

Digitalisation of the hydropower sector

International workshop
Monday 27 August 2018

Digitalización en el Sector Hidroeléctrico

Taller Internacional
Lunes 27 Agosto 2018





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Introduction
Introducción



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conjunto



Examples
Ejemplos



Next steps
Próximas etapas



Who we are

Origin

Created in 1995, under the auspices of the UNESCO International Hydrological Programme

Mission

Advancing sustainable hydropower

Membership

107 member organisations worldwide

Partnerships

More than 50 partners: United Nations, governments, NGOs, development, financial and research institutions





Our members

[http:// www.hydropower.org/membership-directory](http://www.hydropower.org/membership-directory)

Global players



Regional players



Research & non-profit



Utilities and IPP



Consultancies



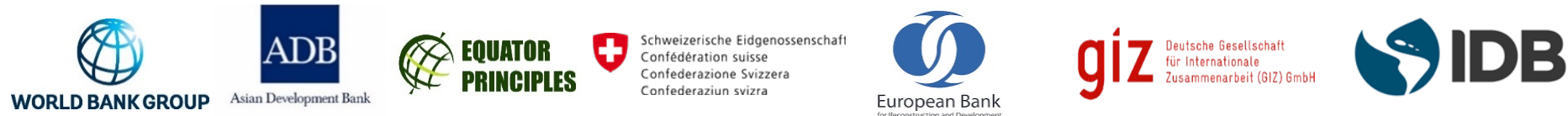


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Our partners



Finance & development



Research & academia



NGO and civil society



International organisation



Governmental entities





What we do



◀ **Networking**
Identification and introduction to experts globally



◀ **World Hydropower Congress**
Biennial international business forum and workshops



hydropower status report

2017

▲ **Reports**
Annual reports and briefings based on sector monitoring



◀ **Sharing knowledge**
Training, knowledge networks, webinars, workshops



◀ **International initiatives**
to unlock sustainable hydropower potential around the world

