# world hydropower Congress

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

### 14-16 MAY 2019 • PARIS



The power of water in a sustainable, interconnected world

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## PARTNERS

Sustainable hydropower does not happen in isolation



### **Global leaders committed to sustainable development**

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#### Our common goal is to provide water and energy to all. Without this, none of the Sustainable Development Goals are achievable.

Our strategic partners are helping us with the knowledge, networks and resources needed to make the congress a catalyst for innovation, collaboration and progress in the water and energy sectors, with hydropower as a common thread in our discussions What good practices and ideas can we share to accelerate the deployment of renewable energy and ensure energy security in the face of climate change?

Coming from the world of business, academia, research, civil society, government or finance, each of our partners is committed to dialogue and to bringing their solutions and leadership to the table to resolve these pressing challenges.





## AT-A-GLANCE

A week to influence the course of hydropower



## **Programme overview**



MON TUE **13 MAY MINISTERIAL** 09:30-13:30 WORKSHOPS CONFERENCE Climate resilience CAPACITY BUILDING Hydropower benefits 09:00-16:30 Francophone sustainability training **UNESCO** International Conference 09:00-13:30 **MINISTERIAL** on Water 10:00-12:00 ASSOCIATED 14:30-15:45 THE POWER Hydropower MEETING **OF WATER** Sustainability Assessment JOINT PLENARY Protocol Governance Committee WORKSHOPS 13:00-17:30 congress Conference on Water Sediment management CAPACITY BUILDING Sustainability protocol Operations and maintenance 16:00-17:15 CE0 18:00-20:00 ASSOCIATED ROUNDTABLE Hydropower MEETING Sustainability Assessment Protocol Council RECEPTION

17:15-18:15

**14 MAY CONFERENCE** 

Pumped hydro Hydropower project preparation Capacity building 12:15-13:05 Europe Africa

South and Central Asia 13:20-14:35 Digitalisation

09:00-09:30

Day 2 Launch

09:30-10:15

Modernisation

10:45-12:00

Integrated planning

Hydropower carbon footprint

Sustainability assessment Climate resilience 15:05-16:20

> Clean energy systems River basin development Sediment management

WED **15 MAY 16 MAY** 09:00-09:30 congress Day 3 Launch 09:30-10:15 FOCUS SESSIONS Technology disruption SESSIONS Regional interconnections Hydropower benefits 10:45-12:00 Green bonds Small-scale power systems Data Management REGIONAL REGIONAL 12:15-13:05 FOCUS FOCUS North America Latin America East Asia and Pacific FOCUS 13:20-14:35 FOCUS SESSIONS SESSIONS Hydropower safety Project ownership

#### 15:05-16:20 Closing session

Protected sites

FOCUS 09:30-10:15 Savoie (France) Isere (France)

THU

FRI

17 MAY

**STUDY TOURS** 

**STUDY** TOURS Haut-Rhin (France) Germany and Luxembourg Portugal Switzerland

FRI

**17 MAY** 

congress

The core congress programme is complemented by associated events, including capacity-building workshops and study tours

Participants from a range of background will address policy topics, good practices and identify responses to business challenges. Some of the toughest questions facing hydropower will be addressed in the programme.



## FOCUS SESSIONS

Explaining, debating and resolving hydropower's top challenges



## **Modernisation**

### When Wednesday 15 May 2019 | 09:30-10:45 Leads David Samuel | Bill Girling



#### Co-convenor



### Modernising hydropower to support a cleaner energy mix

Today's hydropower totalling 1,267 GW contributes around two thirds of global clean electricity produced annually. By 2030, it is estimated that over half the existing fleet will have been, or be due to undergo upgrade and modernisation.

Retaining existing hydro plants will be critical for the future energy mix. Innovative technologies are being implemented in modernisation that go beyond business-as-usual and standard renovations. Investments in upgrades look to realise new benefits and revenue streams, reduce operating risks and costs, and improve sustainability.

Understanding the potential and how best to plan projects is therefore a top priority, especially for decisionmaking on future generating capacity. This session will share strategies being implemented by major players to modernise major plants, and discuss the opportunities as well as the risks for the sector.

#### Session objectives

What innovative approaches exist to retain and enhance the current hydropower fleet? SDG 9 recognises the need to retrofit existing infrastructure by 2030, taking advantage of efficiency increases, sustainability and industrial innovation. This session will:

- Highlight the global need for modernising existing hydropower;
- Present major modernisation programmes implemented or planned;
- Support decision-making for new extension projects.

### Session: 15-1A

## **Integrated planning**

When Wednesday 15 May 2019 | 09:30-10:45 Leads Cristina Diez Santos | María Ubierna



#### Co-convenor



#### Implementing innovative approaches for water and energy systems

Basin and regional-scale planning comprise not only the optimisation of energy systems but also broader environmental, social, water, food and climate change outcomes. During the early planning of hydropower, site selection is critical for successful development. Besides minimising connectivity impacts, basin-scale planning contributes to minimising cumulative effects and planning mitigation measures more effectively.

A better understanding of the different approaches and methodologies available, by analysing its applications, will guarantee that all resources and services will benefit. System planning approaches will enable clear trade-offs that lead to transparent and fair decision making.

