fiorotto, Formerly, University of Trieste, Italy

Session 24: Operation, maintenance and upgrades Chairperson: Laurent Mouvet, Consultant, Switzerland Co-Chair to be announced

- Obturation solutions for dry works on underwater installations *M. Leon, Hydrokarst, France*
- Oneflow: a condition monitoring system for hydroelectric plant equipment based on vibration, acoustics, and AI - E. Lima, T. Kleis, R. Matos, Emerson Ancini, T. Matsuo and Marcos Nishioka, AQTech Power Prognostics, Brazil
- Underwater works and saturation diving are a real, proven and effective method for the maintenance, rehabilitation and securing of dams and hydro electric power plants - D. Calderón Villegas, V. van Oosterhout and A. Van der Pennen, DCN Diving, Colombia
- Increasing perception of ROVs with optical sensors for dam inspection applications - R. Gile, Voyis Imaging, Canada
- Digitalisation of existing hydropower plants for predictive maintenance and improved efficiency, life-time and cost-effectiveness - M. Janiszkiewicz and A. McNabola, Trinity College Dublin, Ireland
- Implementation of optimal load distribution system at the Santo Antônio hydro plant: Development and results - B. Maciel Machado, R. Pereira Gosmann, L. Augusto Weiss, Reivax Automação e Controle S.A, Brazil; B.H. Brito, Instituto Federal de Tocantins, Brazil
- Monitoring 4.0: Vibration behaviour of our hydraulic turbines: from IOT measurement to maintenance decisions M. Souilliart, M. Hars, M. Kuczkowiak and M. Lys, EDF, France
- ▶ Hydraulic and operational design aspects of the rehabilitation of Gabi HPP in the Swiss Alps - M. Wickenhäuser, WSP | BG Consulting Engineers, Switzerland; A. Winkler, Global Hydro Energy, Austria; E. Dufey, Alpiq, Switzerland

--- Coffee Break in Exhibition Hall ---

Session 25: Penstocks

Chairperson: Helmut Obermoser, AFRY, Switzerland (TBC)

- Analysis and modelling of pressure pulsations in the inlet piping of Montézic hydropower plant G. Pavic, Institut National des Sciences Appliquées (INSA) France; B. Lecomte, EDF, France,
- Constructing the Odorigawa power station K. Tanikawa, S.Ono, J. Sugimori and M. Kaneko, The Kansai Electric Power Co Inc (KEPCo), Japan; K. Yonezawa, Central Research Institute of Electric Power Industry, Japan
- Digitalization and internal inspection of penstocks by autonomous flying robots A. Suárez Carrio, F. Espada Moreno, Iberdrola Renovables, Spain
- Lining design and construction of vertical shafts in hydropower plants H. Wannenmacher, M. Entfellner, Implenia AG, Austria
- Penstock resonance caused by RSI pressure pulsations on Francis turbines: A case study in a revamped plant - *P. Caretti, S. Cartapani and L. Papetti Frosio Next, Italy*
- Principle of operation and application of non-intrusive ultrasonic flow meter, Crossflow™ to accurate measurements of liquid flow - D. Zobin, Daystar Technologies Inc. and Advanced Measurement and Analysis (AMAG) Inc, Canada
- Design and construction, and in-situ observations of the penstocks at Okinawa seawater pumped-storage plant *M. Kashiwayanaghi, Y. Nakahara and Y. Ando, Electric Power Development Co, Ltd; H. Murayama, PowerTech, Japan*

Session 26: Sedimentation management

Chairperson: Prof T. Sumi, Japan

- Design development and optimization for sediment management through spillway low level outlets at the Xayaburi plant - P. Mahamai, W. Nedsawang, R. Razdan andC. Boonmakaew, CK Power Public Company Ltd, Thailand
- Development of a low-cost, localized, and long-life fixed-point observation system of sediment height around gates using SBES for the safe operation of dam gates - T. Koshiba and T. Sumi, Disaster Prevention Research Institute, Kyoto University, Japan
- Integrating satellite data and discharge modelling for lifetime assessment of reservoirs with sedimentation F. von Trentini and K. Schenk, EOMAP GmbH & Co KG, Germany
- Measurement of sedimentation processes with autonomous underwater vehicles (AUV): Pilot application in an Alpine reservoir - F.M. Evers, ETH Zurich (VAW), Switzerland; A. Carrera Vinas, Subdron GmbH, Austria
- Operating experience of removing sediment with deliberate transit through hydraulic Pelton unit - P-Y. Couzon, T. Bedrune, E. Valette, EDF-CIH, France; L. Michel, EDF DTG, France
- Sediment management at Plan d'Aval dam (French Alpes): RETEX clearing of sediments in front of the bottom gate through dredging dilution across the turbines, using the Nessie robot - R. Gaillard, Watertracks; S. Caffo, EDF-CIH, France
- Sediment monitoring system R. Bachmann and R. Wimmer, Rittmeyer AG, Switzerland
- The integration of methane gas collectors into the continuous sediment transport: A possibility to avoid the release of greenhouse gases during the de-sedimentation of impounded waters - L. Gehrmann, Hülskens Sediments GmbH, Germany

