

In preparation for:

world hydropower
congress



In support of:

SUSTAINABLE
DEVELOPMENT GOALS

Digitalisation • Sustainability • Climate change

Improving decision-making for hydropower

19 September 2018 • Paris

Programme



Organiser:



In partnership with:





**Improving decision-making
for hydropower**
Executive workshop

Wednesday 19 September 2018
UNESCO
7 Place de Fontenoy, 75352 Paris
Paris, France

Introduction

Decision-making about hydropower is complex by nature. Operators and developers share responsibilities with various levels of administration and government over matters that go well beyond electricity generation.

With this workshop, the International Hydropower Association (IHA) is gathering senior executives and experts from around the world to discuss three trends which are shaping decision-making in the industry: digitalisation, sustainability and climate change.

Digitalisation

Digitalisation is providing owners and operators with an opportunity to improve outcomes for their power plants, provided data can be gathered, analysed and utilised in time by the relevant stakeholders.

Sustainability

The reporting and benchmarking of sustainability practices is affecting all stages of development, from early-stage planning to operation and modernisation.

Climate change

Climate change has instilled uncertainty in the decision-making mix, while access and usage of relevant information remains a problem in many countries with hydropower potential.

IHA, along with its members and partners will discuss the experience, knowledge and tools available to decision-makers to improve the performance of hydropower, and ensure that projects deliver satisfying, sustainable outcomes, which respond to wider water and energy policy expectations.

There will be a photographer taking pictures throughout the day. Please let a member of IHA staff know if you would rather not be photographed. All sessions will also be audio recorded for use by IHA.

Help take the conversation online by using the event hashtag #modernhydro



iha_org



bit.ly/linkedin-ihah

Programme

09:30-09:45 Welcome and introduction to the workshop

Blanca Jiménez-Cisneros, Director, Water Sciences, UNESCO
Richard Taylor, CEO, International Hydropower Association

09:45-11:00 Panel I: Data-driven decision-making Gathering and sharing data: the big picture

What are the tools used by river-basin and energy system planners?
How have these tools been developed? What are the lessons learnt?
What challenges are policy-makers facing in terms of security and sharing of data?
What information is lacking and how can we bridge the gap?
What are the capacity gaps in developing countries and how can we address them?

Speakers:

Jean-Pierre Roux, Programme Manager, SouthSouthNorth
Stela Nenova, Corporate Affairs Advisor, ENTSO-E
Youssef Filali-Meknassi, Senior Programme Specialist, UNESCO

11:00-11:15 Break

11:15-12:30 Panel II: Data-driven decision-making Using data in practice: industry perspectives

How does big data drive changes in business models and operation?
How do companies structure themselves to deal with big data?
How do owners and operators define “smart data”?
What are the latest trends in digitalisation and how may they change the way
hydropower assets are operated and maintained?
Machine-learning and artificial intelligence: what are the limits?

Speakers:

Daniel Paschini, Director, EDF-GEH Maurienne
Jorge Habib, Engineering Superintendent, Itaipu Binacional
Mauro José Corbellini, Executive Technical Director, Itaipu Binacional
Óli Sveinsson, Executive Vice President of Research & Development, Landsvirkjun
Zhou Mengxia, Project Manager, Baihetan HPP, China Three Gorges Corporation
Zhu Qiang, Senior Project Manager, China Three Gorges Corporation

12:30-13:15 Lunch

13:15-14:15

Panel III:
Evidence-based decision-making
Case-study: sustainability

What evidence is required by decision-makers in the finance sector? Elsewhere?
How has hydropower planning and operation been affected by these expectations?
What tools exist to facilitate the gathering and structuring of evidence?
How has the sector addressed decision-making based on cumulative impact?