#### Session objectives

What are the most innovative approaches for water and energy systems planning?

The session will provide examples of successful application to showcase the integration of these early planning approaches into the decision-making with the successful resolution of hydropower development and fluvial ecosystem conservation.

### Session: 15-1B

## Hydropower's carbon footprint

Wednesday 15 May 2019 | 09:30-10:45 Leads Mathis Rogner | Nick Troja



Co-convenor



#### Assessing the greenhouse gas footprint of hydropower activities

Mitigating climate change is one of the most important goals for strategic sustainable development. It is recognised by a range of stakeholders, including financiers who look to quantify the greenhouse gas footprint of their investments. The greenhouse gas status of freshwater reservoirs – that is, any change in the GHG emissions in a river basin resulting from the creation of such a reservoir – has been the focus of a multi-year, multistakeholder research project led in partnership by IHA and the UNESCO Chair for Global Environmental Change. This research project resulted in the launch of the G-res tool in 2017.

The G-res tool employs a new conceptual framework that reflects a net emissions approach, which takes into account pre-impoundment conditions and emissions translated from other human activities. The G-res tool is an online resource that builds upon this methodology and enables users to estimate the GHG footprint of reservoirs, and allocate these to the services it provides, including hydropower activities.

#### Session objectives

How can the G-res Tool help demonstrate the environmental performance of hydropower?

G-res Tool developers and users will share their insights and experiences using the G-res tool. They will discuss the approach to emissions related to other human activities, infrastructure construction, and the allocation of emissions to the reservoir's purposes. The tool's potential impact on future project development will be discussed, and how hydropower can be an positive agent to achieving the Sustainable Development and Paris agreement goals.

### Session: 15-1C

## **Pumped hydro**

### When Wednesday 15 May 2019 | 11:15-12:30 Leads Mathis Rogner | David Samuel



#### Co-convenor



#### Achieving the energy transition with pumped hydro storage

It is widely recognised that the transition towards sustainable energy systems will require significant increases in the use of wind and solar resources. By their very nature these resources make power supply more volatile, reflecting the varying availability of wind and sunlight. Dealing with this new situation requires an increase in the flexibility of power systems. Pumped hydro can

reduce the costs of system operation by shifting excess supply to periods of peak demand. It can also provide a range of critical system services. Storage can offer a broad variety of advantages and benefits to system.

The energy transition means new market and business strategies. Pumped hydro is evolving alongside transitioning energy systems, however, markets are lagging behind and fail to adequately reward pumped hydro for the grid services it provides.

#### Session objectives

How can pumped hydro be adequately rewarded for the wide range of power grid services it provides?

This session will explore the changing landscape for pumped storage assets. It will also look at the policy and market mechanisms that are required to ensure stable power grids and cost-effective pumped hydro operations.

Session: 15-2A

# Hydropower project preparation

When Wednesday 15 May 2019 | 11:15-12:30 Leads Nick Troja | Cristina Diez Santos



#### Co-convenor



#### Managing early stage preparation to successful and sustainable outcomes

Hydropower development has and continues to make an essential contribution to reducing poverty, boosting shared prosperity, and improving sustainability. Furthermore, a large proportion of the world's untapped hydropower resources are in regions where new development has the greatest potential to positively affect peoples' lives. However, private sector investors are often deterred by the financial risk associated with the rigorous and complex planning and assessment required for hydropower projects. In order to redress the balance of public and private sector involvement in developing countries, project preparation facilities have been established to reduce the risk profile of large infrastructure investments but to date there has only been limited focus on hydropower.

#### Session objectives

How can project preparation facilities best scale-up sustainable hydropower development?

This session will explore how project preparation facilities can leverage greater private investment while ensuring that projects are developed according to recognised sustainability criteria and national and regional needs. In doing so, panellists will focus on the particular challenges faced by the sector and what technical and financial support is required to best mitigate risks and scale-up sustainable hydropower development.

Session: 15-2B

## **Capacity building**

### When Wednesday 15 May 2019 | 11:15-12:30 Leads João Costa | Nick Troja



#### Co-convenor



United Nations Educational, Scientific and Cultural Organization

#### Capacity building in the hydropower sector is fundamental to achieving Sustainable Development Goals.

Central to the economic and social sustainability of hydropower developments is the need to support capacity building within local communities and institutions through the demonstrable provision and support of increased capabilities and opportunities. The role that governments and project developers play in this process is integral to community acceptance of the project, the long term sustainability of the scheme and the effective distribution of benefits.

Beyond the local level, international cooperation can support national and regional capacity building through sector-wide programmes focusing on electro-mechanical training or sustainability.

#### Session objectives

This session will focus on expanding support to capacity-development activities at international, national and local levels, and further strengthening the educational institutes.

Dialogue will also cover the importance of management, operations, monitoring, technical services, operating costs, evaluating and planning throughout the value chain in the hydropower sector, as well as policy and regulatory frameworks and applicability in each country in order to extend the impact of capacity building.

