



XFLEX HYDRO

Flexibility demonstrators

Grand Maison PSP

CFBR Workshop

JL Drommi

26 January 2023





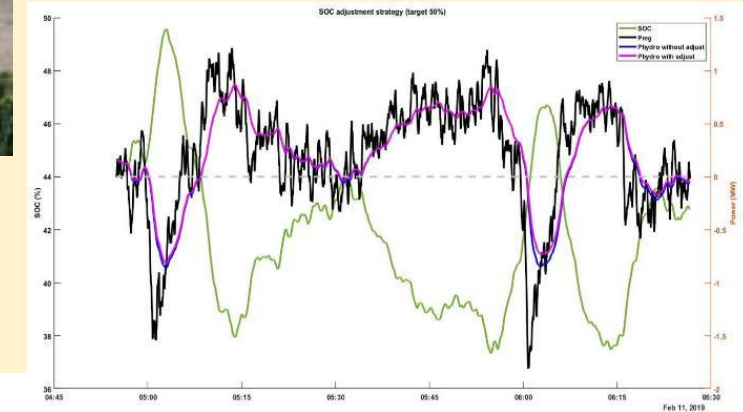
- European policy towards energy transition
- Specific call for Hydro Flexibility improvement
 - Call for industrial scale demonstrators
- XFLEX HYDRO : 2019-2023
- Consortium 19 partners
- 6 demos TRL7



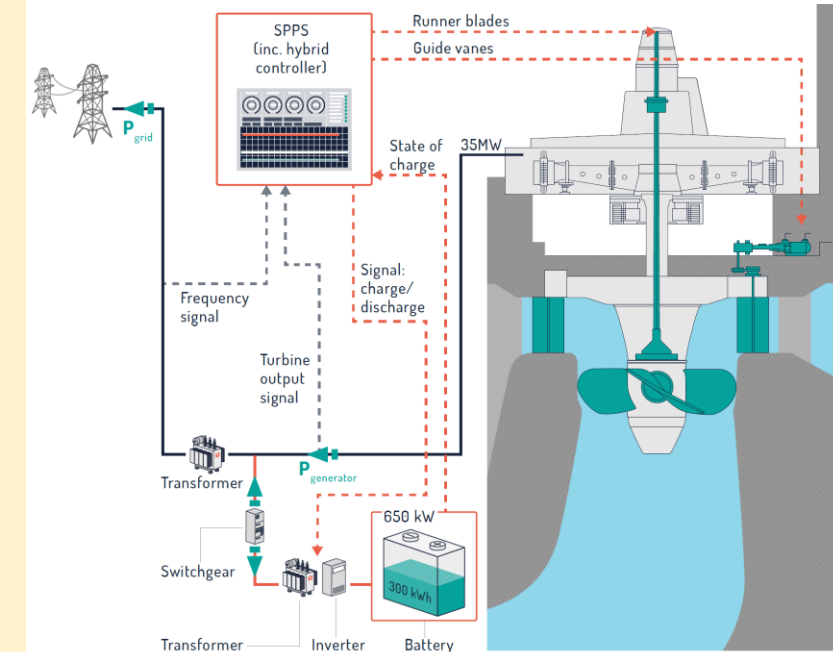
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Demo Vogelgrun !