Session 27: Electrical engineering I

Chairperson: Prof U. Lundin, University of Uppsala, Sweden (TBC)

- Development of scaling approaches for hydro generator cooling flow D. Noelle, V. Hildebrand and H. Pfifer, TU Dresden, Germany; B. Diebel and T. Dauch, Voith Hydro Holding GmbH & Co KG, Germany
- Solving rotor dynamic stability issues on a 88.5 MVA vertical hydro generator F. Bonačić, B. Fabro, and D. Kraljević, Končar, Croatia
- Comparing Scenario Fan Simulation (SFS) and aggregated stochastic dynamic programming (SDP) models for local medium-term hydropower scheduling V. Fjeldstad, Ø. Haugland, G. Klæboe and V. Aubin, Norwegian University of Science and Technology (NTNU), Norway
- Enhancing hydro generator monitoring systems with machine learning methods for early fault detection - H. Foroozan and O. Oreskovic, Veski d.o.o.; B. Filipovic-Grcic, University of Zagreb; I. Krnić and N. Mijalić, Dubrovnik HPP, Croatia
- Stator earth faults in hydro generators: Analysis, detection, and mitigation strategies M.G. Gokhale, N.K. Singh and P. Kumar, NHPC Ltd, India
- Hydro generator root cause analysis based on vibration and air gap monitoring data - O. Oreskovic, O. Husnjak, E. Hacek and D. Bojic, Veski d.o.o., Croatia

--- Lunch Break in Exhibition Hall ---

Wednesday 20 November - Afternoon

Session 28: Small hydro and marine energy

Co-Chairpersons: Vincent Denis, MyHlab, Switzerland; and Pierre Duflon, Andritz Hydro, France

- Adding flexibility to medium head small hydropower plants: First realization of a double-regulated diagonal (Deriaz) turbine based on a systemized hydraulic profile - V. Denis and A. Bullani, Mhylab, Switzerland
- Small hydro reliability enhancement using wireless sensor and multi-source data analytics F. Ravet, D. Nicoulaz and Y. Jacquat, Gradesens SA, Switzerland; C. Morier, N. André, SEFA SA, Switzerland

- The role that AI and gen AI can play in the management of distributed energy resources such as small hydro powerplants - A. Grubb, Microsoft EMEA, Ireland
- Kinematic assembly of the device for PM rotor magnetization, for a 600 kW generator at a low-head small hydro plant D. Pintar, I. Triplat, K. Burek-Svetec, Slaven Naå, Končar, Generatori i motori, Croatia
- Turning a small hydropower plant into a small pumped-storage plant in an energy community: Economic opportunities and technical threats - E. Marchesi and L.L. Papetti, Frosio Next S.r.I., Italy
- Investment opportunities in small hydropower projects in Uganda - D.M. Nabutsabi, Hydro Power Association of Uganda, Uganda
- Tidal range energy: Opportunities and challenges in the UK K. Gilmartin, BHA, UK