### Session: 15-2C

## Digitalisation

### When Wednesday 15 May 2019 | 14:00-15:15 Leads Bill Girling | David Samuel



#### Co-convenor



#### Understanding and implementing digitalisation in the hydropower sector

The ongoing revolution in digitisation is helping to drive innovation in the hydropower sector, through the development of digital monitoring systems to reduce maintenance costs, coupled with advanced controls to balance variable renewable technologies such as wind and solar. Digitalisation will play a key role in meeting the Paris Agreement targets, by ensuring that existing hydropower assets are well maintained and can continue to operate reliably well into the future.

This focus session will build knowledge on digitalisation in the hydropower sector; covering a broad range of issues, including advanced operating strategies to optimise hydropower generation, digital systems to improve maintenance practices, digital twinning, integrated control and cyber-security.

#### Session objectives

Why is digitalisation important to decision-makers across the sector? The session will focus on how digitalisation will enable hydropower operations to adapt to a more diverse role in the future energy mix, improving O&M practices, through improved condition monitoring systems and automated maintenance practices and through the development of advanced decision making tools to optimise decisions around modernisation. The session will also address change management and strategies to implement digitalisation across the business.

## **Sustainability assessment**



When Wednesday 15 May 2019 | 14:00-15:15 Leads João Costa | Frank Faraday

#### Co-convenor



#### Driving sector uptake of sustainability assessment tools for hydropower

The Hydropower Sustainability Assessment Protocol was launched in 2010, in response to a need for a common language to describe good and best practice in hydropower development. To date it has been applied at 40 sites around the world, with the majority of Protocol assessments financed by IFIs or from multilateral donor support.

A new range of tools, derived from the original protocol, have recently been launched. They are designed to guide private developers and operators on good practices and encourage benchmarking around the world.

The uptake of these tools, in particular in developing countries, will be critical to alleviating barriers to development, as environmental and social risks remain an important obstacle in the eyes of investors.

#### Session objectives

The objective of this session will be to explore the conditions necessary to drive more private sector interest and uptake of hydropower sustainability assessment tools and what this means for the future development of the Hydropower Sustainability Assessment Protocol.

Session: 15-4B

## **Climate resilience**

When Wednesday 15 May 2019 | 14:00-15:15 Leads María Ubierna | Nick Troja



#### Co-convenor



#### Creating climate resilience guidelines for the hydropower sector

Hydropower will have a prominent role in achieving the Paris Agreement. Hydropower projects provide low carbon energy production, stability and reliability to the electricity grid, and water services. On the other hand, the hydropower sector is already starting to experience climate change impacts and will need to face more climaterelated risks in the future. While, the wider financial community and governmental agencies are engaged in resilient investment for adaptation to climate change.

Hydropower's resilience and adaptability for future climate scenarios will be fundamental to ensure the hydropower's role in renewable energy systems and responsible freshwater management.

Climate resilience guidelines will provide practical guidance to prepare better for the uncertain future and ensure robust and resilient hydropower projects.

#### Session objectives

How will the climate resilience guidelines ensure resilient projects that will address the needs of the operators, the financial community, policy-makers and local communities?

What is hydropower's role to build resilience in the energy system?

#### Session: 15-4C

## **Clean energy systems**

When Wednesday 15 May 2019 | 15:45-17:00 Leads Mathis Rogner | David Samuel



Co-convenor



### Enabling clean energy systems with hydropower

All the systems that have succeeded in providing 100% renewable electricity rely on hydropower. Hydropower, where available, plays an essential and vital role in creating and maintaining energy systems that are reliable, affordable and sustainable.

Hydropower's flexibility can help balance variable renewable supply, ensuring a firm power output to the grid and reducing spinning reserve requirements.

renewable generation technologies to existing hydropower systems, taking advantage of existing infrastructure and creating new revenue streams. Innovative hybrid systems are wideranging and can solve numerous problems facing modern energy systems. Hybrid systems can also have extensive and significant related social, economic and environmental benefits beyond just providing stronger and more efficient power systems. Hybrid energy systems, along with renewable energy storage, may be key to the future of renewable energy.

#### Session objectives

What is hydropower's role in the energy transition?

This session will highlight innovative and existing technological solutions involving hydropower that provide solutions to some of the challenges facing modern power systems. It aims to kick start discussion on renewables working together can help ensure the provision of reliable, sustainably and affordable energy and water services for all, and how these could help meet and achieve global sustainability and climate goals.

### Session: 15-5A

## **River basin development**

When Wednesday 15 May 2019 | 15:45-17:00 Leads Cristina Diez Santos | João Costa



#### Co-convenor



#### Understanding connectivity, cumulative impacts and improving trade-offs

Basin and regional-scale planning in hydropower development comprise not only the optimisation of energy systems but also broader environmental, social, water, food and climate change outcomes when managing hydropower in a river basin or regional context. Successful river basin management involves a holistic approach which encourages cooperation among a diverse group of stakeholders in the utilisation of natural resources. The integrated management of reservoirs and multiple use of water, the institutional and regulatory agreements, as well as the integration between neighbouring countries, comprise different tradeoff methodologies to manage a hydropower project at a system level.

#### Session objectives

What are the upstream and downstream effects of the hydropower facilities operational schemes and how do cumulative impacts influence in the decision making?

