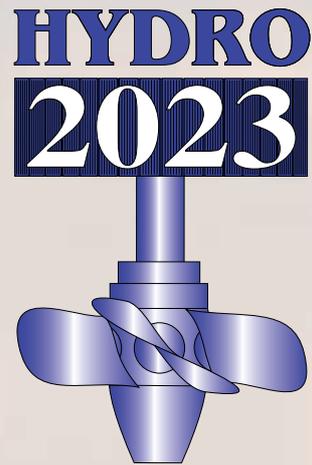


# International Conference and Exhibition



## HYDRO 2023

### NEW IDEAS FOR PROVEN RESOURCES

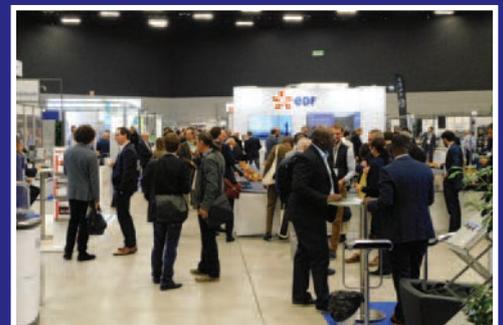
Edinburgh International Congress Centre (EICC), Edinburgh, Scotland, UK

16 to 18 October 2023

Organized by:

THE INTERNATIONAL JOURNAL ON  
**HYDROPOWER  
& DAMS**

Supporting organizations include:



Regular updates will be posted on our website and published in *Hydropower & Dams*

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## SCOTLAND'S HYDROPOWER HERITAGE

### The role of Scottish hydropower

Scotland produces around 88 per cent of the UK's hydropower, with an installed capacity of about 1800 MW at conventional hydro plants and 740 MW at pumped-storage plants. It has 78 large dams and 54 medium/large hydro plants, with more than 300 km of associated tunnels. More than 5000 MW of new pumped-storage capacity is currently being planned.

Scotland is also a world leader in the development and deployment of wave and tidal energy technologies. It hosts: the world's leading wave and tidal test centre, the European Marine Energy Centre in Orkney; the world's largest tidal stream array; and, the world's most powerful tidal stream turbine.

Over the last century, Scottish hydro has played a major part in the country's energy make up. While today hydro lags behind wind and solar as a source of renewable electricity in the UK, it played a vital role in connecting vast areas of rural Scotland to the grid, some of which had no electricity as late as the 1960s. Soon, new pumped-storage schemes will integrate perfectly with the increasing use of intermittent renewables.

The huge hydro potential of Scotland's steep mountain rivers, lakes and reliably heavy rainfall, was first recognized in the 1890s. A reliable source of electricity was needed to help turn raw bauxite into aluminium, and the Foyers hydro plant and smelting works were built in 1896. But it was more than 20 years before the first major hydro project to supply electricity to the public was designed. In 1926 the Lanark hydro scheme was commissioned on the river Clyde. Its two plants are still in operation, with a capacity of 17 MW today. This was followed by plants at Rannoch and Tummel in the Grampian mountains and, in 1935, what became a highly influential cascade scheme in the history of Scottish hydropower, at Galloway.

Scotland's first major pumped-storage plant was Cruachan, in Argyll, inaugurated by Queen Elizabeth II in 1965. A major expansion of the 440 MW plant has been approved, which will add a new 600 MW underground plant.

The most recent large hydro plant to be commissioned in Scotland is the 100 MW Glendoe scheme, in the Highlands above Loch Ness; it was commissioned in 2009. More recently, in 2021, RWE commissioned the 2 MW Glen Noe run-of-river small scheme.

The next major development will be the implementation of several large pumped-storage plants. In 2021, the Scottish Government granted planning consent for the 450 MW Red John scheme, which will be built close to Inverness in the Highlands; Coire Glas, using water from Loch Lochy, was given consent in 2020; with a capacity of 1500 MW and storage of 30 GWh, it will be the largest storage plant in western Europe, doubling the UK's current storage capacity. Other planned pumped-storage projects are: Eishken (300 MW), using seawater, on the Isle of Lewis; Balliemanoich (1500 MW); Corrievarkie (600 MW); and, Glenmuckloch (400 MW).

Scottish and other UK hydropower and dam engineers have much experience to share, as well as future plans to discuss.

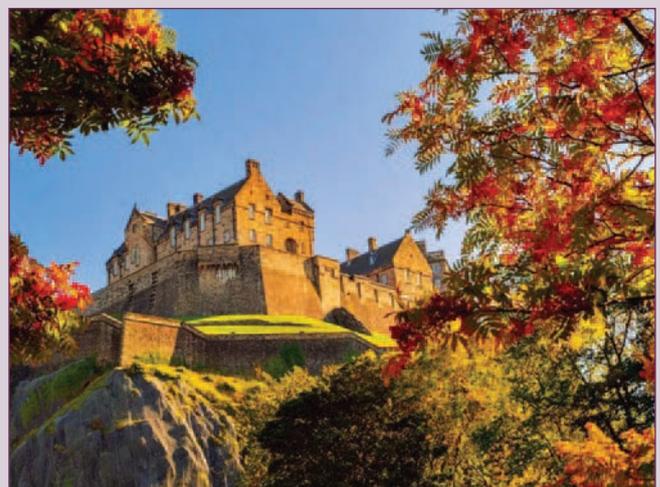
## EDINBURGH AS HOST CITY

Edinburgh has been Scotland's capital since the 15th century and is steeped in history. Its centre is compact and hilly, with many magnificent views and buildings. It comprises a medieval old town and an elegant Georgian new town with gardens and neoclassical buildings. These two contrasting townscapes, which give the city its unique character, are together listed as a UNESCO World Heritage Site.

Towering over the city is Edinburgh Castle, a former fortress and royal residence, at the top of the 'Royal Mile'. It is home to Scotland's crown jewels and the Stone of Destiny, once used in the coronation of Scotland's monarchs. Other sites include the Palace of Holyroodhouse, St. Giles' Cathedral, Canongate and Greyfriars churches, Arthur's Seat and Princes Street.

Edinburgh is the seat of the Scottish Government, the Scottish Parliament and the highest courts in Scotland. The city has long

been a centre of education, particularly in the fields of science and engineering, medicine, law, literature and philosophy.



## PRE-CONFERENCE SIDE EVENTS

### FULL DAY SEMINAR ON BIM

Major plant owners, leading consultants and contractors in the hydro/dam profession, together with IFIs and software specialists, will take part in a seminar on the increasingly important topic of Building Information Modelling (BIM).

The aim is to address the challenges faced in implementing BIM on large projects, particularly in the context of hydropower. The seminar will encourage knowledge-sharing among industry professionals, to overcome barriers such as variations in skillsets and misalignment of ambitions across the supply chain, and ultimately to maximize the benefits BIM can bring to projects. The seminar discussions will focus on key industry topics, including digital co-ordination, interface management, digital ground risk management, and effective change management. Through presentations, panel discussions and interactive tools, the goal is to enhance understanding, encourage dialogue, and drive positive change and advances in the field of BIM, in relation to hydro. Four sessions are planned, covering:

#### Session 1: Setting the scene

- ▶ Introductory talks for those who are not experts in the subject, starting with some basics of the technology and its scope.
- ▶ Discussions on the potential and future role of BIM, highlighting specific advantages and project benefits for our profession.

### FULL DAY TRAINING SEMINAR ON PUMPED STORAGE

The role of pumped storage has never been as important as the present time, as more intermittent renewable energy resources, such as solar and wind power are exploited. At least 35 nations have pumped-storage schemes under construction, and others have major projects planned for the coming years.

Innovative approaches are being adopted, such as the repurposing of disused mines, the use of seawater, and underground pumped hydro, where power caverns are located deep underground.

There have been corresponding developments in pump-turbined in recent years.

The pioneering countries for large-scale pumped-storage schemes, such as China, India, the USA, Korea and others are continuing with future programmes, while many countries throughout the world are embarking on programmes of pumped storage development for the first time. This makes it timely for an exchange of experience not only across borders, but between experts from the various engineering disciplines involved.

Renowned experts from Europe (IHE-Delft, EPFL and others) will present talks and encourage discussions and questions.