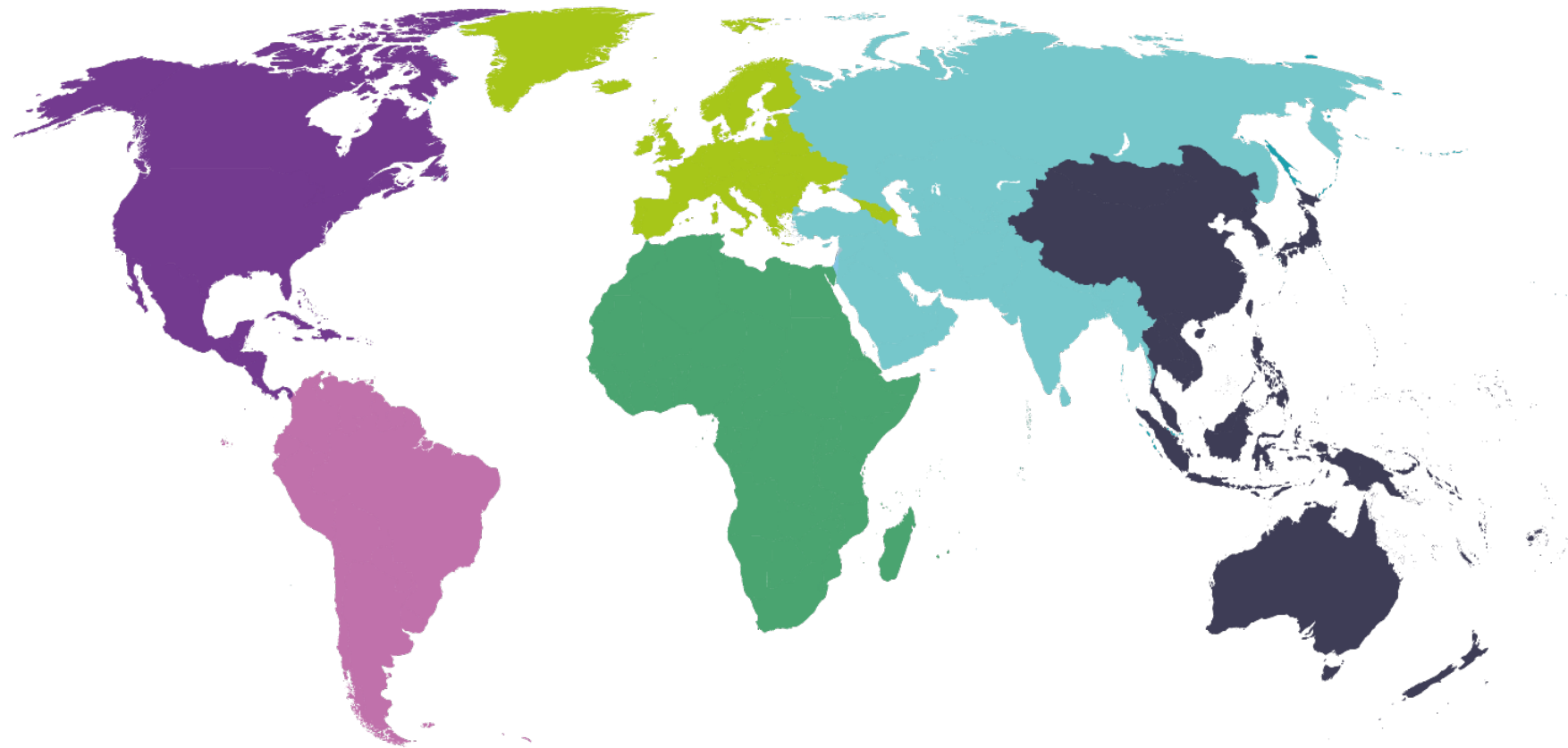
... with experts and decision-makers



Where we work

6 regions

- North America
- South America
- Africa
- Europe
- Asia 1
- Asia 2



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Where we work

1,267GW

global hydropower installed capacity in 2017

4,185TWh

estimated electricity generated from hydropower in 2017

**China
9.12 GW**

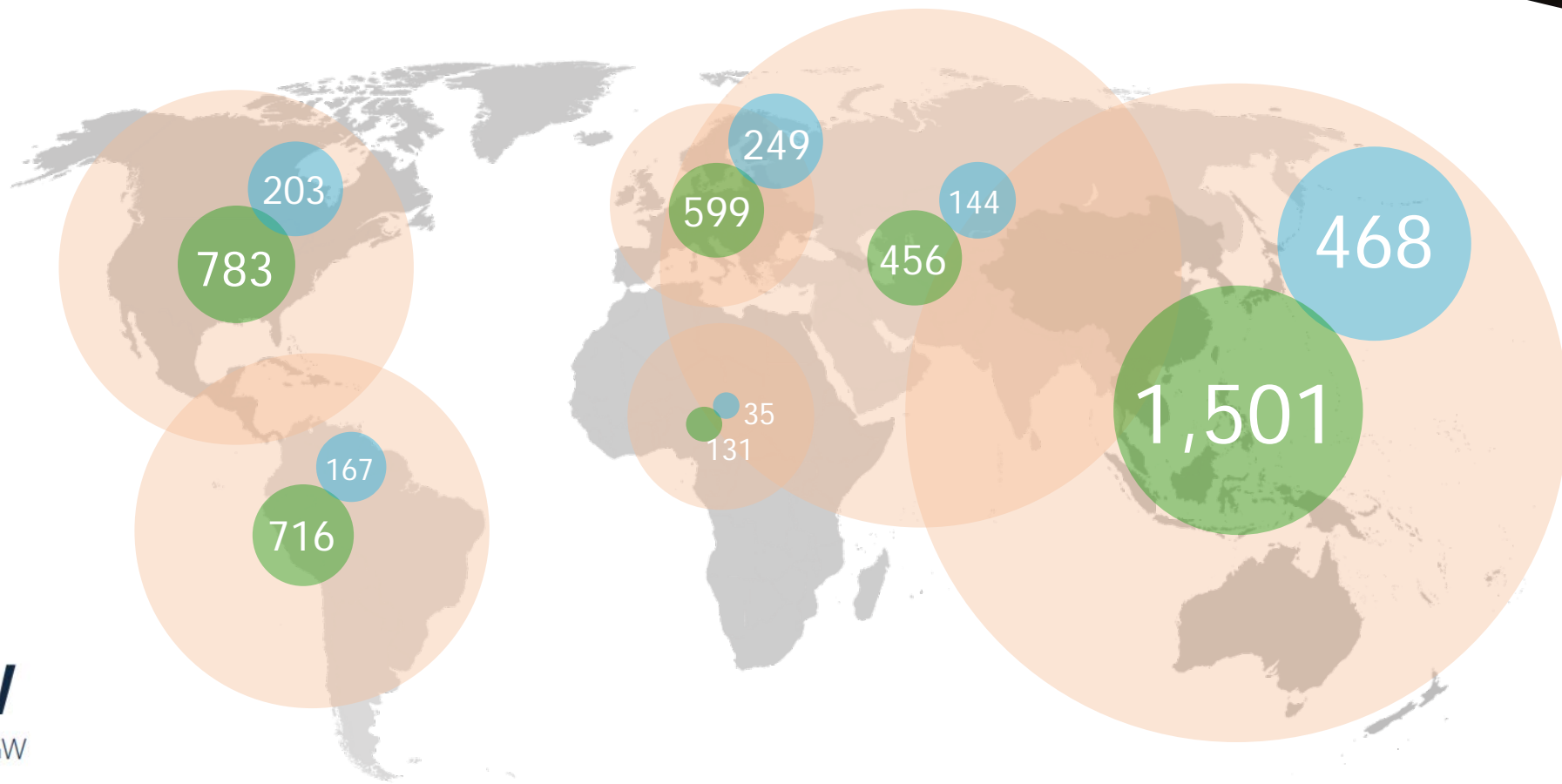
Brazil 3.38 GW

India 1.91 GW Portugal 1.05GW

Angola 1.02 GW Turkey 0.59 GW

Iran 0.52 GW Vietnam 0.37 GW Russia 0.36 GW

Added in 2017



Installed capacity
In 2017 in MW



Estimated generation
In 2017 in TWh/year



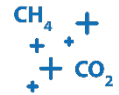
Technical potential
Assuming maximum generation

1

Top challenges



Trends and statistics



Climate mitigation
(GHG emissions)



Climate resilience



Sediment management



Climate bonds



Preparation support facility



Water footprint



Sustainability



River basin development



Regional interconnections



Operations and maintenance



Modernisation



Clean energy systems