Speakers:

João Costa, Sustainability Specialist, International Hydropower Association
Jorge Gastelumendi, Global Policy Lead for Water, The Nature Conservancy
Pravin Karki, Global Lead Hydropower & Dams, World Bank Group
Roger Gill, Managing Director, Hydro Focus
Sara Mercier-Blais, Research Associate, Université du Québec à Montréal

14:15-14:45

Panel IV:
Upcoming sector initiatives

Hydropower Europe
FutureDAMS
World Hydropower Congress

Speakers:

Jean-Jacques Fry, President, ICOLD European Club
Julien Harou, Chair in Water Engineering, The University of Manchester
Greg Tracz, Chief Development Officer, International Hydropower Association

14:45-15:05

Break

15:05-16:05

Panel V
Decision-making under uncertainty
Case study: climate change

What is decision-making under uncertainty?
How does it apply to hydropower planning and operation?
What tools exist to facilitate decision-making?

Speakers:

Denis Aelbrecht, Chair, technical committee on “Global Climate Change, Dams and Reservoirs”, ICOLD
Gabriel Azevedo, Chief, Environmental, Social & Governance Division, IDB Invest
Julien Harou, Chair in Water Engineering, The University of Manchester
María Ubierna, Senior Hydropower Analyst, International Hydropower Association

16:05-16:15

Conclusion

Participants

Ajay Chaudhary, Account Leader – Hydropower, Mott MacDonald Limited
Anthony Hurford, Research Group Manager, The University of Manchester
Antoine Badinier, Directeur Délégué, EDF
Arnaud Dubrac, Project Manager for Energy (Asia), French Development Agency
Awadh Giri, Founder and Principal Adviser, Hydrofe3
Ayako Kageyama, Director, E&S Risk Management, Standard Chartered Bank
Blanca Jiménez-Cisneros, Director, Water Sciences, UNESCO
Christine Cantin, Senior Advisor, Hydro-Québec
Christian de Gromard, Energy Practice Leader, French Development Agency
Daniel Paschini, Director, EDF
David Krug, Assistant Director for the Technical Directorate, Itaipu Binacional
David Hulme, Professor of Development Studies, The University of Manchester
Denis Aelbrecht, Chair, technical committee on “Global Climate Change, Dams and Reservoirs”, ICOLD
Etienne Machacek, Project Manager, EDF
Evgeniy Tikhonov, Strategy and Development Director, EuroSibEnergo JSC
François Halgand, Hydro Technical Director, Tractebel Engineering S.A.
Gabriel Azevedo, Chief Environmental, Social & Governance Division, IDB Invest
Gil Maranhão Neto, Director of Business Development, Engie Brasil
Greg Tracz, Chief Development Officer, International Hydropower Association
Jamie Skinner, Principal researcher, International Institute for Environment and Development
Jean-Jacques Fry, President of European Club, ICOLD
Jean-Luc Pigeon, Director-Environmental Resource Centre, Tractebel Engineering S.A.
Jean-Pierre Roux, Project Manager, SouthSouthNorth
João Costa, Sustainability Specialist, International Hydropower Association
Joerg-Peter Albrecht, Director Business Development, Lahmeyer International GmbH
Jorge, Gastelumendi, Global Policy Lead for Water, The Nature Conservancy
Jorge Habib, Engineering Superintendent, Itaipu Binacional
Juergen Schuol, Head of Sustainability, Voith Hydro Holding GmbH & Co. KG
Julien Harou, Chair in Water Engineering, The University of Manchester
Ken Adams, President, International Hydropower Association
Lamu Audu, CEO, Mainstream Energy Solutions Ltd.
Laurent Dubus, Expert Researcher, EDF
Laurent Sevrin, President, Heleosys
Lin Chuxue, Vice President, China Three Gorges Corporation
Maria Ubierna, Senior Hydropower Analyst, International Hydropower Association
Mario Arquilla, Managing Director, Andritz Hydro
Martin Fuchs, Head of Hydro Consulting, Pöry Austria GmbH
Mauro José Corbellini, Executive Technical Director, Itaipu Binacional
Oivind Johansen, Deputy Director, Ministry of Petroleum and Energy, Norway
Óli Sveinsson, Executive Vice President of Research & Development, Landsvirkjun
Pierre Levasseur, Project Officer, EDF
Pierre Lorillou, Senior Hydropower Specialist, World Bank Group
Polycarp Wong, Vice President, Hydro, Sarawak Energy
Pravin Karki, Global Lead for Hydropower & Dams, World Bank Group