The programme will be structured around four main aspects:

#### Session 2: BIM in action (Case studies)

- ▶ Use of BIM at the Skavica scheme in Albania - *Mott MacDonald, UK*
- ▶ Insights from two BIM-powered hydropower projects in Norway - *Multiconsult, Norway*
- ▶ Examples of the uses of BIM at the Bakaru I and II hydro projects in Indonesia - *Tractebel, Germany*
- ▶ Practical application of BIM-based full lifecycle digital management for large hydro projects in China - *PowerChina Huadong, China*
- ▶ Application of BIM at Bakun, Malaysia - *Bentley Systems, UK/USA*

#### Session 3: BIM into the future

- ▶ Panel session with owners, consultants, contractors and software providers on successes, challenges, training needs, raising awareness of the capability of BIM, and so on.

#### Session 4: Discussion

Open discussion and Q&A with all participants on the prospects, challenges, sharing of experience, and the way forward.

Places will be limited to 150, so those wishing to attend should apply for a place at the time of registration.

Co-sponsors include:

**M**  
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MACDONALD

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#### Session 1: Role and benefits

- ▶ Why we need pump-storage powerplants in grid (storage, regulation, integration of renewables).

#### Session 2: Civil works

- ▶ Design of components of the system, especially caverns and power waterways.

#### Session 3: E&M equipment

- ▶ Selection, design and innovation (synchronous and asynchronous generators, full convertors, hydraulic short circuit).

#### Session 4: New developments

- ▶ The use of existing mines, pumped storage with salt water, pumped storage on islands, low head plants, and so on).



## FULL DAY SMALL HYDRO TRAINING WORKSHOP

Many factors are considered in the design and construction of an optimal hydro project. All parts of a scheme are interrelated and interdependent. Alter one component, and others will be affected.

This workshop, following successful ones held in Vientiane, Montreux, Marrakech, Seville, Danang, Gdansk, Namibia, Porto and Strasbourg, is aimed at people who are, or will be, involved in hydropower development as part of rural electrification programmes. It will cover run-of-river hydro projects in the 'pico' to 'mini' range (1 kW to 1 MW capacity).

As this is a diverse form of energy production, there are always areas which are unfamiliar to people, despite many individual specialisms. This workshop aims to fill in the gaps, and help people to gain a good basic grounding in the topic. The workshop will be led by Prof D. Williams and G. Black, of Learning Hydro, UK.

All relevant aspects will be covered, from rainfall and hydrology to energy evaluation, including:

- Analysis of scheme location and definition of potential catchments
- Turning rainfall into an available flow range from a catchment and development of a flow duration curve
- Power and energy generation calculation
- Intake structures, channel and/or pipeline routes and sizing
- Powerhouse design and equipment
- Turbine selection
- Generator, controls and switchgear options
- Grids, national and local.

This will be a practical 'hands-on' workshop, which will guide the participants, working in groups, to develop an actual hydropower project design during the day. After presentations on the individual scheme aspects, the groups will put together the components of the project. This will follow through to the completed design.



## HALF-DAY CITY EXCURSION, WITH LUNCH

As usual we are organizing a city excursion which will be available for all participants arriving by the morning of Sunday 15 October. This should be booked at the time of registration.

This tour will depart mid-morning, to allow for registration at the conference centre and the collection of badges. The group will take

a short journey to Port Leith, to visit the Royal Yacht Britannia, the former royal yacht of the British monarchy. After viewing the Yacht, participants will travel back to the centre of Edinburgh, where they can view the old town, and Palace of Holyroodhouse, which is the King's residence when he is in Scotland.

The group will take lunch together during the tour.



## CONFERENCE SESSIONS

### Monday 16 October - Morning

#### Plenary Opening Session

- Welcome messages and opening addresses, by speakers from Aqua-Media, ICOLD, IEA, SSE, BHA, the Energy Secretary of the Government of Nepal, and others leading figures from the water and power sectors.

#### Coffee Break and Opening of the Exhibition

#### Session 1: Hydro planning and potential

**Chair: Prof Anton Schleiss, Consultant, Switzerland**

- Importance of reliable hydropower as a catalyst and enabler for the clean and safe energy transition in Europe – *Prof A. Schleiss, Consultant, Switzerland*
- The future of sustainable hydropower in the European Union: projections and opportunities – *E. Quaranta, EC Joint Research Centre, Italy*
- HiDeStor Identification of hidden renewable and sustainable solutions for decentralised electricity storage at the distribution grid level: medium and small pumped-storage powerplants – *V. Denis, A. Bullani, L. Smati, Mhylab, Switzerland; C. Münch-Alligné, O. Pacot, S. Martignoni, L. Moret, HES-SO Valais/Wallis, Switzerland*
- The benefits and challenges for large expansions in Norwegian hydropower – *A. Harby, C. Ø. Naversen, A. Arvesen and A. Adeva-Bustos, SINTEF Energy Research, Norway*
- The challenge of delivering certainty in uncertain times – *S. Kay, N. Macrae and C. Rose, Bechtel, UK*
- Renaissance of the hydropower industry in Australia – *C. Evans, Queensland Hydro, Australia*
- Real-life application of GIS and remote sensing on a hydropower project – *R. S. Barrera, Multiconsult Group, UK*

#### Session 2: Civil engineering: Dam design and construction - I

**Chair: Michael Rogers, Stantec and Hon President, ICOLD, USA**

- Stress-relaxation creep and RCC arch dams – *Q. Shaw, ARQ, South Africa*
- Technologies of high ECRD construction in China – *Zeping Xu, IWHR, China*
- First order reliability assessment of a rockfill dam using FORM coupled with a response surface methodology – *A.S. Zwiers and M. Hill, Stantec, UK*
- Rehabilitation measures with several construction methods at dam and dyke projects in the USA – *M. Baltruschat Bauer, Germany; J. Theos, Bauer Spezialtiefbau GmbH, Germany; M. Bertoni, B. Harris and C. Bou-Sleiman, Bauer Foundation Corp, USA*
- Dam heightening: an efficient tool to increase reliable and sustainable energy supply – *A. Wohnlich, M.P. Bieri and B.M. Quigley, Gruner Stucky Ltd, Switzerland*
- Hydropower and BIM: Benefits and challenges based on current international projects – *S. Oettinghaus, Tractebel Engineering GmbH, Germany*

#### Session 3: Hydraulic machinery - I

**Chair: John Gummer, Hydro-Consult Pty Ltd, Australia**

- A critical review of turbine head specific curves – *J.H. Gummer, Hydro-Consult Pty Ltd, Australia*
- XFLEX HYDRO demonstrator grid services assessment and elaboration of ancillary services matrix – *C. Nicolet, M. Dreyer, C. Landry, S. Alligné, A. Béguin, Y. Vaillant, S. Tobler, G.Sari, G. Pais, M. Bianciotto, S. Sawyer, R. Taylor, M. V. Castro, M. H. Vasconcelos and C. Moreira, Power Vision Engineering Sàrl, Switzerland*
- Characterization of dominant frequencies during transient operation of a Pelton unit at the FMHL pumped-storage plant – *M. Chiarelli and C. Münch-Alligné, HES-SO, Switzerland; Dr R.M. Boes, VAW-ETH Zurich, Switzerland*

- Multijet horizontal Pelton turbine concept: Development and prototype – *R. Mack, P. Mössinger, J. Necker, Voith Hydro, Germany*
- Dynamic efforts in monitoring in hydro turbine operating rings: Implementation and first lessons – *J. Cavalier, O. Mousseiff and P. Maruzewski, EDF Hydro, France*
- Hydro abrasion efficiency-reduction in Pelton turbines: An experimental laboratory investigation – *F. Fahrni, M. von Burg, T. Staubli and E. Casartelli, Lucerne University of Applied Sciences and Arts, Switzerland*
- Water-lubricated sintered bronze journal bearings: An environmentally friendly solution for the hydro industry – *W. Litwin, Gdansk University of Technology, Poland*

#### Lunch in the Exhibition Halls

### Monday 16 October - Afternoon

#### Session 4: Innovative approaches to project finance

**Chair: Dr Judith Plummer Braeckman, University of Cambridge, UK**

- Trends in insurance for hydropower projects – *R.M. Lacey, WestGlen Consult, UK*
- Innovative approaches to project finance: The case for access to capital markets to fund large hydro projects – *K. Challa, CrossBoundary, UK*
- Future trends in PPPs – *P.J. Rae, P.J. Rae Consulting, Canada*
- (Additional presentation from SSE, UK to be confirmed)