Project benefits



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What are we talking about?

Artificial intelligence
Digitisation
Digitalisation
BIG DATA
Data

Virtual power plant Remote control systems

Decision-making Machine learning

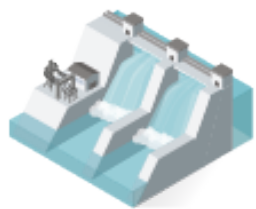
Clean energy systems the cloud





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Design & construction

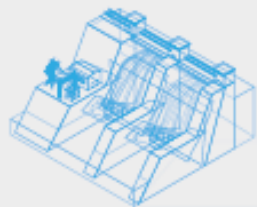


Data to information



Digitisation of drawings and plans

Information to action



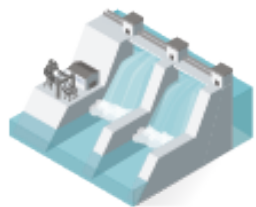
Design optimisation

Development

Virtual reality training



Operation



Real-time data and information systems



Remote plant and fleet operation

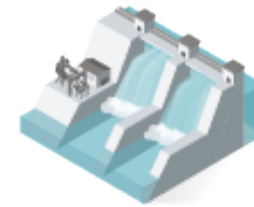


Virtual power plant

Cascade operation

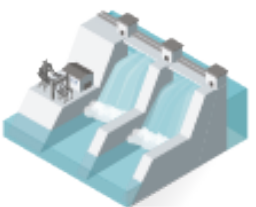


Machine learning and artificial intelligence



Digital hydropower

Maintenance



Monitoring systems



Remote condition management



Remote maintenance



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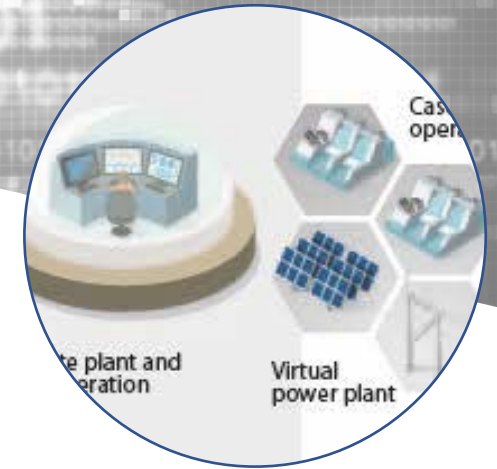