Gil Maranhão Neto F.IHA
Chief Strategy,
Communications and CSR
Engie Brasil

Christine Cantin F.IHA
Senior Advisor
Hydro-Québec

Moisés Machava Filha
Executive Director
Hidroeléctrica de Cahora Bassa



international hydropower association

Recognising
your experience

Become
a Fellow
of IHA

A new tier of
membership
launching in 2018

Participants (continued)

Richard Taylor, CEO, International Hydropower Association

Roger Gill, Managing Director, Hydro Focus

Sara Mercier-Blais, Research Associate/Biologist, Université du Québec à Montréal

Stela Nenova, Corporate Affairs Advisor, ENTSOE-E

Susanna Hyrkäs, Environmental Expert, Fortum Power and Heat Oy

Tammy Chu, Managing Director, Hydro Tasmania (care of Entura)

Tron Engebretsen, Senior Vice President, International Hydro, Statkraft Energi AS

Victor de Genot, International Business Manager, Pöyry Austria GmbH

Youssef Filali-Meknassi, Senior Programme Specialist, UNESCO

Yves Rannou, Board member, International Hydropower Association

Zhou Mengxia, Project Manager Baihetan HPP, China Three Gorges Corporation

Zhu Qiang, Senior Project Manager, China Three Gorges Corporation

Partners

The **International Hydrological Programme (IHP)** is the only intergovernmental programme of the UN system devoted to water research, water resources management, and education and capacity building. Since its inception in 1975, IHP has evolved from an internationally coordinated hydrological research programme into an encompassing, holistic programme to facilitate education and capacity building, and enhance water resources management and governance.



The **International Hydropower Association (IHA)** is a non-profit membership organisation formed in 1995. Its mission is to advance sustainable hydropower by building and sharing knowledge on its role in renewable energy systems, responsible freshwater management and climate change solutions.

IHA was a pioneer of the Hydropower Sustainability Assessment Protocol and is actively involved with academic, financial, governmental and non-governmental partners in advancing international industry good practice.



Speakers



Blanca Jiménez Cisneros, Prof., PhD, Certified Environmental Engineer with master and PhD

degrees in Water, has 35 years of professional experience in academia. Currently, she is the Secretary for the International Hydrological Programme and the Director of Water Sciences at UNESCO.

Throughout her career she has held leading positions at governmental organisations as well as scientific and professional national and international organisations, often being the first woman/Latin American person to hold the position.

Blanca has produced over 487 publications in scientific journals, books and conferences, and has been the author of Mexican and international standards and patents on water. She is responsible for 192 research and innovation projects.

She has received several honours and awards in Mexico and at the international level. She received the Global Water Award granted by the International Water Association (IWA) in 2010 and in 2002 the Royal Polar Star presented by the King Gustaf of Sweden. She served on the Nominating Committee for the Stockholm Water Prize (2007-2012).



Daniel Paschini

graduated in Engineering from the Ecole Centrale Paris, France, in 1994. Earlier in his

career he worked as Plant Manager on the 1,800 MW Grand'Maison pumped-storage plant and as Department Manager at EDF's Hydro Engineering Centre, in charge of Electro-mechanical and SCADA refurbishment.

He joined NTPC, Lao PDR, as Executive Director in 2012, mainly in charge of technical and commercial topics.

In September 2016, he was promoted to the position of Director of EDF-GEH Maurienne hydro business unit (28 power plants totalling 2,500 MW), one of EDF's three hydropower operating groups.



Denis Aelbrecht

works with Electricité de France (EDF) as hydraulics expert in the Hydro Engineering Centre (CIH). His current

area of expertise covers hydraulics and civil engineering issues for power generation assets (hydro and nuclear), including: marine renewable energy development, hydraulic structures design, hydrodynamics modelling, flood risk management and control, and reservoir sedimentation management.