#### Session 5: Civil engineering: Dam design and construction - II

**Co-Chairs: B. Quigley, Gruner Stucky SA, Switzerland**

**H. Irfan Aker, Dolsar Engineering, Türkiye**

- Engineering geological and rock engineering aspects of the Coire Glas project, Scotland – *C. Jack, A. Zwiers, J. T Smith and R. Lyall, COWI, UK*
- Dynamic analysis and design of the Helete dam – *B. Binici, Y. Arici, and I. Kalem, Dolsar Engineering Inc Co, Türkiye; Ö. Yaylaci, General Directorate of State Hydraulic Works, Türkiye*
- Global construction challenges with glacial till cores for hydroelectric dams – *A.I. Bayliss Stantec Consulting Ltd, Canada*
- The Skavica hydropower project: Impact of site constraints on dam geometry, foundation and cut-off design – *J. Pawson, T. Blower and T. Webster, Mott MacDonald, UK*
- The effectiveness of natural pozzolan to control alkali silicate reaction in concrete: The case of the Dasu hydro project – *H. Hosseinzadeh, N. Karaman, and M. Caliskan, Dolsar Engineering, Türkiye; A. Ul Haque, WAPDA, Pakistan*

#### Session 6: Hydraulic machinery - II

**Chair: Daniel Paschini, EDF, Peru**

- Causal analysis for cavitation damage on a Francis-runner and customized design optimization – *J. Schiffer, H. Jaberg, H. Benigni, R. Prirschl, and I. Giersemehl, Jaberg & Partner GmbH, Austria*
- The use of machine learning to detect anomalies in hydro turbines – *V. Pohlenz and Y. Crotti, AQ Tech Power Prognostics, Brazil*
- Revealing the flexible operation capacity of existing hydro turbines: A new multi-loading stress reconstruction method – *J. Kerner, F. André, F. Duparchy, P.-Y. Lowys and S. Frechin, GE Renewable Energy, France*
- The IEC 63230: A new standard on the fatigue of hydraulic turbine runners to help the industry face the energy transition – *D. Thibault and A. Trudel, Institut de Recherche d'Hydro-Québec (IREQ), Canada*
- Gratkorn: Hydraulic design for a compact powerplant limited by given geometrical boundary conditions and the dimension of the tailwater gate – *H. Benigni, J. Schiffer, G. Penninger and I. Giersemehl, Institute of Hydraulic Fluid Machinery, TU Graz, Austria*

## CONFERENCE SESSIONS

- Design and validation of fish-safe turbines for retrofit and new-build applications – *A. Schneider and S. Watson, Natel Energy, Inc, USA*
- High frequency pressure fluctuations and their mechanical impact on penstock liner: A case study – *P. Bryla, E. Millon and C. Badina, EDF-DPIH-DTG, France*

### Session 7: Project finance: Mitigating risk

**Chair: Peter J. Rae, Consulting Engineer, Canada**

- Single versus multiple contract packages for hydropower projects – *G. Chapman, Sarawak Energy Berhad, Malaysia*
- Risks in the construction of hydro plants: Interfaces – *E. Corbett, Howard Kennedy, UK*
- Risks in the construction of hydro plants: Ground conditions – *V. Tyson, Howard Kennedy, UK*
- Geotechnical Risk Register – *A. Drake, Mott MacDonald, UK*
- Considerations of adequate contracts and contract types for large underground pumped-storage plants: Experiences of the FIDIC Emerald Book for the Paldiski underground PSP – *R. Enderle, S. Palt, E. Yildiz and M. Neuenschwander, Fichtner, Germany*

### Session 8: Sedimentation research and management

**Chair: Pratik Pradhan, Butwal Power Company, Nepal**

- Reservoir sedimentation: Storage and risk value analysis – *S. Stokseth and F. Kristiansen, Statkraft Energi AS, Norway; H. Nøvik, Scatec, Norway; Nils Rüter, TU Munich, Germany; B. Glover, Bærekraftig Investering AS, Norway; E. Solvang, Sintef, Norway; K.L. Walløe, D.A Wright and Ø. Pedersen, Multiconsult, Norway*
- Sustainable sediment management for reservoirs by continuous sediment transport – *L. Gehrman and R. Gross, Hülskens Sediment GmbH, Germany*
- Dredging in front of the intake tower at the Necaxa reservoir – *T. Jacobsen, SediCon, Norway*
- Digital solutions for hydropower applications: Satellite-based mapping and monitoring – *F. von Trentini, K. Schenk, M. L. Ribeiro, N. Ruther and A. Bartosova, EOMAP, Germany*
- What computational sedimentation models can do for hydropower schemes? A review – *M. Roca, G. Petkovsek and J. Hinks, HR Wallingford Ltd, UK*
- Challenges and solutions in sediment management at the Alisgiani reservoir in Corsica – *R. Gaillard, Watertracks, France and EDF-CIH, France*
- Sedimentation management and removal solutions. Mitigating the environmental impacts in the Bahia State, Brazil, and Algeria – *F. Del Rey, Hydroplus, France*
- Measurement of suspended sediment concentration and particle size distribution with ultrasound to reduce hydro-abrasive erosion – *S. Scheffler, NIVUS GmbH, Germany*

### Session 9: Rehabilitation and upgrading

**Chair: Laurent Mouvet, Hydro Partners, Switzerland**

- Redevelopment of the Calabogie plant: Capacity upgrade and hydraulic design – *D. Damov, F. Lepage, M. Tremblay, A. C. Bergner, M. Villeneuve, F. Scarcelli, G. McPhail, SNC-Lavalin Inc, Canada*
- New Lanark Mills: Reengineering the past for tomorrow's generation – *S. Harrison, Gilbert Gilkes & Gordon Ltd, UK*
- Potential in upgrading and extension of existing hydro (PotOUT) – *I. Vilberg, M.-P. Gosselin, T. Aronsen, L. Lia, NTNU, Norway*
- Post-incident upgrade of a historic canal reservoir – *A. Peters, Arup, UK; M. Hewitt, Mott MacDonald, UK; D. Neeve, Arup, UK; D. Prisk, Arup, UK*
- Rehabilitation of hydromechanical equipment – *P.C.F. Erbisti, Consultant, Brazil; J.D. Vera, EPM, Colombia*

## Tuesday 17 October - Morning

### Session 10: Environmental and social Issues

**Chair: Dr C. Tortajada, University of Glasgow, UK**

- Key ideas and challenges to deploy the appropriate environmental and social internal team – *T. Michel, EDF-CIH, France*
- Implementing hydropower in Natura 2000: The Mokrice scheme as a case of good practice in mitigating environmental impacts and providing synergy for biodiversity – *B. Pišotek and H. Valentinčič, HESS, Slovenia*
- Assessment of the status of Aboriginal knowledge in environmental follow-up studies – *S. Eveno, Hydro-Québec, Canada*
- Cultural heritage management and community livelihood continuity at the Baleh scheme in Sarawak – *A.L.K. Chuan, D.Z.B.A. Kashim, D.C.Y. Li, S.B. Bohari, and N.S. Hing, Sarawak Energy Berhad, Malaysia*

### Session 11: Dam safety

**Chair: Michel Lino, President, ICOLD**

- Dam safety revisited for embankment dams at pumped-storage schemes with rapid filling-drawdown cycling – *S.M. Sayah, R. Basso and S. Lopez, Lombardi Ltd, Switzerland*
- Investigation of protection technology for embankment dams against overtopping – *C. Zheng, A. Li and J. Jia, IWHR, China*
- Innovative monitoring tools for embankment dyke safety issues – *E. Barros-Maurel, E. Buchoud and C. Perrin, EDF Hydro, France*
- The use of L-Band SAR for soil-moisture monitoring of dams – *J. Lynch, Asterra, Israel*
- InSAR: An innovative remote sensing tool for dam and reservoir integrity monitoring – *S.R. Prezezzi and R. Capes, Tre Altamira, Italy*
- Assessing the health of Italian dams and their hydrological safety – *E.R. Patro, G. Cazzaniga, C. De Michele, University of Oulu, Finland*
- Comprehensive deformation analysis in the construction of CFRDs – *Guo Fawang, Yang Guang, Zhan Zhenggang and Yu Yuzhen, Powerchina Kunming Engineering Corporation Ltd, China*
- Creep in mature rockfill dams – *O. Lier, Norconsult, Sweden*

### Session 12: Cross-border projects

**Chair: Jean-Michel Devernay, Consultant, France**

A number of transboundary hydro schemes around the world are bringing enormous economic benefits to multiple countries. Following on from previous sessions on this topic, speakers this year will address success stories and challenges. Speakers will include: Dinesh Ghimire, Energy Secretary, Government of Nepal; Alessandro Palmieri, Senior Water Infrastructure Advisor, Italy; Mark Stehle, Permanent Joint Technical Commission on the Cunene River Basin. (Two others to be confirmed).