Session 29: Environmental and social aspects

Chairperson: Prof Bernhard Pelikan, Consultant, Austria

- Hydropower in the EU: Water and energy storage, industrial innovation and economic benefits - E. Quaranta, European Commission Research Centre, Italy
- Assessing water quality and phytoplankton distribution in the Mekong river before and after the implementation of the Xayaburi hydroelectric plant - Chanoppholm Klinklob, Rattee Tanatitivarapong, Thanasak Poomchaivej and M.E. Raeder, CK Power Public Company Ltd, Thailand
- Cethana pumped storage carbon footprint assessment B. Houdant and V. Chanudet, EDF, France; J. Myrtle, Hydro Tasmania, Australia
- Environmental sustainability of the area around an upper pond of a seawater pumped storage plant: A case study in Japan - M. Kashiwayanagi and T. Tobase - Electric Power Development Co Ltd, (J-POWER), Japan
- Optimizing operation schedules with strict environmental regulations for a network of hydropower plants - Y. Blum and S. Drewes, The Mathworks, Germany; J. Reis and L. Zögernitz, TIWAG, Austria
- Social responsibility and debris at your dam: How dams can hold the key in curving plastic pollution in the worlds waterways - J. McCully and P. Rollins, Worthington Products Inc, USA
- Delivering enduring benefits to impacted communities: Queensland Hydro's benefit-sharing framework for large scale pumped-storage projects C. Evans, Queensland Hydro, Australia

Session 30: Electrical engineering II

Chairperson: Dr Ralf Bucher, H & MV Engineering, Germany (TBC)

- Strategies to mitigate the effects of H2S in digital controllers applied in hydro plants: Real cases in excitation systems and speed governors - AI. J. Grzybowski Junior, A. A. Rohdem, Reivax S/A; C. Bühler and S.Pellegrini, Reivax, Switzerland
- SECRES: A secondary regulation capacity market simulator model V. Torrado Mendes, F. Brito and M. J. Tavares, EDP Gestão de Produção de Energia, SA, Portugal
- Increasing hydropower flexibility in the grid with a focus on India's energy transition S. Adhikari, S.K. Mishra and J. Pani, NHPC, India
- Multivariate analysis of hydropower plant Ø. Våland, P-T. Selbo Storli and T. Ellesfrød, Norconsult Norge AS, Norway
- Optimal hydro planning and automatic generation control in the generation centre, West Croatia - Krešimir Vrdoljak, Bruno Pavlović, Končar Engineering Ltd, Croatia; Kristian Vidmar, Mihaela Stipetić, HEP Proizvodnja Ltd, Croatia
- Pumped storage powerplants with variable speed units: Designing the electrical protection system M. Pairits and S. Vasilić, Andritz Hydro GmbH, Austria
 - --- Coffee Break in Exhibition Hall ---

Closing Plenary Session

- Session summaries and conference outcomes
- Future Aqua-Media and ICOLD events

TECHNICAL EXHIBITION AND SPONSORSHIP

A major Technical Exhibition will run alongside the HYDRO 2024 Conference, showcasing the latest developments in the hydro, dam, and related renewable energy sectors, as well as the activities of professional associations, and the services of specialist consultants, contractors and equipment suppliers.

All lunch and refreshment breaks will take place in the exhibition hall, below the conference rooms. There will be a networking party after the conference sessions on Tuesday 19 November to provide an additional opportunity for meetings between exhibitors and the international delegates.

Exhibition stands are available in units of 6 m², and custom-built units can be arranged. If you would like to book a place, we recommend that you contact our Sales & Marketing team as soon as possible to reserve your preferred position; spaces are selling fast.

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ACCOMPANYING PERSONS' EXCURSIONS

As usual, a three-day package of cultural and touristic excursions is being planned for accompanying persons (family members and partners) joining delegates at HYDRO 2024.

The length of each trip will not exceed six hours. Among the sites provisionally planned for the three trips are:

Monday 18 November

- A visit to Stift Rein a monastery, founded in 1129, with a chance to learn about handicrafts of Cistercian Monks.
- Lunch in central Graz.
- Visit to Museum der Geschichte, which is dedicated to preserving and showcasing the history of Graz and its surrounding regions.

Tuesday 19 November

- Visit to Lipizzaner Stud Piber, with a guided tour of the breeding, training and retirement home of the famous Lipizzaner white horses of the Spanish Riding School. This is a UNESCO natural cultural heritage site.
- Lunch in regional local restaurant.
- Guided tour of the colourful St Barbara Church.

Wednesday 20 November

- An exclusive tour of the well known Graz Opera House.
- The group will then take a cable car up to the Aiola restaurant, to have lunch and enjoy spectacular views of the mountains; they will also have a tasting of Styria's regional speciality: pumpkin seed oil.

Confirmed full details of the three excursions will be available soon.

Accompanying persons are also welcome to join the evening social programme.

