



International Conference and Exhibition on
**Floating solar PV on dam reservoirs
and solar-hydro hybridization**



ON-LINE
7-8 July 2021

Organized by Aqua~Media International with
ICOLD's Technical Committee on Emerging Challenges & Solutions

THE INTERNATIONAL JOURNAL ON
**HYDROPOWER
& DAMS**

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The US Department of Energy predicts that a combination of floating solar panels and hydropower/dam reservoirs could produce up to 40 per cent of the world's electricity, and many countries have begun to exploit some of the vast global potential over the past five years. A recent World Bank market report highlights the rapid growth in this technology.

Reservoirs are the natural companions to solar PV, as they provide the space on which the panels can be installed, and they may also provide additional benefits, such as cooling of the panels, and providing storage for the intermittent solar electricity. Many of the developing countries of Africa and Asia, with hydro reservoirs in operation, and abundant sunshine, could especially benefit from this technology.

The International Commission on Large Dams (ICOLD), through its Technical Committee on Emerging Challenges and Solutions, has begun work on this topic, and intends to publish a Technical Bulletin next year.

This two-day event plans to bring together (virtually) owners and operators, researchers, consultants, contractors and suppliers (from the hydro and PV industries), financiers, and in particular, those planning to embark on a programme of floating solar PV (FPV) developments.

This is the first international event where the dam, hydro and solar PV sectors have come together, specifically to explore experience, challenges and future opportunities in this rapidly emerging technology.

Speakers will include operators and consultants who already have experience of developing floating solar installations, in Europe, Asia, Africa and the Americas, and they will share knowledge with others wishing to learn about technical, environmental, risk management, and economic/financial aspects of FPV schemes. Everything from global benefits, to the practicalities of mooring systems for solar panels, and ensuring safety to the installation and the water infrastructure, will be covered in presentations and discussions. Future potential and plans in many parts of the world will be highlighted.

Chairman of the ICOLD Technical Committee on Emerging Challenges and Solutions, Luc Deroo of France, will be overall chair of the programme, which will comprise presentations by international experts on each morning, followed later by panel discussions on four main topics.

Organizations such as the European Commission, World Bank, EIB, IRENA, SERIS

Aqua~Media is pleased to be working in partnership with ICOLD again, for this virtual conference which will be the first to bring together international experts from the dams/hydropower profession with their counterparts in the solar PV industry, specifically to discuss floating solar PV on reservoirs.



DAY 1 - FPV on dam reservoirs: Concept, global potential and design issues

OPENING: ■ Welcome messages from ICOLD and Aqua~Media as Co-hosts ■ Introduction from Conference Chairman, Luc Deroo

SESSION 1 (Morning): Presentations

- Floating photovoltaic on dam reservoirs (FPV-DR): Issues and questions – *L. Deroo, Chair of ICOLD's Technical Committee on Emerging Technology and Challenges, and ISL, France*
- Where sun meets water: Solar hydro hybrids – *B. Brunes, The World Bank*
- Experience of FPV on large reservoirs, and challenges – *O. Philippart, Ciel et Terre International, France*
- Design and analysis of FPV on reservoirs – *S. Sun, PowerChina Huadong Engineering Corp Ltd (HDEC), China*
- FPV: a designer's perspective – *M. Bernicot, ISL, France*
- The design of FPV moorings – *F. Gorintin, Solar PV Lead Engineer, Innosea, France*
- The accident at Yamakura, Japan – *J. Fukuwatari, ICOLD Technical Committee T, Japan*
- DNV Recommendations and guidelines – *M. Tagliapietra DNV GL Energy, The Netherlands*

Two hour break with short presentations by exhibiting companies - topics to be announced on the final programme

SESSION 2 (Afternoon): Panel discussion

Topic 1: Potential for FPV-DR ■ **Chair: E. Quaranta, European Commission, DG Joint Research Centre, Italy**

The theoretical potential is huge. Speakers will discuss the real potential available and realistic to develop, and variations in the potential in different parts of the world.