### Coffee Break in the Exhibition Halls

### Session 13: Developments in fish protection

**Chair: Prof M. Aufleger, University of Innsbruck, Austria**

- Fish protection and downstream fish migration: State of the art and recent developments – *Prof M. Aufleger, University of Innsbruck, Austria*
- Securing environmental safeguard amidst national development goals: Conceptual design of fish ladder and eel passage for the Moragolla hydro project, Sri Lanka – *N. W. Bulathge and C.K.S. Handagala, Ceylon Electricity Board, Sri Lanka*
- Fish-friendly flow and flow variations in regulated Norwegian rivers – *F. Bigillon and L. Bendixby, Norconsult AS, Norway*

## CONFERENCE SESSIONS

- Cheap and functional new fishway solutions meet hydropower operators' and environmental goals – *G. Seidl and B. Pelikan, Ingenieurbüro Pelikan, Austria*
- Innovative design of dissipaters downstream of dams and hydropower outlets to enhance fish protection – *S. Maleki, Stantec, Australia; V. Fiorotto, Stantec, Italy*
- Trap and transport of Atlantic salmon to mitigate the impacts of hydro, and innovative automatic release cages – *A. Jacobs, SSE, Scotland*

### Session 14: Dam safety and hazard management

**Chair: Dr Quentin Shaw, ARQ, South Africa**

- Glacial hazard assessments in the Himalayan Region – *J.M. Reynolds, Reynolds Geo-Solutions Ltd, UK*
- The threat to dams in earthquakes – *J.L.Hinks, HR Wallingford Ltd, UK*
- Management of upstream slopes of embankment dams subjected to wave and ice loads – *G.H.R Ravindra, S.Stokseth, F.G. Sigtryggsdottir, R. Duncumb, P.M. Johansen, Ø. Lier, A. Fløystad, E.A. Vartdal, A.M.H. Ruud and R. Wood, Statkraft Energi AS, Norway*
- Verification of foundation adequacy for a 50 m-high gravity dam in Georgia – *T. Blower, E.C. Archibald, T. Webster and L.F. Jarvis, Mott MacDonald, UK*
- Study on the performance of Polyurea anti-seepage spray coatings for hydraulic structures – *Libing Qi, IWHR, China*

### Session 15: Financing pumped storage schemes

**Chair: Dr Judith Plummer Braeckman, University of Cambridge, UK**

- Investment opportunities in the pumped-storage sector – *R. Flynn, Equitix, UK*
- Economic impacts of pumped storage – *G. Blackett, BiGGAR Economics, UK*
- Overcoming commercial and financial challenges facing new large-scale long duration energy storage – *A. White, KMPG, UK*
- Zero terrain pumped storage – *P. Siitam, Energiasalv, Estonia*
- (Additional presentation to be confirmed)

**Lunch in the Exhibition Halls**

## Tuesday 17 October - Afternoon

### Session 16: Climate and sustainability

**Chair: Denis Aelbrecht, EDF, France**

- Roles of hydropower in managing climate change and ensuring successful energy transition – *Prof A.K. Biswas, University of Glasgow, UK*
- Reducing Scottish Water's carbon footprint and power costs by developing hydro across its asset base – *N. Beaumont, Scottish Water Horizons, UK*
- Climate change/variability and its impact on hydro generation: Case of the Akosombo and Kpong dams in Ghana – *P.T. Padi, and A.N. Wabab, Volta River Authority, Ghana*
- EDF's engineering experience in hydrology and hydro plant climate resilience: Example in the French Alps – *A. Valery, J. Gailhard and M. Le Lay, EDF Hydro, France*
- Performing a robust carbon footprint assessment of hydroelectric schemes throughout their entire project life cycle: A key to sustainable design – *D. Grenier, C. Daux, D. Levrat and O. Cornille, Tractebel Engie SA, France*
- Hydro-Québec's climate change adaptation plan. A first step towards the resilience of our energy system – *J.-P. Martin, Y. Chavaillaz, J. Clavet-Gaumont, I. St-André, C. Cusson and P. Bourke, Hydro-Québec, Canada*
- ESG Management foundation toward Corporate Climate Action and Resilience – *M.I. Aman, I.K. Mansor and F. Nadar, SEB, Malaysia*
- Hydro in synergy with dam reservoirs in Rep. of Korea – *KyungTaek Yum, SungYoub Jung, Yong-Chae Jeong, Dong-Hoon Shin, Ki-ho Kang*

### Session 17: Hydrology and flood management

**Chair: Prof Bogdan Popa, University Politehnica, Bucharest, Romania**

- Innovative methods to anticipate flood management at EDF dams – *D. Puygrenier, and M. Secher, EDF, France*
- The Black Drin basin: Hydrological modelling challenges in the Balkans and their relevance for hydro – *T. Beskeen and P. Ede, Mott MacDonald, UK*
- Dynamics operation of a multipurpose reservoir in Thailand using adaptive inflow forecasting with medium-range rainfall forecast – *S. Jamrussri and S. Hamcumpai, EGAT, Thailand*
- Increasing hydropower operator revenue with advanced inflow forecasting – *D. Palmer, Upstream Tech, USA*
- Analysis of flood control capability of Cahora Bassa dam in the Zambezi river basin, Mozambique – *J. Matola, R. Guale and M. Mahungwana, Hidroeléctrica de Cahora Bassa, Mozambique*

### Session 18: Pumped storage - I

**Dr Miroslav Marenc, IHE-Delft, The Netherlands**

- Pumped storage in Europe considering the global energy crises – *M. Belsnes, A. Harby, Sintef, Norway; M. Korpås, NTNU, Norway*
- Pumped-storage projects: Lessons-learned from recent developments in Central Europe – *J.-M. Burnier, F. Hachem, M.P. Bieri and B. Quigley, Gruner Stucky Ltd, Switzerland*
- The PumpIT pumped storage projects identification tool: An advanced GIS-based approach – *P. Thapa, S. Schroers, P. Schäfer and S. Palt, Fichtner GmbH & Co. KG, Germany*
- Developments in the use of sea water for pumped storage – *I. Gillies, AECOM, UK*
- A seawater pumped storage solution for the Galápagos Islands – *M. Marenc and J.-L. Brown, IHE Delft Institute for Water Education, The Netherlands*
- Location and characterization of Italian pumped-storage plants, considering the siltation impact and new GIS methodologies – *J. Alterach, A. Abbate and M. Volonterio, Ricerca sul Sistema Energetico, Italy*
- New life for historic slate quarries by accommodating a 100 MW pumped-storage scheme – *B. Stabel and T. Clegg, Fichtner GmbH & Co. KG, Germany*
- Decentralized pumped storage: A growing demand – *E. Wielinger and P. Duflon, Andritz Hydro, France*

### Session 19: Sustainable dams

**Chair: Dr Malcolm Dunstan, MD&A Associates, UK**

- The sustainability of concrete dams: design and construction – *M.R.H. Dunstan, Malcolm Dunstan & Associates UK*
- ICOLD Bulletin 'The sustainability of concrete dams': Legislation – *S.D. Usher, Aqua-Media International, UK; S. Cohen, Stantec, USA*
- Additional contributions from AFRY, Switzerland, and FOSCE, Germany