He joined EDF in 1995, and has held successive positions in EDF as research engineer (1995-2000), project manager (2000-2002), and group manager (2002-2005). He was also senior project manager with EPRI in the USA between 2005 and 2007. He has been with EDF-CIH since 2007, where he formerly worked as hydraulics service manager (2008-2014), before moving to his current position as expert.

He is a member of the scientific and technical committee of the “Société Hydrotechnique de France” (SHF), the French section of IAHR. He is also a member of the executive board of French national committee on large dams (CFBR), and serves as chairman of the International Commission on Large Dams (ICOLD) technical committee on “Global Climate Change, Dams and Reservoirs”.



Gabriel Azevedo

is a civil engineer with an MSc. and a PhD in hydrology and water resources management from Colorado State University.

Gabriel has been involved in infrastructure development and environmental management projects in some 30 countries. He worked at the World Bank as lead water resources engineer for Latin America and later for Europe and Central Asia as well as sustainability sector leader for Brazil.

He was formerly vice president for the Latin America and Caribbean region with the World Wildlife Fund for Nature (WWF). In 2008 he joined the Odebrecht Organisation where he was sustainability director for Odebrecht Energy, and for Odebrecht Engineering and Construction. He is now head of environment, social & governance division at Inter-American Investment Corporation.

Throughout his career, Gabriel has been directly involved with more than 20 large dam projects in various capacities. He has also participated in a number of research and teaching initiatives. He is a member of the International Hydropower Association and of the World Water Council.



Greg Tracz is Chief Development Officer at the International Hydropower Association (IHA) where he leads

business development for members and strategic outreach for the association. He has been involved in public policy and communication in the energy sector for over ten years.

At IHA, he is responsible for identifying business opportunities for members and supervises the delivery of key projects, including the World Hydropower Congress, a biennial policy forum for decision-makers in the water, climate and energy sectors. He holds a masters' degrees in political science from Sciences Po (Paris) and a master's in environmental law from Paris-Sorbonne University. Prior to IHA, Greg has worked in climate and energy-related positions in France and the United States.



Jean-Jacques Fry, graduated in 1974, obtaining a PhD at Ecole Centrale de Paris (1977). He worked for UNDP/OPE as a consultant

up to 1982. He joined EDF in 1982 and worked as consultant for more than thirty international hydropower projects.

He was Professor in Ecole Centrale de Lyon from 1995 to 2016 and General Secretary of CFBR from 1991 to 2002. He supervised more than 10 PhD and wrote more than 120 publications. He edited two books: "Internal Erosion of Dams and their Foundations" in 2007 and "Qualification of seismic dam analysis and their equipment" in 2018.

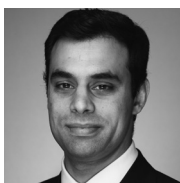
He is the President of the European Club of ICOLD.



Jean-Pierre Roux is a Programme Manager at SouthSouthNorth in Cape Town, South Africa. He manages research

and technical assistance grants supporting sustainable development projects across the African region, with a focus on climate science, adaptation and low carbon development. He coordinates the implementation of the Future Climate for Africa programme, a 5-year research collaboration aiming to generate fundamentally new climate science focused on Africa, and to ensure that this science has an impact on human development across the continent.

He holds an Honours Bachelors in Philosophy from the University of Cape Town and a Masters in Environmental Policy from Oxford.



João Costa joined the International Hydropower Association's sustainability team in October 2017. His work

focuses on developing the Hydropower Sustainability Assessment Protocol and on driving its implementation through training and capacity-building projects worldwide.

João earned an MSc in civil engineering at the Instituto Superior Tecnico in Lisbon, before deciding to further his studies with an MPhil in engineering for sustainable development at the University of Cambridge. There, he focused his research on hydropower, particularly on the development of a screening tool to assess the viability of harnessing energy from storm water.

Prior to joining IHA, in his eight years of experience as a civil engineer, João worked in numerous international projects, including a hydropower plant in Portugal and a range of construction schemes in the UK and the Middle East.