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Digitalisation of operations



- Integrated operation with variable renewables
- Optimise reservoir management to maximise revenues
- Extend the operating range of existing hydro units
- Asset performance management
- Maximise energy production
- Enhanced cyber-security

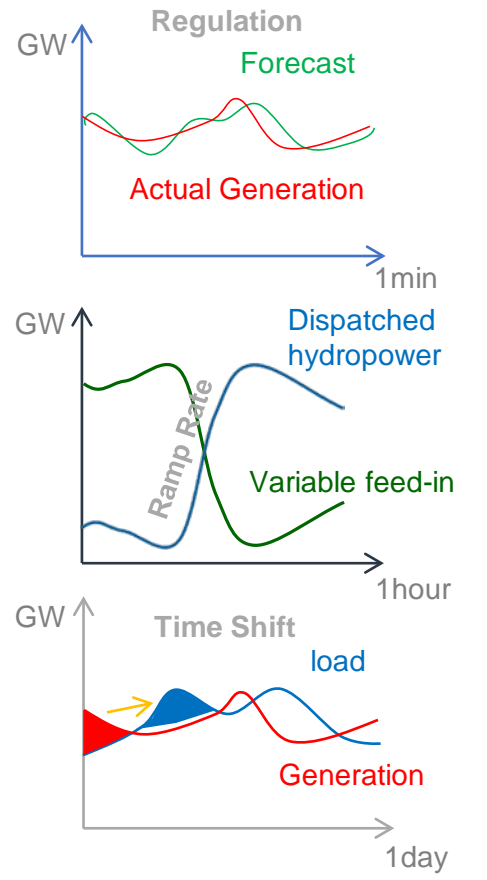
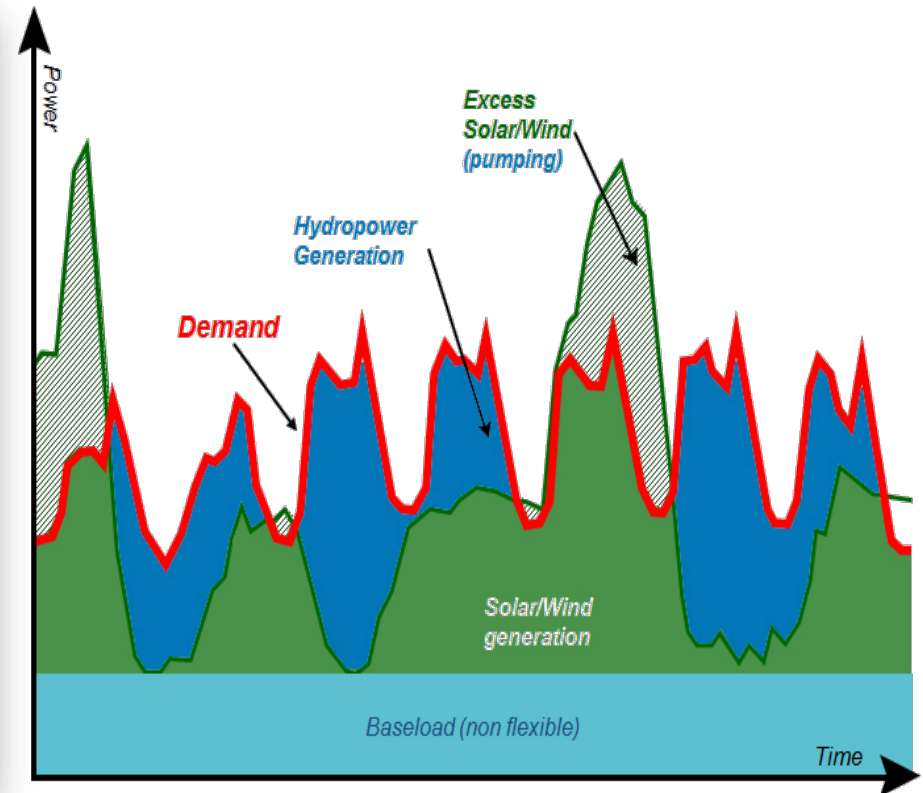
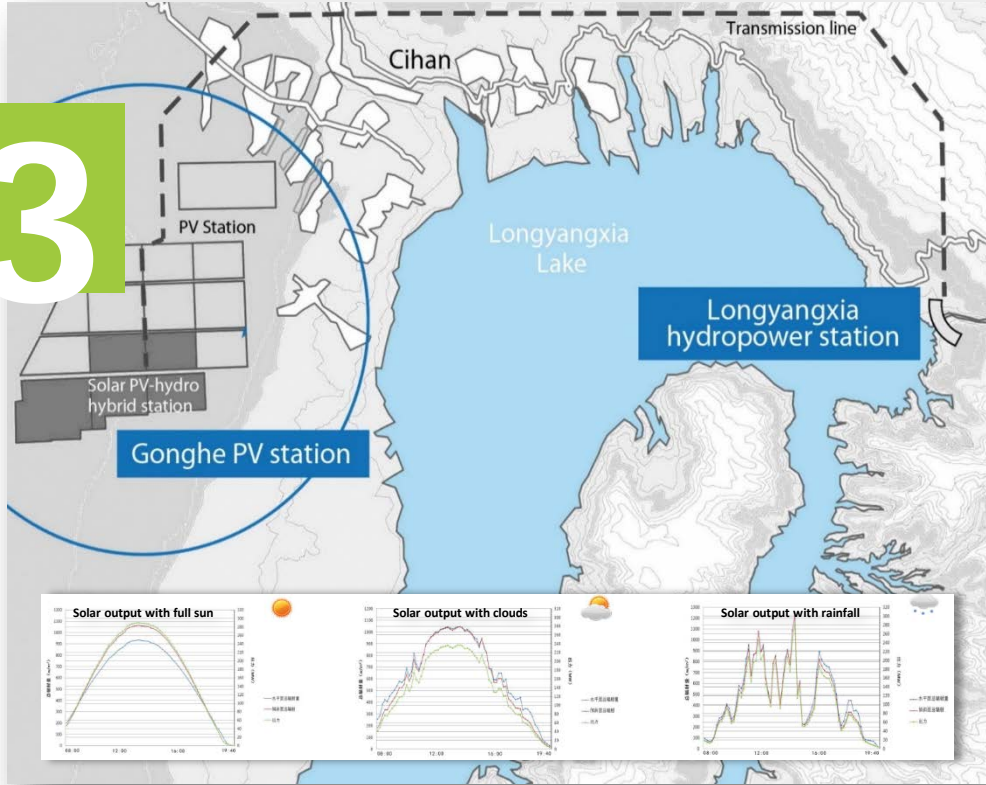