### Session 20: Gates and spillways

**Co-Chairs: Dr Peter Mason, Damsolve, UK and Paulo Erbisti, Consultant, Brazil**

- Rehabilitation of the Drin river hydraulic gates – *J. Gummer, Hydro-Consult Pyt Ltd, Australia; H. Obermoser, AFRY Switzerland*
- Risk assessment and functional check of static or quasi-static components at hydro plants: an application to gated weirs and outlet works – *N. Bragato, RNB Hydro, Italy; L. Papetti, Frosio Next Srl Italy*
- Risk-based design of a real-life dam spillway upgrade – *S. Maleki, Stantec, Australia; V. Fiorotto, Italy, Stantec, Australia*

## CONFERENCE SESSIONS

- Accident with a large hydrostatic operated drum gate: Stabilizing, recovery, repair and re-commissioning within short time frame – *H. Fosker and J. Hals, Norconsult, Norway*
- Underwater installation of new set of embedded parts for gates and stoplogs – *M. Leon, Hydrokarst, France*
- Koldam hydro station: Problems faced in the plunge pool and flip bucket area and remedial measures adopted – *A. Rana, NTPC Ltd, India*
- Energy dissipation on concrete dam stepped spillways – *K.H. Thorsen, L.M. Mikalsen, O. Olsen, L. Lia, E. Pummer and A.B. Türkben, NTNU/Multiconsult, Norway*

### Session 21: Pumped storage - II

Chair: **David Surla, EDF, France**

- A multi-disciplinary tool for inventory and classification of pumped-storage sites – *J. Arsénio, A. Mendes and P. da Silva, COBA Engineering Environmental Consultants, Portugal*
- Snowy 2.0: One of the largest pumped-storage projects under construction in the world – *P. Ligmnier, P. Seret and A. Toussaint, Tractebel Engineering S.A., France*
- Acoustic optimization and power increase of the four-stage pump at Malta pumped-storage scheme – *B. Hübner, A. Lechner, M. Giese, P. Campero and R. Schager, Voith Hydro, Germany; G. Penninger and D. Giefing, Verbund Hydro Power GmbH, Germany*
- Replacement of horizontal ternary unit by pump turbine with variable speed at Limberg 1: Experience from rehabilitation – *K. Kyzlink, A. Petříček, and M. Hofírek, Litostroj Engineering, a.s., Czech Republic*
- Applications of geomembranes in existing and new pumped storage schemes – *G. Vaschetti, V. Verdel, M. Scarella, F. Tronel, Carpi Tech, Switzerland*
- Global scale hydro projects leading Queensland's decarbonisation pathway – *L. McKenzie, Queensland Hydro, Australia; J. Kent-Johnston, AusHydro, Australia*
- Construction of the 344 MW Kokhav Hayarden pumped-storage plant in Israel – *S. Cohen, S. Palt, N. Ruse, Star Pumped Storage, Israel*
- Renovation of the Okutataragi plant in Japan – *G. Horikawa and O. Nagura, Kansai Electric Power Company, Japan*

## Wednesday 18 October - Morning

### Session 22: Small hydropower - 1

Co-Chairs: **V. Denis, MyhLab, Switzerland and Pierre Duflon, Andritz, France**

- Prediction and mitigation of turbulence by CFD modelling of a turbine in take channel at a small hydro plant: Counter-intuitive outcomes and hydraulic common sense – *C. Fregoni, Frosio, Italy*
- Small hydro development in a fragile environment: Case study of the Lofa mini grid – *A.T. Ankoh, P. Karki and Ky Hong Tran, The World Bank; A.D. Waylea, RREA, Liberia*
- Brenwe hydro: Challenges of building a small hydropower plant in a remote Pacific island – *A. Bird, R. Spittle and K. Wood, Stantec, New Zealand*
- Hydro Innvik: Design and construction of a 7.5 MW off-grid hydro project in arctic Canada – *E. Bouchard-Claisse, CIMA+, Canada*
- Renewing the generation capability of a 140 year-old sawmill in Glasgow, Scotland – *G. Black, babyHydro, UK*
- Comprehensive monitoring solution for small hydro reliability enhancement – *F. Ravet, D. Nicoullaz and Y. Jacquat, Gradesens SA, Switzerland; C. Morier and N. André SEFA, Switzerland*

### Session 23: Electrical engineering and machinery

Chair: **Prof U. Lundin, University of Uppsala, Sweden**

- Modernization of hydro-generator condition-based monitoring technologies to facilitate major maintenance decision-making – *A.N. Doyle, Iris Power, Canada; O. Husnjak, Veski d.o.o., Croatia*
- Lessons learnt from implementing active magnetic balancing in a 64 pole 50 MVA generator – *U. Lundin, Uppsala University, Sweden; P. Jonsson, Vattenfall R&D, Sweden; J. Abrahamsson, J. Pérez-Loya and J. Listenius, Magstrom, Sweden*
- Key parameters for the design of brushless excitation retrofits for hydro generators – *D. Swaffield, Quartzelec Ltd, UK*
- Static frequency converter for hybrid pumped-storage plants with integrated energy storage systems – *F. Errigo and F. Morel, SuperGrid Institute, France*
- Improving generator performance with innovative ventilation kits – *S. Bruna, T. Auzolle and N. Devillers, BH2M, France*
- Upgrading the generators at Bakun, Malaysia – *A. Binti Asmara, C. Landon and A. Abdul Kadir, Sarawak Energy Berhad, Malaysia*
- Root cause analysis on a 110 MW hydro unit based on vibration and air gap monitoring data – *O. Oreskovic, O. Husnjak, Veski Ltd, Croatia; Davor Bojic, HEP, Croatia, Veski Ltd, Croatia*
- Remote and local joint control of the Momina Klisura hydro plant – *I. Nujic, Končar - Power Plant and Electric, Croatia*

### Session 24: IEA Hydro

Co-Chairs: **Sam Bockenbauer, Chair of IEA Hydro; and Klaus Jorde, ExCo Secretary, IEA-Hydro**

- Presentations will include a general overview of IEA-Hydro: the general objectives and the ongoing and future activities.
- A representative of the IEA Secretariat will give insights on activities and a global analysis on the status of hydropower development and its role in the energy transition.
- There will then be presentations on a range of activities within the individual working groups (called Tasks) within IEA Hydro.

*Coffee Break in the Exhibition Halls*

### Session 25: Small hydropower - II

Co-Chairs: **Prof David Williams and Gordon Black, Learning Hydro, UK**

- The Mork powerplant in Norway: Climate- and nature-friendly small hydropower plant – *H. Kr. Halvorsen, Hafslund ECO Vannkraft AS, Norway*
- Small-hydro mobility – *A. Choulot, A. Bullani, L. Smati and V. Denis, Myhlab, Switzerland; M. Boelli, Skat Consulting Ltd, Switzerland*
- Small, mini and micro hydro case studies – *K. Smith and F. Atherley, Knoydart Renewables Ltd, UK*
- Installation of a new siphon to feed a 199 kW hydro plant and assisting the draw-down capacity of Whiteadder reservoir dam – *N. Beaumont, S. Clark, Scottish Water Horizons, UK*
- An innovative 48 kW containerized hydro plant to recover energy 'mid-way' through the waste water treatment (WWTW) process – *N. Beaumont and S. Clark, Scottish Water Horizons, UK*

### Session 26: Electrical engineering and grid management

Chair: **Dr Ralf Bucher, H & MV Engineering, Germany**

- Optimal parallelizing of power converters for a fully fed variable speed pumped hydro unit – *I. Legarra, E. Olea, N. Churruca, A.J. Raj and I. Atutxa, Ingeteam Power Technology, Spain*