**Jorge
Gastelumendi**

is the Director of Global Freshwater Policy at The Nature Conservancy (TNC) where he oversees

the water policy practice globally: sustainable hydropower, source water protection, and water markets since 2015. Before this, Jorge was the Senior Policy Advisor for International Climate Policy at The Nature Conservancy where he led TNC's Climate Finance team supporting in-country financial arrangements. In this capacity he was lead advisor from mid-2013 until the adoption of the Paris Agreement to the Government of Peru in its dual role as UNFCCC COP20 Presidency and as co-chair of the Green Climate Fund's Board.

Before joining TNC in 2008, Jorge was carbon fund manager at The World Bank's Carbon Finance Unit. In Peru, he headed the Environmental Law Department at Grau Law Firm and provided expert analysis on Peru's Policy Framework for the Clean Development Mechanism. Jorge was a professor at Georgetown University Law Center until 2012. He holds a J.D. from Peru's Catholic University, an MSc. in Energy and the Environment from the University of Calgary and a Master in Public Administration from the Kennedy School of Government – Harvard University.



Jorge Habib is Superintendent of Engineering for Itaipu Binacional. He joined the Itaipu project in 1989, working as

an automations engineer. In 2006 he became the Assistant to the Technical Director and also the Coordinator of Itaipu's Corporate University. Mr. Habib's department is in charge of the Itaipu Modernization Project and also of R&D programs.

Jorge holds a B.S. in Electrical Engineering from Federal University of Paraná (UFPR-Brazil) and an M.S. in Software Engineering from the Aeronautics Institute of Technology (Brazil), as well as an MBA from FIA/ USP. Jorge Habib is also a lecturer at the State University of Western Paraná.



Julien Harou is Chair in Water Engineering since 2013. Previously he was a lecturer at University College London. He has a

PhD from the University of California Davis in water resources engineering and economics and a Master's degree from Cornell University.

Julien's group contributes globally leading research in water resources planning and management, water-energy-food systems, and environmental management software. He is research director of the \$10M RCUK-funded FutureDAMS project, lead of NERC's Water Stewardship Portal project and a co-investigator of NERC's UMFULA project.

Current and recent collaborators include the World Bank, IUCN, UK water regulators (EA, Ofwat), UK water companies, TNC, IWMI, WWF, IFC, DEFRA, the European Commission, IHA, and various consultancies.



María Ubierna joined the International Hydropower Association's Hydropower Association's

hydropower development work programme in January 2017. Her work focuses on building and sharing knowledge on sustainable hydropower development, working on several topics such as sediment management and water footprint.

María holds a master's degree in civil engineering specialized in hydraulics and environment from Spain. She pursued her studies abroad with a master of advanced studies in sustainable water resources from ETH Zurich. María has experience as an analyst in the consulting firm Accenture, and as a research assistant in the Chair of Hydrology and Water Resources Management at ETH Zurich, where she conducted research on water resources management strategies, with focus on developing countries in Africa.



Mauro José Corbellini is an electrical engineer with more than 50 years of experience in the field. He worked

both in the implementation of the telecommunications infrastructure and on the projects of several large hydro plants in the state of Paraná, as well as being one of the pioneers in the studies for the interconnection of the Brazilian electrical system, after having specialized in load flow studies in the United States.

He worked at the World Bank, developing projects in all regions of Brazil, and with the Organization of American States, in a watershed preservation project. He contributed to the implantation of vehicle assemblers in Paraná and in other states of the country.

He has been Executive Technical Director of Itaipu since the beginning of 2018.



Óli Sveinsson is the executive vice president of research and development at Landsvirkjun, the National Power

Company of Iceland. He has a degree in physics from the University of Iceland (1995), and MSc (1998) and PhD (2002) degrees in civil engineering specialising in hydrological processes from Colorado State University. Óli did postgraduate work (2002–04) at the International Research Institute for Climate Prediction, Columbia University. Early in his career he worked as a hydrologic surveyor for the National Energy Authority of Iceland and as a surveyor for an engineering consulting office. He has been a lecturer at both college and university level and provided consultancy services.