## Sediment management

When Wednesday 15 May 2019 | 15:45-17:00 Leads María Ubierna | Bill Girling



#### Co-convenor



Managing sediment in the context of climate change and integrated river basin development

Hydropower has a prominent role in achieving the Paris Agreement. Hydropower projects provide low carbon energy production, stability and reliability to the electricity grid, and water services.

Alteration in the sediment budget in the catchment, in particular, sedimentation, undermines the capacity of the hydropower projects to deliver water and energy services in addition to the upstream negative effects of delta formation and downstream scour effect.

Sediment management contributes to maintaining the storage capacity, reducing the operating risks, and minimising river connectivity impacts. Implementing effective sediment management strategies is essential to extend the life of the project, to ensure a reliable and sustainable source of water and energy, and to maintain the river connectivity.

#### Session objectives

Why is sediment management important so hydropower projects deliver sustainable water and energy services?

What are the regulatory challenges, the financial incentives and initiatives to promote sustainable sediment management?

Session: 15-5C

# Hydropower innovation and disruptive technology

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When Thursday 16 May 2019 | 09:30-10:45 Leads Mathis Rogner | Bill Girling

Co-convenor



#### Anticipating disruptive changes to future-proof hydropower

Disruption is not a new idea. J. Schumpeter introduced a similar concept, when he wrote about "creative destruction" more than half a century ago. New technologies, products and processes turn their predecessors obsolete, resulting in new industries. We are becoming increasingly aware of technology as a major driving force for disruption. Historical examples of disruption include the agricultural and industrial revolutions, which saw the displacement of human and animal power by fossil-fuels and lead to the global energy transition to displace fossil-fuels with renewable resources.

For the hydropower sector, disruptive technologies will drive changes and appropriate innovations within policy and regulatory frameworks that govern electricity markets and investments.

#### Session objectives

What are the innovative hydropower solutions to changing energy systems?

This session seeks to assess (1) the magnitude of disruption, and to what the disruption applies; and (2) the rate of disruption, i.e. how quickly is this happening?

It is important to highlight that hydropower, despite being a mature and established technology, is still innovating and thus can be both disrupted and act as a disruptor.

### Session: 16-1A

## **Regional interconnections**



When Thursday 16 May 2019 | 09:30-10:45 Leads David Samuel | Nick Troja

#### Co-convenor



全球能源互联网发展合作组织

### Connecting hydro to new markets.

As electricity grids become more interconnected, hydropower will increasingly supply not just national but regional needs. Future energy systems will pool energy resources spanning geographies and time zones, enabling hydropower to work together with other renewables.

Hydro has offered baseload and grid balancing for decades, and as market integration continues, new synergies between adjacent grids can be captured. High voltage transmission can extend access to flexible pumped storage for example, in areas where high wind and solar needs storage.

However development of crossborder grid connections can be challenging, given the complexity and cost. This session will gather experts from around the world with experience in regional interconnections, to discuss existing schemes, planned projects, and power pools. A key focus will be sharing lessons learned, and hydropower's potential for regionwide markets.

#### Session objectives

How can regional interconnections help build energy security?

Export of hydropower's low cost, reliable and flexible electricity across national borders already brings benefits, and can be a key driver for investment. The session aims to highlight the role of hydropower in regional energy systems, and its potential for new schemes. A key objective will be understanding what models help the development process.

### Session: 16-1B

## **Benefits of hydropower**



When Thursday 16 May 2019 | 09:30-10:45 Leads Cristina Diez Santos | María Ubierna

#### Co-convenor



### Quantifying the benefits of hydropower projects

Single and multipurpose hydropower facilities can deliver multiple power and non-power benefits. Over and above electricity generation, the power related benefits include flexible generation and flexible storage, as well as a reduction in the dependence on fossil fuel. Moreover, they can provide local macroeconomic revenues, benefits related to employment, education and recreation, and constitute new possibilities for trade, transport and tourism. Furthermore, affected communities can benefit also from flood mitigation, water supply, pollution control and irrigation.

Setting out realistic indicators that can quantify the above mentioned power and non-power benefits will help to meet the power needs in developing countries and emerging economies together with the development of the UN Sustainable Development Goals.

#### Session objectives

What is the state of knowledge for the quantification of benefits attributed to the development and operation of a hydropower facility?

The session will cover the differences and similarities between projects, depending on their purposes and uses.

Participants will also focus on current initiatives to better understand and quantify links between sustainable hydropower development and the achievement of SDGs.

### Session: 16-1C

## **Green bonds for hydropower**

When Thursday 16 May 2019 | 11:15 -12:30 Leads Nick Troja | João Costa



#### Co-convenor



#### Bringing standards to the green bond market and what it means for hydropower

Green bonds are examples of the emerging instruments for green finance and investment in the energy sector that can be used for hydropower. They are fixed income loans created to specifically finance and refinance projects and assets that help address environmental and/or climate risks and shift investment to a low carbon, sustainable economy. In 2017, over USD 160 billion of labelled green bonds were issued, nearly doubling the previous year with expectations that it could reach USD 1 trillion by 2020.

Following over two years of discussions with industry, academia, governments and international NGOs, the Climate Bonds Initiative, an investor-focused not-for-profit is due to launch a consultation later this year on proposed green bond criteria for hydropower. This criteria is seen as key to fully unlocking the market to the hydropower sector, as to date it has been held back a lack of clarity over appropriate standards.