Renewables working together for clean energy systems

Power, heat and transport



3



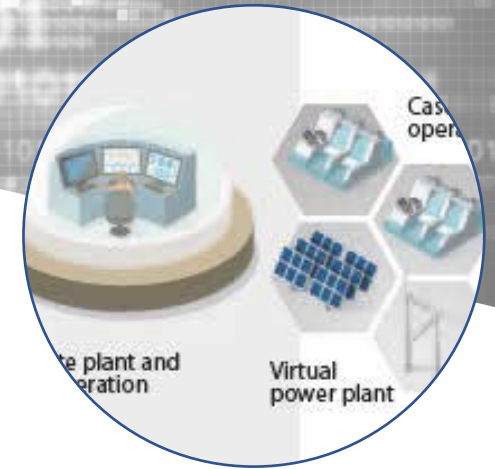
Hydropower filling the gaps between supply and demand and storing surplus electricity. Solar power offsetting generation and conserving water



3

Digitalisation of operations

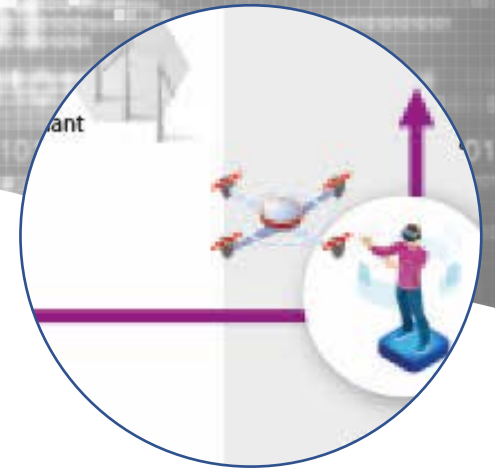
Control system upgrade at
Sardar Sarovar hydro plant in India