Since 2004, Óli has worked for Landsvirkjun or its subsidiaries, first as a department head for engineering research, and since end of year 2010 as executive vice president of research and development. The research and development division manages investigations and preparations of new-renewable power projects, increases flexibility in energy production and introduces innovation into energy production.



Pravin Karki has over 25 years of professional experience relating to hydropower and water resources, mainly in

hydropower engineering, international policy and academic research.

He completed his bachelor's degree in water resources and hydraulic structures from the Czech Technical University followed by an MSc in hydropower engineering from Norway. He graduated with a MPhil in engineering for sustainable development from Darwin College, Cambridge University, UK.

He joined the World Bank in 2008 and currently leads the Global Solutions Group on Hydropower & Dams in the Energy and Extractives Practice of the World Bank.



Richard Taylor has been involved in the water and energy sectors since 1985, and his work has involved assignments in

more than 50 countries worldwide. In addition to water and energy, his interests include climate change and sustainability.

He has been engaged in United Nations initiatives on water (WWDR and UNEP), energy (UNIDO and UNDESA) and climate change (UNESCO and IPCC). He has also participated in the work of other international organisations, such as the World Bank Group, International Renewable Energy Alliance, REN21, International Renewable Energy Agency, International Energy Agency, World Energy Council, World Water Council, Global Environment Facility, Climate Investment Funds and the Climate Bonds Initiative.

He is a Fellow of the Energy Institute in the United Kingdom, and an alumnus of the University of Cambridge Institute for Sustainability Leadership. In 2001, Richard Taylor was appointed executive director of the International Hydropower Association. Since 2015, he has been serving as chief executive officer of the IHA group of not-for-profit companies, which carry out the work of the association.



Roger Gill has over 30 years of experience in the renewable energy sector. He is principal consultant in his Hydro

Focus Pty Ltd international consulting business, specialising in providing advice on the sustainable development of renewable energy projects and the efficient operation of renewable energy businesses.

Prior to embarking on his consulting practice in 2007, Roger was executive general manager at Hydro Tasmania directly responsible for the operations and trading of 2,300 MW of hydropower in the Australian electricity market. He also has management experience in the development of several wind farms in Australia. He has a background in civil engineering and has undertaken business studies at Harvard Business School.

He is currently a non-executive director of several corporations in Australia related to renewable energy, irrigation and rail transport services, including Pacific Hydro Pty Ltd, Tasmanian Irrigation Pty Ltd, and Tasmanian Railway Pty Ltd. He has been a Board member of the International Hydropower Association since 2002.



Sara Mercier-Blais is a research associate at Université du Québec à Montréal. After a M.Sc. degree in Biology

studying the impacts of thermocline deepening on GHG emissions from a natural lake, Ms. Mercier-Blais joined in January 2015 Yves Prairie research lab at Université du Québec à Montréal as a research associate to work on the G-res Tool project. This research project is modelling the variability of GHG emissions from hydropower reservoirs. This work has provided a more detailed understanding of the GHG footprint of reservoirs as well as an easily accessed tool to calculate individual reservoir footprints and brings us a step further in our ability to rapidly and efficiently predict the carbon footprint of existing and future reservoirs.



Stela Nenova

is presently a corporate affairs advisor at ENTSO-E, the European Network of Transmission

System Operators for Electricity, where she focuses mainly on policy, strategy, and stakeholder relations. Prior to this position, she worked for three years as a policy advisor to a Member of the European Parliament on energy, environmental and industrial policy, and climate change.

She started her career in the energy field as a business analyst and auditor at M&C Energy Group (now part of Schneider Electric) in Budapest, Hungary, consulting clients on energy risk management and energy procurement.

Ms Nenova holds a B.A. double degree in Economics and European Studies from Mount Holyoke College, MA, USA and an M.A. Degree in Public Policy from CEU, Budapest, with a specialisation in International Public Policy.



Youssef Filali-Meknassi

holds a Ph.D. degree in hydrology from the INRS in partnership with the "École Polytechnique

de Montréal". At the end of his studies, he completed his first post-doc at the Universitat Politècnica de Catalunya and a second post-doc at the Missouri University of S&T. Dr Filali was then promoted to Research Assistant Professor in 2005 due to his contributions to the Environmental Research Center. In 2007, he got the Wesley W. Horner Award from the ASCE.