#### Session objectives

What role will the green bond market have in the future of hydropower financing?

This session will focus on how the eligibility criteria has been applied to date, highlighting projects which will benefit from green bond financing and what advantages issuers receive from doing so. Panellists will also explore how the green bond market helps better align the sector with both the Sustainable Development Goals and the Paris Agreement. Finally, panellists will discuss how the criteria may evolve over time to take into account improved methodologies and the latest in climate science.

### Session: 16-2A

## **Small-scale power systems**

When Thursday 16 May 2019 | 11:15 -12:30 Leads Mathis Rogner | Cristina Diez Santos



#### Co-convenor



#### Implementing small-scale hydropower systems for energy access and development

To address environmental challenges, energy security, and to pursue inclusive and sustainable development, leaders are looking to transition economies towards renewable energies. Access to affordable and reliable energy and water services provided by sustainable hydropower can bring economic, social and environmental dividends. Despite being a mature technology, exhibiting one of the lowest electricity generation prices of all technologies, the hydropower potential in most developing countries remains largely untapped. Small-scale hydropower systems represent a significant resource that can provide significant benefits to underserved areas. This includes both new greenfield projects in remote areas, but also the exploitation of water flows from existing hydro-technical structures which are used primarily for other purposes, such as in irrigation canals or wastewater flows.

#### Session objectives

How can we encourage hydropower growth in remote and rural areas? Can existing infrastructure be exploited? This session aims to explore how to remove barriers and to highlight benefits of smaller-scale hydropower systems to small, under capacity grids, and how energy can be recovered from existing hydro-technical infrastructure to reduce costs and spur more rapid deployment. Speakers from civil society, finance, hydropower owners and developers will focus on the challenges and opportunities that exist to increase sustainable and high-impact hydropower development.

### Session: 16-2B

## Data management

When Thursday 16 May 2019 | 11:15 -12:30 Leads Bill Girling | David Samuel



### Managing, sharing and securing data for hydropower

Data sharing and data management has been the cornerstone of every successful hydropower project. In the developed world, organisations develop their own internal databases for hydrological data, energy statistics, market information, etc. Organisations in the least developed countries often depend upon publicly accessible data for planning and operating hydro facilities.

Advancements in digitalisation of data in the water and energy sector has the potential to offer tremendous opportunities for real-time access to volumes of data that were not possible in the past. Emerging trends such as artificial intelligence (AI), neural networks and the advent of block chain technologies all stand to move the water and energy sector into an advanced regime of data management.

#### Session objectives

How will advanced data management systems improve hydropower O&M?

The session will illustrate how advanced data management systems and data sharing can positively impact the hydropower sector through examples of information systems for improved decision making, enhanced cyber-security and access to baseline climate and watershed data.

Session: 16-2C

## Hydropower safety

When Thursday 16 May 2019 | 14:00 -15:15 Leads Bill Girling | María Ubierna



#### Co-convenor



### Advancements in overall safety at hydropower facilities

Safety continues to be the top issue for all hydropower utilities globally, centred around ensuring that all staff on site are properly trained, to reduce accidents related to the operation and maintenance of hydropower facilities. As well, recent climate events illustrate the need to enhance dam safety and emergency preparedness planning (EPP) as a fundamental elements of planning new facilities and modernising existing assets. Advancements to hydropower safety measures are essential to ensure that hydropower remains a leading source of renewable energy into the future, by continuously improving dam safety measures under all plausible future climates, and ensuring that operators and maintenance staff are building the necessary skills to adapt to more extreme operating conditions, while maintaining a higher level of cybersecurity.

#### Session objectives

What changes are needed to ensure that hydropower can continue to be operated and maintained into the future?

The session will highlight advancements in the overall safety of the world's hydropower assets and will feature case studies from some of the hydropower sector's leading organisations, who are continuously improving their overall safety programs.

### Session: 16-4A

## **Project ownership and financing**

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When Thursday 16 May 2019 | 14:00 -15:15 Leads Nick Troja | David Samuel

#### Co-convenor



#### Combining public and private sector support to unlock hydropower development

Governments around the world are continuing to seek greater private sector involvement in hydropower development. This is particularly the case in developing countries where public funds are scarce with many competing priorities and there is a need to utilise the technical expertise and experience of the private sector. However, questions have been raised about the applicability of traditional ownership and financing models such as Built, Operate, Transfer (BOT) and Build, Own, Operate, Transfer (BOOT) to attract private investment. While they remain popular in some parts of the world, critics argue that they are overly complex making it difficult to balance the risks and rewards between the different parties involved.

#### Session objectives

How can governments best leverage the role of the private sector?

With the need for private sector investment only to increase in the future, this session will discuss and debate whether traditional models still have a role in the sector and what innovative financing structures are being considered or employed. In addition, panellists will explore what mitigation tools are available to ensure that all stakeholders including governments, development finance institutions, lenders and developers accept a fair allocation of risk.