EVENING SOCIAL PROGRAMME

- On Sunday 17 November, a dinner for Chairpersons and Speakers will be held at the Seifenfabrik, a historical industrial building in Graz, following meetings and briefings at MCG.
- On the evening of Monday 18 November, the Welcome Reception, generously sponsored by Andritz, will be held in the Stefananien Saal and Beethoven foyer of a historical building, full of character.
- Our usual networking party will be held on Tuesday 19 November, in the Exhibition Hall of MCG.
- The HYDRO 2024 Farewell Dinner will take place in a (totally transformed) room at MCG.

The various social events will enable hydropower discussions to continue, accompanied by some culinary specialities of Styria, and musical entertainment.







STUDY TOURS

Austria, with its extensive experience of large and small hydropower and pumped-storage development, and with around 60 per cent of its electricity coming from hydropower, has a number of recently commissioned projects, plans for many more, and is Europe's most active country for pumped storage, with four major projects under construction.

The opportunity to visit a variety of dams and powerplants will be offered on two study tours currently being planned. One tour can be taken as a one- or two-day trip, and the other will be a longer journey with more visits, and is currently planned as a three-day option.

Tour A: One or two days

For those with limited time to spare after the conference, we have arranged for several small and micro hydro sites to be visited within Graz, one of which is to be commissioned this year. This will also form the first day of a two-day trip.

Those continuing for the second day will visit the Feistritz-Ludmanssdorf run-of-river plant, one of a cascade of 10 plants on the Drava river in Carinthia. Since 2007, all 10 plants in this group, between Spittal and the Slovenian border, have been managed together by the Drava central control room. At Feistritz-Ludmanssdorf, two Kaplan units generate an average annual output of 351 GWh. Of special interest at this scheme is the fish migration system, and various ecological measures which have been taken.

Tour B: Three days

The first visit will be to the 210 MW Wallsee-Mitterkirchen plant on the Danube, where a project has been underway by Verbund to upgrade the efficiency by replacement and upgrading of machinery. Output has increased by about 12 GWh/year.



A 17 MW open-field solar installation supplements generation at the site. To support the grid frequency, a 'Blue Battery' has up to 10 MW of spare capacity available, from the production at the Wallsee-Mitterkirchen hydro plant.

A new PV facility at Wallsee–Mitterkirchen, which covers an area of 3 ha, has a maximum capacity of 1.7 MW, with enough annual production to supply about 600 households.

The group will then travel on to Salzburg for an overnight stay. Next morning there will be an opportunity to tour the stunning city of Salzburg, including its castle, and a boat trip on the Traunsee may be possible, before the next technical visit. This will be to the 14.5 MW Stegenwald conventional run-of-river scheme, under construction on the Salzach river. The overnight stay will be at Zell am See.

A highlight of the tour, on the next day, will be a visit to Verbund's 480 MW Limberg III pumped-storage scheme, part of the Glockner-Kaprun power complex, west of Salzburg. The power cavern is being built into the mountain next to the existing powerplants of the 'Kaprun Upper Stage' (Limberg 1 and 2) and will be connected to the existing Mooserboden and Wasserfallboden reservoirs with a headrace tunnel.

Limberg III will be equipped with two 240 MW variable speed pump-turbines, and is due for completion next year. The tour will also include a visit to Limberg II.

Touristic visits will be incorporated within the tours and will be detailed on the next update, when technical visit timings have been confirmed.

All tours will return to Graz in the late afternoon. Full details of the tours, logistics and precise itineraries will be posted on line shortly, so please check our website for updates.





ACCOMMODATION IN GRAZ

Accommodation has been reserved in some selected hotels in Graz, for the main nights of the conference. There are hotels in various budget categories, and many are within walking distance of MCG. More details and rates are available at the HYDRO 2024 registration site, now open, and accommodation should be reserved at the time of registration.

Shown here, as examples, are the Weitzer, Wiesler, Aurgarten, Plaza Inn, Best Western, Mariahilf and Ibis hotels. All offer free WiFi, and breakfast will be included within the room rates arranged.





CONTACT DETAILS

For enquiries concerning registration and accommodation, please contact:

HYDRO 2024 Secretariat, Event Management Services (EMS)

EMS-hydro2024@ems-ltd.org

Tel: +44 1225 258013

For enquiries about the programme, please contact: Maria Flintan/Alison Bartle, Hydropower & Dams PO Box 285, Wallington, Surrey SM6 6AN, UK Email: Hydro2024@hydropower-dams.com



For the latest information and online registration, visit:

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www.hydropower-dams.com/hydro-2024

BOOKING CONDITIONS

The Conference HYDRO 2024 - Secure technology for turbulent times, is being organized by The International Journal on Hydropower & Dams with Event Management Services (EMS), UK.