## CONFERENCE SESSIONS

- Energy demand management in isolated grids powered by hydro – *A. Dall, E. Lundø Madsen, Nukissiorfiit, Greenland*
- Hydro generator design with a grid code framework – *I. Vazdar, Končar, Croatia*
- Regulatory changes to promote enhanced hydroelectric flexibility economically through digital solution, sensing and artificial intelligence – *J. Terra and R. Kelman, PSR Energy Consulting and Analytics, Brazil*
- Optimization of hydroelectric generation through primary and secondary power-frequency control systems: Cases in South America – *C. Bühler, Reivax, Switzerland; R.P. Gosmann, Reivax, Brazil*
- Innovative method to evaluate the primary frequency control applying simulated isolated network in two machines simultaneously at a 3600 MW hydro project – *C. Bühler, Reivax, Switzerland; R.B. de Paiva, National System Operator, Brazil; A.F.S. dos Santos, Santo Antonio Energy, Brazil*
- Reducing maintenance on turbine shafts – *H. Dekker and A.W. Chesterton Co USA*
- Assessment of the state of conservation, efficiency, and operation of the hydropower plant's components – *A. Pinter, Hydro Dolomiti Energia Srl, Italy; A. Romaioli and L.L. Papetti, Frosio Next S.r.l., Italy*
- Machine condition assessment of a 415 MW unit based on off-line and on-line measurements – *O. Oreskovic, O. Husnjak and E. Hacek, Veski Ltd, Croatia; A. Kostelac, Isum Energy, Croatia; L.E. Gune, Hidroeléctrica de Cahora Bassa, Mozambique*
- The use of advanced digital solutions for hydro plant O&M – *R. Hearnden, T. Zulzke Penteado, T. Wieser, A. Jung, M. Murnion, J.M. Nieto Diaz and A. Rubbert, Green Highland Renewables Ltd, UK*
- Application of the digital twin concept for operation and maintenance of hydro generating units – *A.-M. Giroux and Q. Dollon, Institut de Recherche d'Hydro-Québec, Canada*
- Field monitoring data-driven approach to the maintenance of hydropower assets – *D. Fornelli, Geotechnical Observations Ltd, UK*

### Session 27: Tunnels, penstocks and underground works - I

**Chair: Dean Brox, Consulting Engineer, Canada**

- Permanent waterway lining for the Kidston pumped-storage scheme – *C.N. Önald and D.Litsas, Mott MacDonald, UK*
- The Polihali Transfer Tunnel: from feasibility to tender – *J. Sawyer, J. Parry and M. Kastne, LHWP Phase II Project Management Unit, Lesotho*
- Underwater works and design engineering for the rehabilitation of intake structures and headrace tunnels at a large hydropower project in Colombia – *D. C. Villegas, J. C. Arango and A. Van der Pennen, DCN Diving, The Netherlands*
- The dewatering and condition assessment of the pressure shaft at existing pumped-storage schemes – *J. Troke, Stantec, UK; P. Mason, Damsolve Ltd, UK; C. Scott, Stantec and T. Shire, Stantec, UK*
- Inclined tunnel construction with Gripper TBMs for hydropower projects – *M. Lübbers and M. Peters, Herrenknecht AG, Germany*

**Lunch in the Exhibition Halls**

### Wednesday 18 October - Afternoon

#### Session 28: Hybrid renewable schemes

**Co-Chairs: Luc Deroo, ISL Ingénierie, France and Dr Kamal Laksiri, CEB, Sri Lanka**

- Floating solar hydro project in the Nile, Uganda – *M-L. Petitpain, ISL France*
- Hybrid pumped-storage hydro and wind farm schemes: Recent developments – *J. Cox, AECOM, UK*
- An economic model for revenues of the extension of operating range of hydropower plants – *Q. Boucher, R. Guillaume and J.-P. Payre, Supergrid, France*
- Implementation of the 16 MW Gaildorf hybrid wind-pumped storage plant in Germany – *K. Lochschmidt, V. Brost, S. Palt and A. Doerfer, Fichtner GmbH & Co. K, Germany*
- The challenges of a full-scale hybrid powerplant in the Philippines – *Dr H. Novik, Scatec, Norway*
- Conversion of a 1925 hydropower asset in Zambia into an advanced hydro/solar hybrid – *R. M. Lacey, WestGlen, UK*
- Ongoing Design of a three small hydro/storage/solar hybrid plants under development in West Cameroon – *J. Kenfack, B. Bignom, Solarhydrowatt, Sarl, Cameroon; V. Nkue, Ministry of Energy and Water, Cameroon*

#### Session 29: Operation and maintenance

**Chair: Helmut Obermoser, AFRY, Switzerland**

- EDF's e-Monitoring centre project for hydro plants in Türkiye – *M. Boucherit, Y.L Beck and M.E. Atmaca, EDF Hydro, France*

### Session 30: Tunnels and underground works

**Chair: Prof Leif Lia, NTNU, Norway**

- New ideas for old data: Intelligent ground models to support sustainability and value engineering in hydro projects – *J. Bradley, J. Neville and A. Drake, Mott MacDonald, UK*
- Use of a tunnel boring machine for tunnels mountainous terrain: The Sunkoshi Marin and Bheri Babai hydro schemes in Nepal – *L. Home, B. Shrestha, and P. Shrestha, Robbins, USA*
- Hidroituango: Collapse of an auxiliary diversion tunnel during construction – *D. Brox, Dean Brox Consulting, Canada*
- Key technology of support design for large-scale underground cavern in weak rock mass: A case study of Israel Kokhav Hayarden pumped-storage plant – *Jiajin Liu, Xingang Yao and Jiayao Wu, PowerChina Huadong Engineering Corporation Ltd, China*
- Repair of the headrace tunnel at the Chamera-1 power station – *D.R. Sagar and A. Gupta, NHPC Ltd, India*
- Optimizing secondary intakes by simplified CFD simulations – *A.B. Türkbek and L. Lia, NTNU, Norway; M. Szabo-Meszaros, Sintef Energy, Norway; K. Vereide, Sira-Kvina Power Co/NTNU, Norway*

**Coffee Break in the Exhibition Halls**

### Plenary Closing Session

- Session summaries by chairpersons
- HYDRO 2023 outcomes
- Welcome to HYDRO 2024 and ICOLD 2024



# TECHNICAL EXHIBITION AND SPONSORSHIP

A major Technical Exhibition will run alongside the HYDRO 2023 Conference (16-18 October), showcasing the latest developments in the hydro 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 two spacious exhibition halls, below the conference rooms. There will be a networking party after the conference sessions on Tuesday 17 October to provide an additional opportunity for meetings between exhibitors and the international delegates.

Exhibition stands are available in units of 6 m<sup>2</sup>, 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.

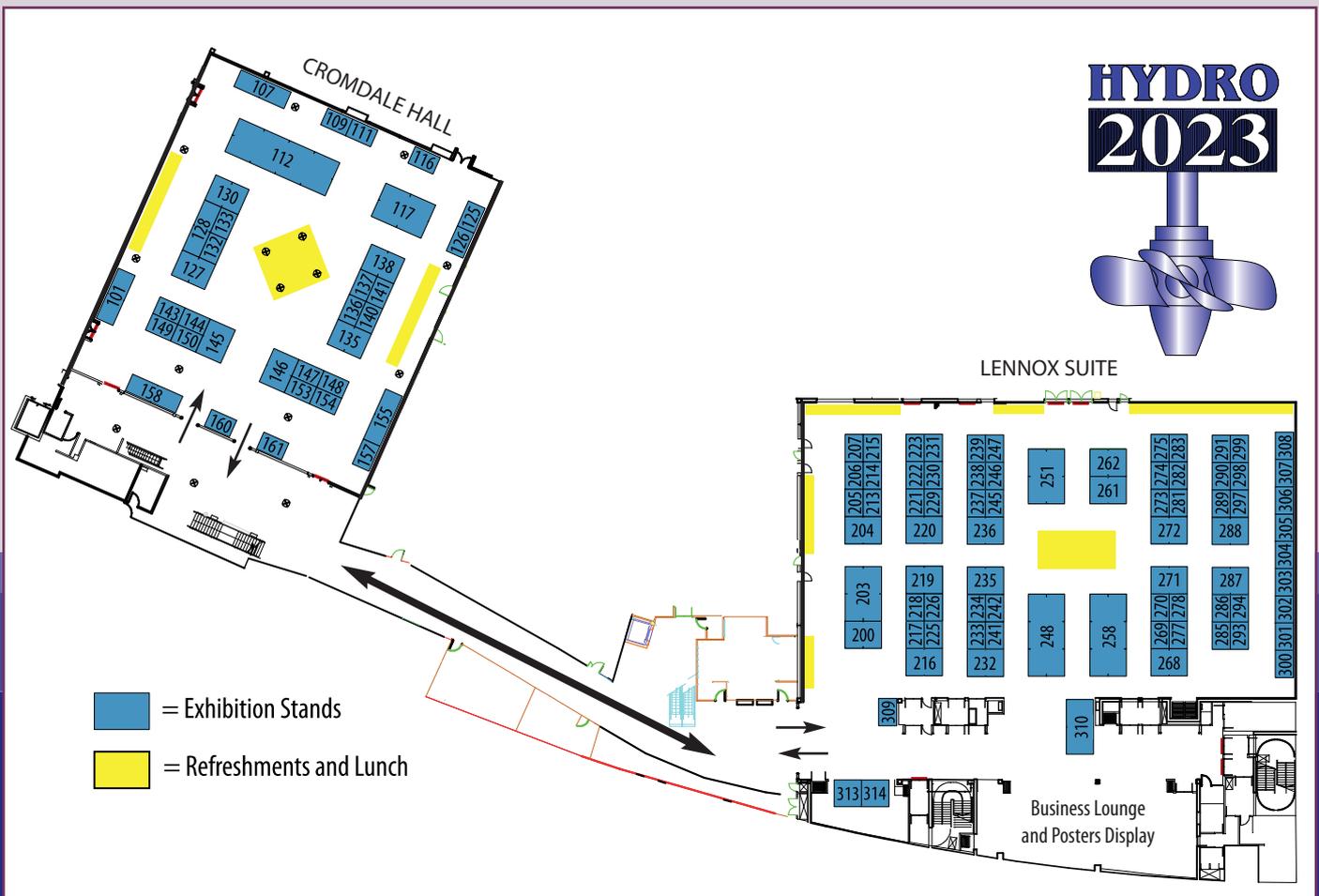
A number of sponsorship opportunities are available, such as the conference bags, water coolers, the coffee and lunch breaks, Wi-Fi, and the various social events. Further details can be obtained from our Sales & Marketing team or can be seen on our website.