Session: 16-4B

### **Protected sites**

When Thursday 16 May 2019 | 14:00 -15:15 Leads João Costa | Cristina Diez Santos



#### Co-convenor



#### Exploring synergies between hydropower and World Heritage Sites

Natural and Cultural heritage sites have the great potential to contribute to social, economic and environmental goals. Hydropower, as one of the cheapest renewable energy sources, can help reach the Sustainable Development Goals providing clean and affordable energy. As hydropower development interacts with other water management services as well as

natural resources, this session intends to explore the linkages between hydropower and Natural Heritage sites from a sustainable development perspective. This session will consider the evolution of thinking around the assessment of sustainable hydropower and its relation with Natural Heritage Sites; whether cohabiting or situated upstream or downstream. This session will

hydropower and its relation with Natural Heritage Sites; whether cohabiting or situated upstream or downstream. This session will examine the added-value of World Heritage Sites within the integrated approach to river basin management and the regional and national economic development.

#### Session objectives

This session will explore the possible synergies between Natural Heritage Sites and hydropower development. It will also analyse the linkages between SDG6 and SDG7 with SDG15, and the challenges and opportunities for the development of sustainable hydropower with the preservation of natural resources.

### Session: 16-4C



## WORKSHOPS

Building capacity for professionals and decision-makers from around the world

world hydropower associated events CONGIESS 73-14 May 2019

# Workshop on new sustainability assessment tools



When Monday 13 May 2019 | 13:00-17:30 Leads Frank Faraday | João Costa

#### Co-convenor



Eidgenössisches Volkswirtschaftsdepartement EVD Staatssekretariat für Wirtschaft SECO How new tools developed under the Hydropower Sustainability Assessment Protocol can help improve the strategic development of hydropower projects.

The Hydropower Sustainability Assessment Protocol was launched in 2010, in response to a need for a common language to describe good and best practice in hydropower development. To date it has been applied at 40 sites around the world.

A series of new tools under the Hydropower Sustainability Assessment Protocol were launched in 2018. These were an expanded Hydropower Sustainability Assessment Protocol to include climate change mitigation and resilience, a new tool – aligned with the safeguards policies of the International Financial Institutions to identify gaps against good practice in environmental, social and governance topics and new good international industry practice quidelines.

#### Workshop objectives

What role can assessment tools play in promoting sustainability good practice in the hydropower sector? The objective of the session is to introduce these new sustainability assessment tools to delegates, identify linkages to relevant IFI standards and to discuss how these tools can contribute to wider sustainable hydropower development. SDG7 will be addressed primarily however the workshop is also linked to other goals such as SDG 6 'Clean Water and Sanitation' and SDG 13 'Climate Action'.

## Workshop on O&M strategy



When Monday 13 May 2019 | 13:00-17:30 Leads Bill Girling | David Samuel

#### Co-convenor



#### Good practice in operating and maintaining hydropower

While global statistics on the performance of existing hydropower assets are not readily available, there are a number of documented cases where hydropower has been shown to be under-performing relative to industry standards.

Local conditions can be significant factors in some of these cases, like sediment loads in some regions but often poor performance can be correlated to lack of training on good practices in operation and maintenance.

International Hydropower Association has worked in collaboration with World Bank Group to develop guidelines around good practice in operations and maintenance of hydropower assets globally. This has been achieved through the consultation with the sector and the development of case studies that illustrate good O&M practices.

#### Workshop objectives

What are the barriers to developing industry good practice guidelines for the hydro sector?

The objectives of this workshop are to identify opportunities and barriers towards the implementation of good practice guidelines on hydropower O&M, through case studies and a round table discussion with a panel of experts from the hydropower industry.

### Workshop on sediment management



**When** Monday 13 May 2019 | 13:00-17:30 **Lead** María Ubierna

#### Co-convenor



Using sediment management strategies for sustainable reservoir and run-of-river hydropower projects

Hydropower will have a prominent role in achieving the Paris Agreement. Reservoir and run-ofriver hydropower projects provide low carbon energy production, stability and reliability to the electricity grid, and water services. hydropower projects to deliver water and energy services and weaken therefore the path to accomplish SDG 6 and SDG 7.

Sediment management contributes to maintaining the storage capacity, reducing the operating risks, and minimising river connectivity impacts. Managing sediment is essential to extend the life of a project, to ensure a reliable and sustainable source of water and energy, and to maintain the river connectivity.

#### Workshop objectives

What are the international good practices on sustainable sediment management?

What are the regulatory challenges and financial aspects that hinder implementation of effective sediment management strategies?

### Workshop 3

Sedimentation or sediment related issues undermine the capacity of the

### Francophone workshop: sustainability and good practices



When Tuesday 14 May 2019 | 09:00-13:30 Leads Frank Faraday | João Costa

Co-convenor



Introduction to sustainability assessment tools

This session, supported by the Francophone Institute for Sustainable Development, will be the first tailored session for the French speaking hydropower community designed to introduce the Hydropower Sustainability Assessment Protocol and ESG Tool as well as the good practice articulated in the Good International Industry Practice guidelines.

#### Workshop objectives

The objective of the session is to present the Hydropower Sustainability Assessment Protocol, ESG Tool and new guidelines to a French speaking audience. The aim of the session is to raise awareness among French speaking developers and project sponsors that the Protocol and good practice can be applied in a Francophone environment.