On-line Registration

You can register on-line via the *Hydropower & Dams* website at: www.hydropower-dams.com. This is a secure site. Registrations are handled by EMS on behalf of Aqua~Media. You will receive an acknowledgement of registration on completion of this process; however, this is <u>not</u> a confirmation (until payment is received).

Pre-registration is required, and we encourage all delegates to register on-line; the registration site provides more information about the event. In the unlikely event of any difficulties using this system, please contact EMS (see contact details below).

Picking up conference documents and badges

The registration desk will be open from 08.00 hrs on Sunday 17 November 2024, at the Messe Congress Graz (MCG) and delegate bags can be collected from that time up until 19.00 hrs.

Payment

Payment for all services (fees, hotels, tours) must be made in Euros (\in) and received in advance of the Conference. Payment is possible by the following methods:

- On-line by Visa or Mastercard; or,
- By bank transfer (see details on the registration form).

All fees paid by credit card will be charged in Euros (€).

Accommodation

Beware of scam accommodation bureaux who operate falsely claiming to represent HYDRO 2024. We recommend that you do not pass credit card details to them. Descriptions of all hotels, and their locations, are given on the registration site.

Disclaimer

Best endeavours will be made to present the programme as printed. The HYDRO 2024 organizers and their agents reserve the right to alter arrangements, timetable, plans or other items relating directly or indirectly to HYDRO 2024 for any cause beyond its reasonable control. The Conference and Tours are subject to minimum numbers. Tour places are subject to availability on a first-come-first-served basis. Tour B is limited to 25 places. Full payment for tours must be received at the time of registration.

Cancellations

Cancellations must be made in writing to EMS. Cancellation charges will be payable as shown in the Table below. Substitution of delegates, speakers or exhibitors after a reservation has

been made is acceptable before the conference, and no extra fee is payable. Any necessary refunds (see Table below) will be made after the conference.

Liability/Insurance

The registration fees do not include the insurance of participants against personal accidents, sickness, cancellations by any party, theft, loss or damage to personal possessions. All services provided are subject to local laws. Arrangements for the Conference have been made in accordance with Austrian Law.

Delegates, exhibitors and tour participants are strongly advised to take out adequate personal insurance to cover risks associated with travel, accommodation, cancellation and theft or damage to personal belongings. The organizers cannot accept responsibility for death, injury, loss or accident, delays arising from any act or default of any person, or any other matter arising in connection with Conference services or transport. The organizers make no warranty in this connection.

In the very unlikely event that it is necessary to cancel any of the conference arrangements or postpone the conference, a refund will be made, and thereafter the liability of the organizers will cease. Alternatively, fees could be carried forward for a postponed event on new dates.

The organizers reserve the right not to accept applications for attendance (for example, but not exclusively, if applicants are not working in the field of hydro, or if there could be a conflict of interest with the mission of the conference, the organizers, or any policy of the host country).

Passport and Visa Requirements for Austria

It is the responsibility of all participants to check their own passport and visa requirements. Please contact the Austrian Embassy or Consulate in your country if in doubt about requirements, or visit:

> https://www.oesterreich.gv.at/en/themen/menschen_aus_anderen_staaten/ visum fuer oesterreich.html

Applying for a letter of invitation to support a visa application

In some cases, letters of invitation from Aqua~Media may be necessary, to support visa applications. If you require a letter of invitation to facilitate your visa application, please let us know at the time of registering.

The process could take several weeks, so we strongly urge participants requiring visas to start the application process in good time.

Please note that letters to assist with obtaining visas can only be provided to registered or invited participants, and these letters do not imply an invitation to the conference without payment of registration fees, unless this is specified. If you need a supporting letter, please notify us as soon as possible and supply your full name, date of birth, passport details, and proposed dates of arrival and departure.

