Joint Programme on Hydropower

Annual Report 2022

EERA
European Energy Research Alliance
Hydropower

MESSAGE FROM OUR COORDINATOR

Dear members of JP-Hydropower,

I hope this message finds you all in good spirits. Over the past year, we have accomplished much through engaging discussions and productive workshops. These efforts have led to the creation of joint project proposals, a successful summer school, and the growth of valuable networks. I firmly believe that JP Hydropower represents the finest group of researchers worldwide, and the friendship among us has given rise to robust teams and numerous creative initiatives.

As we continue on our journey towards sustainable and efficient energy practices, I want us to confront the various technological, digital, environmental, and societal challenges that lie ahead in the hydropower sector. It is essential that we address these challenges head-on and find innovative solutions to overcome them.

One critical aspect is enhancing the flexibility of our hydropower plants, enabling them to adapt to the variable production from renewable sources. Additionally, we must consider the redesign of the energy market to accommodate decentralized production and welcome new market players, all while ensuring sustainable developments.

I do hope to see many of you in the year to come.

Best regards

Ole Gunnar Dahlhaug

MESSAGE FROM THE MANAGER

"If not now, when?" A saying that has accompanied political and social battles throughout decades, a chant that is filled with claims and expectations. And what is most political and social than preserving our planet? Clean transition needs to be now, and fast.

Hydropower is one of the answers and can contribute significantly to achieving the EU's decarbonisation and renewable energy targets. Hydropower's importance will even increase in the future, providing the power system with storage and flexibility services, allowing other renewables to thrive.

The Joint Programme on hydropower and its excellent expertise will be up for challenge of advancing research and advocating for the role of this amazing technology.

Martina Campajola

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Our members

In 2022, the Joint Programme added 1 new member to the group:

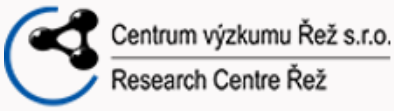
University of South-Eastern Norway

The addition represent precious new opportunities for networking and project building activities. They also bring the total number of members to 30, increasing the reach of the Joint Programme both geographically and in terms of topics covered. The newest member offer research based education for the development of hydropower professionals within the department of Process, Energy and Automation Engineering


AIT
AUSTRIAN INSTITUTE OF TECHNOLOGY


BERA
Belgian Energy Research Alliance


BRNO
UNIVERSITY
OF TECHNOLOGY


Centrum výzkumu Řež s.r.o.
Research Centre Řež


efzn
Energie-Forschungszentrum
Niedersachsen


ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE


ETH zürich


Hes·so
VALAIS
WALLIS


IMP
PAN
GDAŃSK


LULEÅ
UNIVERSITY
OF TECHNOLOGY


NINA
Norwegian Institute for Nature Research


NTNU


SINTEF


TU
Graz


TU
WIEN
TECHNISCHE
UNIVERSITÄT
WIEN
Vienna | Austria


TÜBİTAK


ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA


UNIVERSITÀ
DEGLI STUDI
DI PADOVA


University of
Strathclyde
Glasgow


UPC


POLITÉCNICA


up


USN
Universitetet
i Sørøst-Norge


Universität Stuttgart


UPPSALA
UNIVERSITET


vr vis


VŠB TECHNICKÁ
UNIVERZITA
OSTRAVA


Warsaw University
of Technology

Horizon Europe

Networking activities are key for the development of a solid and cohesive community. The calls' main aim was to explore possibilities for collaboration between the different organisations that are members of the JP. The meetings effectively gave space to all participants to express their capabilities and their desired involvement in the different topics, helping the community to understand the available expertise and areas of interest

FUNDED PROJECTS

Development of hydropower equipment for hidden hydropower

Support to the activities of the European Technology and Innovation Platforms (ETIPs) and technology areas of the Strategic Energy Technology Plan (SET-Plan)

Pan-European Network for Sustainable Hydropower

Research Calls

- Development of digital solutions for existing hydropower operation and maintenance
- Development of hydropower equipment for hidden hydropower
- Support to the activities of the ETIPs and technology areas of the SET Plan
- Development of novel long-term electricity storage technologies