## Workshop on climate resilience

world hydropower congress 14-16 MAY 2019 • PARIS

**When** Tuesday 14 May 2019 | 09:00-13:30 **Lead** María Ubierna

#### Co-convenors





Climate resilience and hydropower development

Hydropower will have a prominent role in achieving the Paris Agreement. Hydropower projects provide low carbon energy production, stability and reliability to the electricity grid, and water services.

Optimising the role of hydropower infrastructure in the provision of climate adaptation services is possible by understanding and assessing the climate-related risks and opportunities.

Hydropower's resilience and adaptability for future climate scenarios will be fundamental to ensure the hydropower's role in renewable energy systems and responsible freshwater management.

Climate resilience guidelines will provide practical guidance to prepare better for the uncertain future and ensure robust and resilient hydropower projects.

#### Workshop objectives

What are the climate-related risks and opportunities of hydropower projects in the context of climate change?

What is hydropower's role to build resilience in the energy system?

Practical examples of how the climate resilience guidelines have provided guidance to ensure resilient investments.

### Workshop on hydropower benefit sharing



When Tuesday 14 May 2019 | 09:00-13:30 Lead Cristina Diez Santos|

Co-convenor

#### ТВС



### Mechanisms to improve people's livelihoods

Hydropower development can help improve social and economic benefits for the local and regional communities. Benefits for local communities may include jobs, social services, infrastructure, energy, education, new markets, government revenues and economic development. However, the distribution is often perceived an uneven. This can create friction and in the worst cases the loos of social license to operate.

As a response to this, the term "Benefit sharing" references to the fairly and equitably distribution of project costs and benefits across stakeholders by maximizing and distributing benefits to local communities. Although there is a wide variety of benefit sharing models, it can be difficult in many cases to identify the best mechanisms to implement for each project.

#### Workshop objectives

What are the benefits that emerge from hydropower development and what are the mechanisms to distribute them?

The workshop will present the outcomes from the undergoing study on benefit sharing practices in hydropower projects in developing and developed countries. It will present the lessons learned from various experiences.



## **REGIONAL FOCUS**

Exploring challenges and opportunities from the people who are the closest to them



### **Regional focus: Europe**

When Wednesday 15 May 2019 | 12.45 – 13.35 Lead Mathis Rogner





### What are the key challenges facing European players?

The European Union as well as many non-EU countries including Switzerland, Norway and Turkey have brought forward climate and energy policies over recent years aimed at establishing affordable, secure and sustainable clean energy systems. In order to meet ambitious climate mitigation commitments, European countries will need to rapidly decarbonise their power sectors and increase the share of renewable energy. Toward this end, in early 2018 the EU parliament voted to

increase its renewable energy goal for 2040 from 27 per cent to 35 per cent.

Hydropower development in Europe is facing a number challenges. To face the unique set of environmental, social, technological and market barriers, a consortium of European hydropower stakeholders have undertaken a EU funded project to develop a research and innovation agenda and technology roadmap for the hydropower sector in Europe and how it will help the region achieve regional and global sustainability targets.

#### Session objectives

This session will introduce the Hydropower-Europe project. While the ultimate goal is the develop technology roadmap for hydropower in Europe, the first step is broad stakeholder engagement:

- an overview highlighting where capacity has been added, project developments and policy updates; and
- to establish the current status of state of the art hydropower innovation.

### **Regional focus: Africa**

**When** Wednesday 15 May 2019 | 12.45 – 13.45 **Lead** Cristina Diez





### How hydropower can solve new challenges in Africa?

Hydropower has a major role in the transition to low-carbon energy systems in the region and is a vital solution towards the achievement of the Sustainable Development Goals (SDG). Its development offers the opportunity to boost clean electricity production, widen access to electricity and improve livelihoods.

With over 350 GW of hydropower potential, only about 7% of the continent's economically feasible hydropower potential has been tapped and only two thirds of the population have access to electricity.

Many African countries are embracing hydropower to meet the electricity demand. Regional cooperation and integration – through the Power Pools - presents an opportunity for effectively exploiting and managing the region's hydropower resources, while decentralised solutions can help complement to grid-based electrification. Both on-grid and offgrid solutions are vital to meet the targets set out in SDGs 6 and 7.

#### Session objectives

This session will present the latest trends and developments shaping the region including:

- an overview highlighting where capacity has been added, project developments and policy updates; and
- short deep dives into developments occurring in , Ethiopia, Cameroon and Ghana led by local experts

# **Regional focus: South and Central Asia**

When Wednesday 15 May 2019 | 12.45 – 13.35 Lead David Samuel



### What are the game changers in Central Asia?

South and Central Asia saw 3,264 MW of capacity added in 2017, with over half of new projects commissioned in India. The region's total installed capacity now stands at 144.7 GW. In India, new installs included the 1,200 MW Teesta III project in the Himalayan northeastern state of Sikkim. Russia commissioned the Nizhne Bureyskaya project (320 MW) in the far east, while total hydropower generation remained stable. Iran commissioned the Rudbar Lorestan dam comprising a 450 MW powerhouse. Construction of the Rogun dam (3,600 MW) in Tajikistan and other projects in Kyrgyzstan received support from Uzbekistan, and progress has also been made on CASA 1000 to interconnect with Pakistan. Georgia commissioned the Dariala (108 MW) and Khelvachauri 1(47 MW) plants, and has plans to modernise the Enguri (1,300 MW) dam amongst other investments in hydropower. Nepal's total capacity reached almost 1,000 MW in 2017, and new projects under construction include 456 MW Upper Tamakosi and 900 MW Arun III.