As soon as a registration is confirmed, a number of expenses are incurred by the organizers; therefore the cancellation conditions below apply.

| Date cancellation received | From 16 September to 27 October 2024 | On or after 28 October 2024 |
|------------------------------------|--------------------------------------|-----------------------------|
| Registration for the Conference | 50% of fee will be forfeited | No refund |
| Technical Excursions (Study Tours) | No refund unless place can be resold | No refund |
| Accommodation | No refund unless place can be resold | No refund |

A reduced registration fee is available for speakers, current subscribers to *Hydropower & Dams*, and those taking a new subscription. See booking information form on the next page for details.

CONTACT DETAILS

For enquiries concerning registration and accommodation, please contact:

HYDRO 2024 Secretariat, Event Management Services (EMS)

Hydro2024@ems-ltd.org • Tel: +44 1225 258013

For enquiries about the programme, please contact: Mrs Maria Flintan, c/o Hydropower & Dams

PO Box 285, Wallington, Surrey SM6 6AN, UK

Email: Hydro2024@hydropower-dams.com

For the latest information and online registration, visit: www.hydropower-dams.com/hydro-2024



Online HYDRO 2024 registration is via the website: www.hydropower-dams.com The system is simple to use, but in the event of any difficulties, please contact EMS. Email: hydro2024@ems-ltd.org ~ Tel: +44 1225 258 013 Prices for each delegate category and conference activity are given below.

| EARLY DELEGATE FEE (to 20 September): Includes attendance of the Conference and | Exhibition; | | | |
|---|---|-------------------|-----------------|------------|
| documentation; conference papers, downloadable from a link; morning and afternoo lunches during the Conference; full social programme in the evenings | €1390 | | | |
| FULL DELEGATE FEE (from 21 September): Includes everything described above | | | | |
| REDUCED DELEGATE FEE: For existing subscribers to <i>Hydropower & Dams</i> . | | | From 21 Sep: | €1420 |
| FEE INCLUDING NEW SUBSCRIPTION TO <i>H&D</i> : (6 issues from No. 6, 2024 + Atlas + Maps) (This represents a saving of about 35 per cent on the normal <i>H&D</i> subscription rate). | | | From 21 Sep: | €1630 |
| SPEAKER FEE: Includes everything described above for Full Delegates, plus an additional reception on Sunday 17 November. NB: This fee applies to <u>one</u> person per paper (main author or presenter). | | | | |
| FIRST EXHIBITOR FEE: (One full participant registration is included with exhibition booking). | | | | |
| SECOND + THIRD EXHIBITOR FEE: (Fee per person for up to two additional exhibitors). (Includes all benefits available to full delegates). | | | | |
| SMALL HYDRO WORKSHOP: (Full day on Sunday 17 November) | | | | |
| BIM SEMINAR: (Full day on Sunday 17 November) | | | | |
| PUMPED STORAGE WORKSHOP: (Full day on Sunday 17 November) | | | | |
| FISH PROTECTION: (Half day on Sunday 17 November) | | | | |
| ACCOMPANYING PERSON FEE: (For family members, partners or friends <u>not</u> colleage the Conference or Exhibition). The fee includes the excursions on each day with lunch | ues attending , and evening social events. | € 450 | | |
| HALF DAY EXCURSION: (Sightseeing around Graz, including the castle and art gallery, with lunch included) | | | | |
| STUDY TOURS: | | | | |
| Tour A1: 1 day tour - Small and micro hydro plants within Graz | | €120 | | |
| Tour A2: 2 day tour - As above and on to Feistritz-Ludmanssdorf (Drava river cascade) | € 445 (single occupancy) | € 390 (per | person - double | occupancy) |
| Tour B: 3 day tour - Wallsee Mitter | € 985 (single occupancy) | € 825 (per | person - double | occupancy) |
| | | | | |

OPTIONAL DONATION TO THE AMI HYDROPOWER FOUNDATION: As in past years, there is an opportunity when registering online to make a donation to the AMI Hydropower Foundation. This is a charitable foundation, set up by Aqua-Media and governed by a board of International Trustees. It exists to facilitate the participation of delegates from the less developed countries at the annual Hydro Conferences.

DIETARY REQUIREMENTS: These should be specified on the online registration system (for example: vegetarian, vegan, gluten free, kosher, halal...)

VISA REQUIREMENTS: Please let us know if you need an invitation letter to support a visa application for travel to Austria.

NB: Attendance of the Welcome Reception and Farewell Dinner are included within the registration fees for all participants. However, we request a nominal contribution of €15 per event, to encourage a firm commitment to participate. This is important to enable us to assess numbers for catering, and avoid food wastage.