ACTIVE PROJECTS

OUR SUB-PROGRAMMES

Ole Gunnar Dahlhaug
NTNU

Martina Campajola
EERA

SP1: Hydroelectric Units

Pål-Tore Storli
NTNU

Giovanna Cavazzini
UNIPD

SP4: Water resources, environmental impacts and climate adaptation

Staffan Lundström
LTU

David Finger
EI Linz

SP2: Hydropower Structures

Jochen Aberle
TU Braunschweig

Robert Boes
ETH Zurich

SP5: Social acceptance, engagement and policy

Berit Köhler
NINA

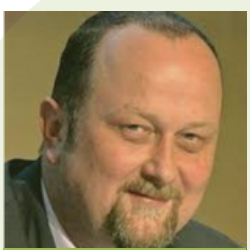
Patrick Hendrick
BERA (ULB)

SP3: Grid, System Integration and Markets

Michael Belsnes
SINTEF Energy

Robert Schürhuber
TU Graz

SP6: Digitalization



Eduard Doujak
TU Wien

Johanna Schmidt
VRVis

HIGHLIGHTS OF OUR MEMBERS' KEY ACTIVITIES

Publications

- Special Issue in Water 'advances and challenges in hydropower' competed with 14 papers (Aberle & Boes, eds)
- White paper clean Energy transition

Awards

Sébastien Erpicum received Arthur Ippen Award 'for his outstanding leading research regarding the hydraulics and fluid mechanics of hydraulic structures'

Activities highlights

- Submission of HEU «FEEDS - Fair Environment for Energy Data Spaces»
- Submission of COST ACTION «PEN@Hydropower» Proposal
- Submission of HEU «H-Hope – Hidden Hydro Oscillating Power for Europe» Proposal
- Submission of EU-LAC «ESTELA - Energy Shared Technology between Europe and Latin America» Proposal
- Membership at transversal Joint Program «Digitalisation for Energy»
- participation of members at World Congress of ICOLD (Int. Commission on Large Dams) in Marseille with several workshop presentations on

1. Sediment bypassing at reservoirs
2. Dealing with floating debris at dams, and
3. Landslide-generated impulse waves in reservoirs
4. Hydraulics of dams

- Contribution to IAHE bibliography on vortex flow (e;g; at hydropower intakes)
- Interdisciplinary Workshop

EUROPEAN INITIATIVES

Hydropower as a catalyst and facilitator for the clean, safe and independent energy transition in Europe

In response to the EU energy policy – revamping the Strategic Energy Technology Plan initiative, JP Hydro produced a common position paper addressed to the EC. It served the purpose of promoting the voice of hydropower in tackling the challenging geopolitical landscape in the energy transition and the fight against climate change. This was the result of a collaboration between Hydropower Europe, International Hydropower Association and IEA hydropower,

KEY MESSAGES:

- **Given Europe's ambition to raise the renewables target to 45%1 hydropower is critical to ensure Europe's energy system has the necessary renewable electricity and flexibility to protect grid stability from intermittent renewable energy, to sustain the green transition.**
- **While hydropower is the largest renewable non-intermittent electricity supplier in the World and in Europe, there remains significant potential, mainly through refurbishments, new multipurpose storage projects and pumped-storage powerplants.**
- **More funding is needed in research and innovation to deploy solutions at the scale required in support of sustainable solutions that offer win-win situations for the environment and from an operational perspective.**
- **Europe must protect against periods of dunkelflaute by including flexible power generation and dispatchable large capacity renewable storage, like hydropower, in national targets**
- **To ensure there is enough hydropower to meet Europe's decarbonization goals and maintain energy security, hydropower must have a prominent role within the Strategic Energy Technology (SET) Plan.**
- **The upcoming ETIP will serve as the basis for collaboration between stakeholders on hydropower and increase their visibility within the SET Plan**

THE WAY FORWARD

Mayor initiatives at the EU level

The EU SET Plan and the Clean Energy Transition Partnership represent the most important possibilities to make hydropower more prominent in the Clean Energy Transition landscape in Europe.

Similarly, the Clean Energy Transition Partnership (in which the Joint Programme had an active role, contributing to its Strategic Research and Innovation Agenda) will represent a possibilities for researchers to receive more funding for activities in the hydropower sector. Participating in these two major efforts will boost the relevance of the hydropower R&I community.

UNIFIED HYDROPOWER FORUM

The JP should aim at unifying efforts with similar initiatives, finding common grounds and expanding multilaterally its outreach. The way forward sees the JP meeting more regularly with partners and initiating constant dialogue with researchers from the hydropower sector, industry (namely ETIP) and the broad Clean Energy Transition scene.