For further information or to reserve an exhibition stand, please contact:

Mr Richard Henley, Mrs Melanie Ganz or Miss Tanita Chondrunaiko

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[www.hydropower-dams.com/hydro-2023/exhibition-plan/](http://www.hydropower-dams.com/hydro-2023/exhibition-plan/)



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## ACCOMPANYING PERSONS' TOURS

As usual at our HYDRO conferences, a three-day package of cultural and touristic tours is being arranged for accompanying persons, this time in and around Edinburgh.

- **Day One:** A pre-opening visit to Edinburgh Castle, to enjoy a private continental breakfast, followed by a tour of the castle and a visit to the Royal Botanical gardens.
- **Day Two:** A morning cruise on Loch Lomond, with lunch in a traditional local pub on the banks of the Loch. There will be time for a short walk on the paths along the shore of the loch, before travelling on to Stirling, for a visit to Stirling Castle .
- **Day Three:** A morning walk in Maarlyns Wynd, in the old town, followed by a haggis-making workshop and tasting. (Dietary requirements will be catered for). There will then be a walk along the Royal Mile, a fish and chips lunch, and then on to a kilt and bagpipe workshop.

## SOCIAL PROGRAMME

### Sunday 15 October

This year's dinner for Chairpersons and Speakers, following their briefing at the EICC, will take place a short coach ride away at the stunning Mansfield Traquair. This building is a former Catholic Apostolic church, completed in 1885, today maintained and run by the charitable organization Heritage Portfolio, and used for receptions and weddings. An outstanding feature is the scheme of mural decoration, painted by Phoebe Anna Traquair in the 1890s.

## POST-CONFERENCE GOLF DAY

### Thursday 19 October

We are pleased to announce the inaugural AMI golf event at HYDRO 2023, which is necessarily open to a limited number of participants. It will take place at the prestigious Eden Course at St Andrews (known as the 'Home of golf').

The format will be a four-ball event, open to all standards of golfers, which will be followed by a networking lunch in the clubhouse before the return to Edinburgh. The Eden Course is on the seaward



### Monday 16 October

The Welcome Reception, for all delegates and accompanying persons, will take place in the Grand Gallery of Edinburgh's splendid National Museum, located a short distance from the EICC. A buffet supper will be served, and there will be music, and a chance not only to explore the splendour of the Gallery, but also to tour two other exhibit halls, one focusing on milestones of Scottish history, and the other on science and technology.

### Tuesday 17 October

After the sessions on Tuesday, we will be holding the traditional networking party in the two exhibition halls at EICC. Refreshments (drinks and snacks) will be provided, and this will provide an informal and leisurely opportunity to tour the exhibition stands and hold discussions with the many international exhibitors. Some companies may choose to welcome delegates in small focused groups to see special demonstrations of new products at their stands.

### Wednesday 18 October

The HYDRO 2023 Farewell Dinner will be held at one of Edinburgh's modern visitor attractions and science centres, Dynamic Earth. The centre (a registered charity) is located in the Holyrood area, beside the Scottish Parliament building.

As well as the central hall, where dinner will be served beside a large globe-like structure, there are small interactive exhibition areas which can be visited in small groups during the evening. One includes a real iceberg, others simulate a rainforest and an earthquake, and another provides a deep ocean experience.

side of the Links, with some severe bunkers adding to a course full of typical Scottish Links' character.

The course provides equipment for hire, including pull trolleys, powakaddys and a wide selection of hire clubs and shoes supplied by the course's partner Callaway. These are all at extra cost. As places are limited, we recommend that you register for this event at your earliest opportunity. If you have already registered for HYDRO 2023, you can amend your booking to include this. The price per person will be €150, which will include transport from and back to Edinburgh, lunch and drinks, as well as the golf.



## POST-CONFERENCE STUDY TOURS

Two post-conference tours, (each three days with two overnight stays), are being planned to follow HYDRO 2023, departing from Edinburgh on Thursday 19 October and returning on Saturday 21 October in the mid-afternoon (around 15.00 hrs).

### Tour A

The Pitlochry hydro scheme, owned and operated by SSE will be the main focus of this tour. It was constructed between 1947 and 1951, and its visitor centre provides an opportunity to learn of Scotland's hydropower heritage. In addition to historical interest, the plant has a number of modern features, including a technique based on artificial intelligence to count and monitor fish.

En route there will be visits to mini hydro schemes in Perthshire: three on the private Atholl estate, equipped by Gilkes, UK; and, another implemented and operated by Green Highland.

On the first day there will also be a visit to the impressive Blair Castle and its gardens. Over 750 years it has been home to politicians, soldiers, agriculturalists and entrepreneurs. Its history is brought to life against a backdrop of fine 18th century interiors and Scots Baronial architecture, in 30 rooms.

On the second day, a tour of the Aberfeldy distillery has been arranged. There will be two nights' stay at the Atholl Palace hotel.

### Tour B

The major expansion project at the Cruachan pumped-storage scheme, in the west of the country, operated by Drax, will be the main focus of this tour, along with a visit to SSE's Sloy powerplant on Loch Lomond on the first day, and also be a chance to see a barrage which controls the level of the loch.

Two nights will be spent at the Oban Bay hotel, and there will be a chance for a walking tour in Oban, as well as a visit to the Oban distillery.

On the way back to Edinburgh on 21 October, there will be a stop to visit Inverary Castle, on the shore of Loch Fyne. The castle is one of the earliest examples of Gothic Revival architecture, and has been the seat of the Dukes of Argyll, Chiefs of the Clan Campbell, since the 18th century.

Transport on each tour will be by luxury coach, with the services of a local tour guide. All meals for the group will be included.