3

Digitalisation of maintenance

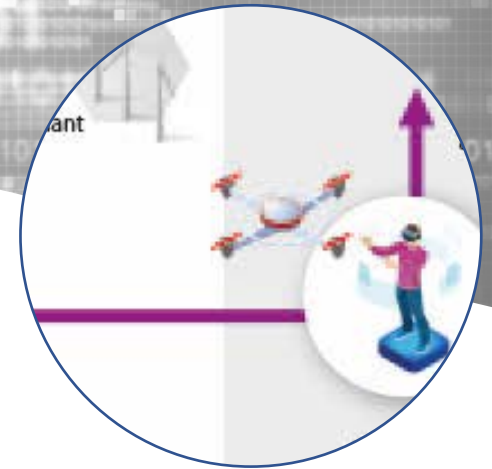


- Remote condition monitoring , automated sensors
- Optimised maintenance scheduling = Reduced outage costs
- Fully integrated asset management planning tools
- Machine-based learning
- Data analytics



3

Digitalisation of maintenance



ENEL Green Power installing Drones for monitoring and maintenance of hydroelectric power plants

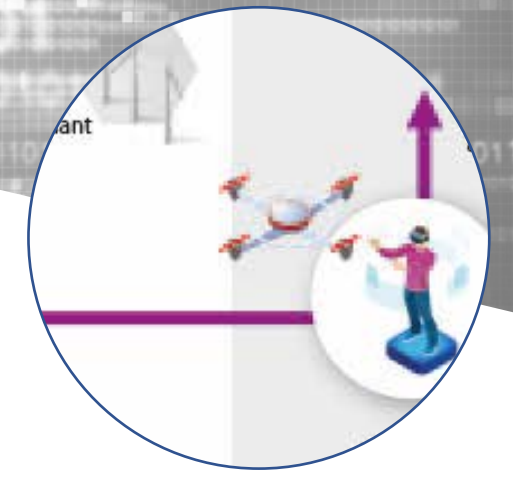
SINTEF launched a program called MONITOR X aimed at optimising lifetime utilization of hydropower plants based on monitoring of technical condition and risk





3

Digitalising modernisation



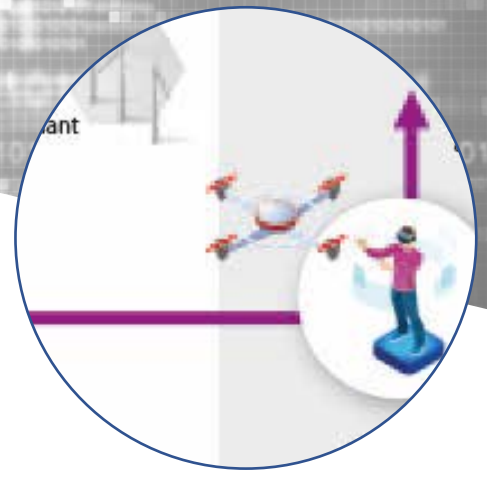
- Optimise life extension decisions
- Enhanced efficiency improvements through digital machine learning
- Digital mapping of key assets





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Digitalising modernisation



EDP Alqueva pumped-hydropower storage plant modernisation

Salto Grande modernisation





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In preparation for:

world hydropower
congress 

Save the date



Digitalisation • Sustainability • Climate change

Improving decision-making for hydropower

19 September 2018 • Paris

Organiser



In partnership with



With this workshop, the International Hydropower Association will be gathering members and partners from around the world. Participants 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, responding to wider water and energy policy expectations. Contact Marine Dominguez, md@hydropower.org if you would like to receive more information.



world hydropower congress



Delivering on
the Paris Climate
Agreement and
the Sustainable
Development Goals

The power of water in a
sustainable, interconnected world

14-16 MAY 2019 • PARIS



Advancing sustainable hydropower

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Video: "If you are a climate fund, you should be funding hydropower"

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