He joined UNESCO in September 2006 and spent 10 years working in Africa. Since January 2016 he joined UNESCO HQ in Paris and launched the Water Information Network System (WINS). He is actually Senior Programme Specialist & Deputy chief of Groundwater Systems and Settlements section (GSS).

Dr Filali-Meknassi has over 40 peer-reviewed papers, around 200 reads and 700 citations.



Zhou Mengxia

works for the China Three Gorges Corporation as a project manager at the Baihetan Hydropower

Project, which is currently the largest hydropower station under construction in the world. He is mainly engaged in the work of intelligent technology of dam construction, temperature control and crack prevention of mass concrete structure.



Zhu Qiang is an

engineer from the IT department at the China Three Gorges Corporation. He graduated from Peking University

with a degree in photogrammetry and remote sensing, and has done two-years postdoctoral research on the application of the geospatial information technology in hydropower project. He is now engaged in the application planning of ICT technology and management system construction. Among which, he is mainly responsible for the developing of the decision support system in the command centre, CTG, and the application of geographic information system as the senior project manager.

Glossary

The **Mid-term Adequacy Forecast (MAF)** is a Pan-European assessment of power system adequacy spanning the timeframe until 2025. Designed to assist decision-making, it is based upon a state-of-the-art probabilistic analysis conducted using sophisticated market modelling tools.

Agency for the Cooperation of Energy Regulators (ACER), a European Union Agency, was created by the Third Energy Package to further progress the completion of the internal energy market both for electricity and natural gas. As an independent European structure which fosters cooperation among European energy regulators, ACER ensures that market integration and the harmonisation of regulatory frameworks are achieved within the framework of the EU's energy policy objectives.

Automatic data acquisition systems (ADAS) are electronic devices used to automatically read, store, and transmit measurements from geotechnical, environmental, and structural sensors used for monitoring dams and levees.

Automatic generation control (AGC) is a system for adjusting the power output of multiple generators at different power plants in response to changes in the load. Since a power grid requires that generation and load closely balanced at any moment, frequent adjustments to the output of generators are necessary.

Automatic voltage control (AVC) maintains the voltage profile of a power system in an acceptable range and minimises the operational cost by coordinating the regulation of controllable components.

Clean Energy Package or Clean Energy for All Europeans is a set of measures initially presented by the European Commission in November 2016 in order to provide the stable legislative framework needed to facilitate the clean energy transition in Europe. The legislative proposals cover energy efficiency, renewable energy, the design of the electricity market, security of electricity supply and governance rules for the Energy Union.

Climate Resilience Guidelines for the hydropower sector aim to provide practical and workable international good practice guidance for project owners, governments, financial institutions and private developers. The guidelines will incorporate climate change resilience and hydrological risk management into hydropower project appraisal, design, construction and operation, resulting in more robust and resilient projects. The World Bank and EBRD are supporting IHA as the Secretariat for the coordination of the testing and the updated version of the guidelines.

Climate Resilience is the capacity of a hydropower project or system to absorb the stresses imposed by climate change, and in the process to evolve into greater robustness. Projects planned with resilience as a goal are designed, built and operated to better handle not only the range of potential climate change and climate-induced natural disasters, but also with contingencies that promote constructive, minimally-destructive failure, and efficient, rapid adaptation to a less vulnerable future state.

Climate stress testing is used to determine the system response to different climate states. It produces a climate response map showing the economic performance of the project across a wide range of possible climate states. The inputs to the hydrological and water system model are weather variables (precipitation and temperature) that simulate climate change for a plausible range of future potential climate scenarios.