NB: If you require a night's accommodation in Edinburgh after the tours, this can be booked by EMS ([hydro2023@ems-ltd.org](mailto:hydro2023@ems-ltd.org))

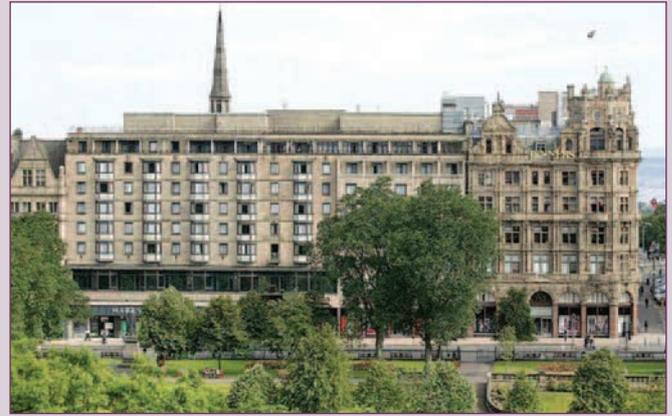
## THE INTERNATIONAL STEERING COMMITTEE

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A. J. Schleiss, Switzerland  
S. Sparkes, Norway  
J. Teyssieux, France  
A. Tremblay, Canada  
B. Trouille, USA  
O. Westberg, Norway  
D.A. Williams, UK  
Xu Zeping, China  
K-T. Yum, Republic of Korea  
G. Zenz, Austria



## ACCOMMODATION IN EDINBURGH

Rooms have been blocked for HYDRO 2023 delegates at a range of hotels and aparthotels in the city, most of which are within easy walking distance of the EICC. For those staying further away, there is an efficient tram service.

Just a few examples of hotels with rooms reserved for delegates are as follows:

The **Mercurie Edinburgh Haymarket** is a comfortable business hotel in the heart of the city, just 3 minutes' walk from EICC. The Castle and main attractions of Edinburgh are all less than 2 km away. Transfer from the airport is around 30 minutes. All rooms are equipped with smart TVs and free high-speed internet access.

The **Kimpton Charlotte Square** is a 5\* traditionally Scottish luxury hotel in the city centre. It is 2 minutes' walk from Princes Street Gardens, and 12 minutes' walk from the EICC. The hotel has a spa, two restaurants and two bar/lounges, and there is complimentary wireless internet.

The **Moxy Fountainbridge** is a boutique hotel, with modern and creative artistic features, in the city centre, close to EICC. It is part of the Marriott group, and has been recognized for its eco-friendly policies. There are large flat screen TVs and fast Wi-Fi connections in each room, and the hotel has a rooftop bar.

The **Voco Edinburgh Haymarket** is a comfortable modern hotel just a few minutes' walk from EICC, and also from Princes Street and its gardens. Its Blossom Restaurant and Bar provide a relaxing atmosphere, and there is a fitness centre. All bedrooms offer free high-speed Wi-Fi.

The 4\* **Novotel Edinburgh Centre** is about 8 minutes' walk from the EICC. It has a heated pool and spa, and a contemporary restaurant and bar. The bedrooms are newly upgraded.

Breakfast is included in all hotel bookings.

Self-catering apartments can also be booked.

Full details and prices of all the HYDRO 2023 hotels is available during the online registration process.



- Accommodation and tours should be booked at the same time as registration. The above give some examples of the hotels available, and details of other hotels can be found on the registration site.
- Please note the early fees are available until 18 August. We recommend booking early to secure your first choice of accommodation.
  - Reduced registration fees are available for subscribers to *Hydropower & Dams*.
- Letters to support visa applications can be prepared by the organizers for registered participants. Please allow plenty of time for the visa application process (see also Booking Conditions).

# BOOKING CONDITIONS

The Conference HYDRO 2023 - New Ideas for Proven Resources, 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](http://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 not a confirmation (until payment is received).

We encourage all delegates to register on-line; the registration site provides more information about the event. Pre-registration is required. 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 15 October 2023, at the Edinburgh International Congress Centre and delegate bags can be collected from 08.30 to 12.00 hrs, and from 14.00 to 19.00 hrs.

## Payment

Payment for all services (fees, hotels, tours) must be made in Euros (€) 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 2023. We recommend that you do not pass credit card details to them. Descriptions of the hotels are given on the registration site.

## Disclaimer

Best endeavours will be made to present the programme as printed. The HYDRO 2023 organizers and their agents reserve the right to alter arrangements, timetable, plans or other items relating directly or indirectly to HYDRO 2023 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. 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. The organizers accept no 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.

All services provided are subject to local laws. Arrangements for the Conference have been made in accordance with UK 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.

In the 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 conference 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 the UK

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

<https://www.gov.uk/check-uk-visa>

## 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 18 August to 24 September 2023	On or after 25 September 2023
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 next page for details.**

## CONTACT DETAILS

**For enquiries concerning registration and accommodation, please contact:**

**HYDRO 2023 Secretariat, Event Management Services (EMS)**

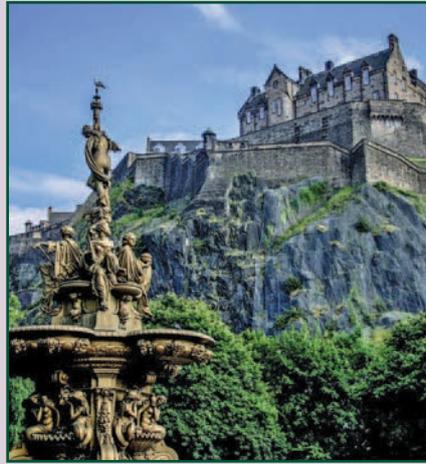
**Hydro2023@ems-ltd.org • Tel: +44 1225 258013**

**For enquiries about the programme, please contact: Ms Sarah James, c/o Hydropower & Dams**

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

**Email: [Hydro2023@hydropower-dams.com](mailto:Hydro2023@hydropower-dams.com)**

**For the latest information and online registration, visit: [www.hydropower-dams.com/hydro-2023](http://www.hydropower-dams.com/hydro-2023)**



**Online HYDRO 2023 registration is via the website: [www.hydropower-dams.com](http://www.hydropower-dams.com)  
 The system is simple to use, but in the event of any difficulties, please contact EMS.  
 Email: [hydro2023@ems-ltd.org](mailto:hydro2023@ems-ltd.org) ~ Tel: +44 1225 258 013  
 Prices for each delegate category and conference activity are given below.**

<b>EARLY DELEGATE FEE (to 18 August):</b> Includes attendance of the Conference and Exhibition; documentation; conference papers, downloadable from the App; morning and afternoon refreshments; lunches during the Conference; full social programme in the evenings	<b>€1120</b>	Fees excluding UK VAT (20%)
<b>FULL DELEGATE FEE (from 19 August):</b> Includes everything described above	<b>€1225</b>	
<b>REDUCED DELEGATE FEE:</b> For existing subscribers to <i>Hydropower &amp; Dams</i> .	<b>€1060</b>	From 19 Aug: <b>€1165</b>
<b>FEE INCLUDING NEW SUBSCRIPTION TO H&amp;D:</b> (6 issues from No. 6, 2023 + Atlas + Maps) (This represents a saving of about 35 per cent on the normal H&D subscription rate).	<b>€1230</b>	From 19 Aug: <b>€1335</b>
<b>SPEAKER FEE:</b> Includes everything described above for Full Delegates, plus an additional reception on Sunday 15 October. NB: This fee applies to <u>one</u> person per paper (main author or presenter).	<b>€ 665</b>	
<b>FIRST EXHIBITOR FEE:</b> (One full participant fee is included with exhibition booking).	<b>€ 0</b>	
<b>SECOND + THIRD EXHIBITOR FEE:</b> (Fee per person for up to two additional exhibitors). (Includes all benefits available to full delegates).	<b>€ 800</b>	
<b>SMALL HYDRO TRAINING SEMINAR:</b> (Full day on Sunday 15 October)	<b>€ 75</b>	
<b>BIM SEMINAR:</b> (Full day on Sunday 15 October)	<b>€ 150</b>	
<b>PUMPED STORAGE WORKSHOP:</b> (Full day on Sunday 15 October)	<b>€ 150</b>	
<b>ACCOMPANYING PERSON FEE:</b> (For family members, partners or friends <u>not</u> colleagues attending the Conference or Exhibition). The fee includes the excursions on each day with lunch, and evening social events.	<b>€ 470</b>	
<b>HALF DAY EXCURSION:</b> Visit the Royal Yacht Britannia, the Royal Mile, and Holyrood House (lunch included)	<b>€ 155</b>	

**TECHNICAL EXCURSIONS:**

- Tour A:** Pitlochry, and a variety of small hydro schemes in Perthshire      **€ 995** (single occupancy)    **€ 800** (double occupancy)
- Tour B:** The Cruachan expansion scheme, and Sloy powerplant at Loch Lomond    **€ 995** (single occupancy)    **€ 800** (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 your UK visa application.

*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.*