- **Introductory talk by the Chair:** The role of floating PV in the retrofitting of existing hydro plants and evaporation reduction
- What is the current FPV-DR situation: potential, projects, challenges, ...?
- How does FPV-DR compare with classical PV, from a developer's point of view (CAPEX, OPEX, efficiency, ...)?
- *Panelists will include O. Tricca, European Investment Bank, Luxembourg; F. Boshell, IRENA; and others*

Half hour break for networking with exhibitors and participants

SESSION 3 (Afternoon): Panel discussion

Topic 2: Design issues / Risk analysis and management ■ **Chair: F. Gorintin, Innosea, France**

Extreme events (waves, wind and others) will be discussed in relation to floating solar panels. Large dam reservoirs can generate high waves, induced by strong wind events. This has caused already caused failures of floating solar panels (for example on the Yamakura reservoir).

- How can waves and strong winds be robustly modelled?
- Options to withstand high waves (1.5+m) and very strong winds (120+ km/h)?
- Have other extreme events been considered at existing projects?
- Risk analysis / Risk management: are FPV an additional potential failure mode to be considered? How are the specific risks assessed and how are they managed?
- Moorings: Large dam reservoirs can be very deep, and may have large level variations. What are the best mooring options in these conditions?



DAY 2 - Case studies, hybridization options and E&S issues

SESSION 4 (Morning): Presentations

Chair: B. Brunes, The World Bank

- FPV in India: Progress, challenges and opportunities – *Prof A. Kumar, Indian Institute of Technology Roorkee, India*
- Emerging challenges and solutions for two FPVs in Indonesia – *A. Firman, Vice-Chairman, INACOLD, Indonesia, Henrivawan, Institut Teknologi Bandung, Indonesia*
- Floating solar powerplants in Vietnam – *M. Ho Ta Khanh, Consultant, Vietnam*
- The Lazer (France) and Nam Theun 2 (Laos) floating solar projects – *N. Gérard, J. Pralong and A. Rousselin, EDF-CIH, France*

Half hour break for networking with exhibiting companies and other participants

- Alqueva and Alto Rabago, Portugal – *F. Guerra, EDP, Portugal*
- Floating solar on dam reservoirs: Uganda's perspective – *M. Mukulu, UEGCL, Uganda*
- Status in Burkina Faso and neighbouring countries – *A. Nombre, IFEC, Burkina Faso*
- Solar, hydro and pumping: a mix for tomorrow – *F. Lempérière, HydroCoop, France*

One hour break to host meetings or visit exhibiting companies

SESSION 5 (Afternoon) Panel discussion

Topic 3: Coupling: solar-hydro hybridization ■ **Chair: Dr E. Bucher, Tractebel Engie, Germany**

Options and benefits: Several kinds of hybrid project can be contemplated, with very varied options for hybridization, and hence very different benefits, either for energy production or water resources preservation.

- What are the options for hybridization, and what are the possible benefits?
- Which case studies serve as the most significant examples?
- *Panellists will include T. Reindl, Solar Energy Research Institute of Singapore (SERIS); S. Serl, IRENA; L. Canale, Scatec*

Half hour break for networking with exhibiting companies and other participants

SESSION 6 (Afternoon) Panel discussion

Topic 4: E&S issues

The panellists will debate the main E&S challenges related to FPV on dam reservoirs, and how to design a FPV powerplant that minimizes these issues and optimizes E&S benefits. Solar PV has an impact on the physical, chemical and biological cycles in the reservoir, so the first discussion topic will be impacts on biodiversity:

- Can more be done to delineate these impacts precisely?
- Do we have data from projects where large parts of a water body have been covered?
- Do we have data, where impact on fisheries has been appraised, or measured?
- How life cycle analysis (LCA) of a project might help when comparing options and projects
- Are data available from past projects, where LCA of FPV has been derived?
- *Panellists will include S. Cromratie Clemons, University of North Carolina, USA; others to be announced shortly*

Updates will be published regularly at: www.hydropower-dams.com ~ Contact: solar-hydro2021@hydropower-dams.com