CORESO is one of the five Regional Security Coordinators (RSCs), which are companies owned by the Transmission System Operators (TSOs). They perform services for the TSOs, such as providing a regional model of the grid or performing advanced calculations to show which remedial actions are the most cost-efficient, without being constrained to national borders, and helping to regionally ensure security of supply by means of coordination activities. CORESO's mission is to proactively help TSOs to ensure security of supply on a European and regional basis. As a centralised

RSC, CORESO focuses its coordination activities and thus provides the highest added value from a few days ahead until Intraday (a few hours before real time). It develops and performs coordination services in cooperation with TSOs and RSCs, while TSOs remain responsible for operation.

Data mining is the process of discovering patterns in large data sets (e.g. identification of plausible scenarios under future climate change) involving methods at the intersection of machine learning, statistics, and database systems.

ENTSO-E (European Network of Transmission System Operators (TSOs) for Electricity), represents 43 TSOs across 36 countries and has been given mandates by European Union regulation to advance on the integration, decarbonisation and security of the European power systems and markets.

IHP-WINS (UNESCO Hydrological Programme Water Information Network System) was launched in January 2017. The Water Information Network System (WINS) is an open access and free participatory platform for sharing, accessing and visualising water-related information, as well as for connecting water stakeholders. Developed and maintained by the International Hydrological Programme (IHP) of UNESCO, WINS is a tool designed to support decision-making, deriving policy recommendations, and building capacity for sound, efficient, and scientific-based water resources management.

Net Present Value (NPV) is the value of all future cash flows (positive and negative) over the entire life of an investment discounted to the present. NPV analysis is a form of intrinsic valuation and is used extensively across finance and accounting for determining the value of a business, investment security, capital project, new venture, cost reduction program, and anything that involves cash flow.

Network codes: grouped in three overarching areas (connection, operational and market codes), ENTSO-E's network codes are binding pan-European rules drafted by ENTSO-E, with guidance from ACER, to facilitate the harmonisation, integration, and efficiency of the European electricity market.

Plant Information Management System (PIMS) collects and integrates information about a production process from different sources.

Remote terminal unit (RTU) is a microprocessor-controlled electronic device that interfaces objects in the physical world to a distributed control system or SCADA system by transmitting telemetry data to a master system, and by using messages from the master supervisory system to control connected objects.

SCADA (supervisory control and data acquisition) is a system of software and hardware elements that allows industrial organisations to control industrial processes locally or at remote locations, monitor, gather, and process real-time data and record events into a log file among other things.

Seasonal outlooks: the ENTSO-E outlook reports present the views of Europe's TSOs regarding national, regional, and pan-European security of supply for the summer and winter periods and highlight possibilities for neighbouring countries to contribute to the generation/demand balance in critical situations.

Ten-Year Network Development Plan: this plan, designed by the European Union, identifies gaps in infrastructure, building on national and Regional Investment Plans (RIPs). It informs decision-makers in Member States and other stakeholders about projects with a network-wide impact.

world hydropower congress



For more information: **hydropower.org/congress**

The seventh World Hydropower Congress is organised by the International Hydropower Association (IHA) and hosted in partnership with UNESCO's International Hydrological Programme.

Delegates from up to 100 countries are expected to be represented at the biennial event in Paris, France, between 14 and 16 May 2019.

With the theme of 'The Power of Water in a Sustainable, Interconnected World', the Congress will focus attention on hydropower's role in delivering on the Paris Climate Agreement and the Sustainable Development Goals.

Join us

Latest information on the programme and speakers will be announced at hydropower.org/congress.

Contact us at congress@hydropower.org for early registration and to participate in preparatory meetings.

Become a partner

To become a strategic partner and learn about sponsorship opportunities, please contact iha@hydropower.org



Visit the World Hydropower Congress website
hydropower.org/congress



Delivering on the **Paris Agreement** and the **Sustainable Development Goals**

The power
of water in a
sustainable,
interconnected
world

14-16 MAY 2019 • PARIS

**The global gathering that brings together decision-makers,
innovators and experts to shape the future of hydropower.**

This high-level event will chart the course for hydropower development,
ensuring that reliable and resilient water and energy systems benefit all.

ORGANISER



HOST



STRATEGIC PARTNERS



SUPPORTING & PROGRAMME PARTNERS