#### Session objectives

Recent changes at the political level in South and Central Asia have signalled a will to exploit the region's untapped hydropower potential, while ensuring that existing assets are optimised.

What factors will ensure the success of these policies and projects?

### **Regional focus: North America**

**When** Thursday 16 May 2019 | 12.45 – 13.35 **Lead** Bill Girling





#### What are the business strategies of North American sector leaders?

Although growth in hydropower in North and Central America remains modest compared to other regions, there is increased focus on pumped storage projects. 510 MW of new installed capacity was added in 2017, around a quarter of which came from pumped storage, to take total installed capacity to 203.1 GW. In Canada, major storage projects under construction include Keeyask generating station in Manitoba, Site C in British Columbia, Muskrat Falls in Newfoundland and Labrador, and Romaine-4 in Quebec. In the United States, 140 MW of installed capacity was added through retrofits to existing facilities: 139 MW of pumped storage capacity was added at the Northfield Mountain Unit in Massachusetts and the Ludington facility in Michigan.

Of particular interest for business strategies in North America are the opportunities for power export within the region.

#### Session objectives

This session will provide a platform for sector leaders to share their vision of hydropower's evolving role in the energy mix in North America.

### **Regional focus: South America**

**When** Thursday 16 May 2019 | 12.45 – 13.35 **Lead** María Ubierna





### What is driving growth in South America?

South America remains the second region worldwide in hydropower capacity increase. Led by Brazil, the region accounts for approximately 15 per cent of world's installed capacity and generation.

Colombia is at the forefront of clean energy systems worldwide being ranked 8<sup>th</sup> in the Global Energy Architecture Performance Index (EAPI) which measures countries' ability to deliver secure, affordable and sustainable energy. Government ambitious targets to decarbonise the energy matrix foster the hydropower development in particular in Ecuador, Peru and Bolivia.

The El Niño meteorological event hit South America heavily in 2017, leaving ten times more rainfall than usual in the west coast while Brazil experienced the fourth consecutive year of drought. Long-distance regional interconnections between the region's countries would strength the hydropower sector and are under consideration.

#### Session objectives

This session will present the latest trends and developments shaping the region including:

- an overview highlighting where capacity has been added, project developments and policy updates; and
- short deep dives into developments occurring in Brazil, Colombia, and Bolivia led by local experts.

### **Regional focus: East Asia and Pacific**

**When** Thursday 16 May 2019 | 12.45 – 13.35 **Lead** Nicholas Troja



### What is driving growth in East Asia and the Pacific?

East Asia and the Pacific remains the world's engine room for hydropower development. Led by China, the region accounts for nearly 40 per cent of world's installed capacity and generation.

Rapid economic growth together with an increasing focus on achieving sustainable outcomes, has helped propel hydropower development across the region. Outside of China, which added a further 9 GW of capacity last year, Southeast Asian countries including Indonesia, Vietnam and Myanmar have a healthy pipeline of projects backed by ambitious government targets.

In the Pacific, Australia is witnessing a flurry of hydropower activity, particularly in pumped storage. Meanwhile, Papua New Guinea has several projects under active development which could transform the country by significantly scaling up household access to electricity.

#### Session objectives

This session will present the latest trends and developments shaping the region including:

- an overview highlighting where capacity has been added as well as project and policy updates; and
- short deep dives into developments occurring in China, PNG, Laos and Australia led by local experts



## **STUDY TOURS**

Understanding hydropower up-close



## Savoie (France)

When Friday 17 May – Saturday 18 May Lead K.I.T. Group



Strategic partner





- Chambery
- La Coche HPP
- La Bathie HPP
- Albertville workshop

## Isère (France)

When Friday 17 May Lead K.I.T. Group



Strategic partner





- Grenoble
- Grand'Maison pumped energy transfer station
- Romanche valley
- EDF Romanche-Gavet HPP
- EDF Hydrélec Museum

## Haut-Rhin (France)

When Friday 17 May to Saturday 18 May Lead K.I.T. Group



Strategic partner





- Mulhouse-Basel
- Kembs dam
- Kembs double lock locks
- 160 MW hydroelectric plant
- Hydraulic control center

## **Germany and Luxembourg**

When Friday 17 May to Saturday 18 May Lead K.I.T. Group



Supporting partner

VOITH

- Heidenheim
- Voith training centre
- Voith hydro manufacturing shop and digital campus
- Gaildorf
- Naturstromspeicher Gaildorf
- Heidelberg
- PSP Vianden



## Portugal

When Friday 17 May to Saturday 18 May Lead K.I.T. Group



Supporting partner



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- Cávado River mountainous basin
- Venda Nova III/Frades II
- Alto Rabagão

## Switzerland

When Friday 17 May to Saturday 18 May Lead K.I.T. Group



Supporting partner





- Montreux/Veytaux
- Forces Motrices Hongrin-Léman
- Cháteau de Chillon
- Veytaux Martgny
- Nant de Drance and Emosson