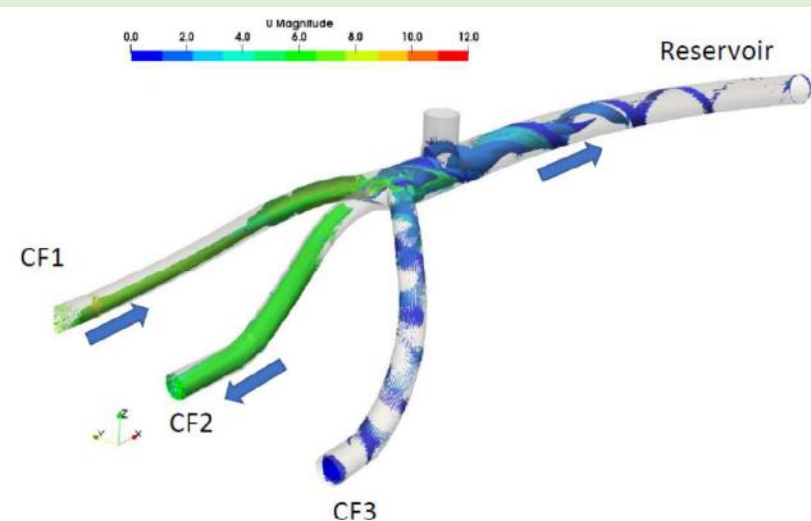
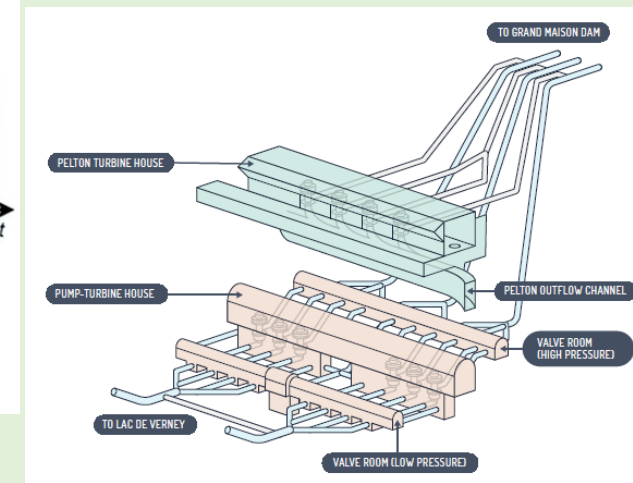
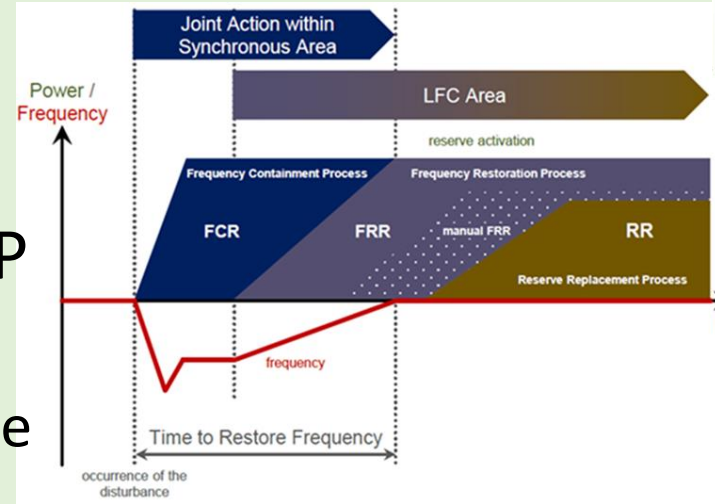


- **VOGELGRÜN Unit Hybrid**
 - In service since August 2021
- **Hybridisation**
 - Real time joint control of a BESS and a Hydro unit located at the same grid connection point
- **Goal**
 - Estimate turbine wear & tear with and without hybrid operation
 - BESS sizing as small as possible
 - Provide dynamic power response improvement

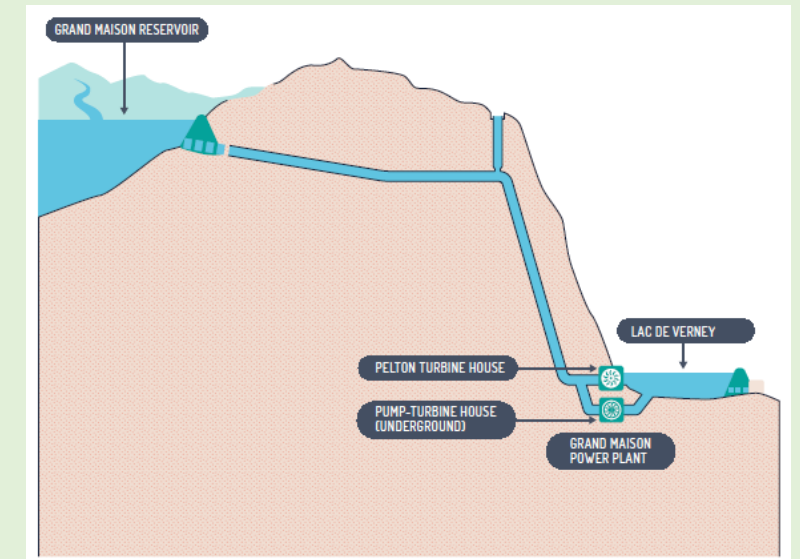


Grand Maison : REVERSE - Objectifs

- PSP : 1800MW largest in Europe
 - 8 Pump Turbines + 4 Pelton
- Demonstrate flexibility of existing PSP
 - Contribute to grid frequency control
 - Provide regulating power in pump mode
 - Hydraulic Short Circuit
 - In service since Sept 2021

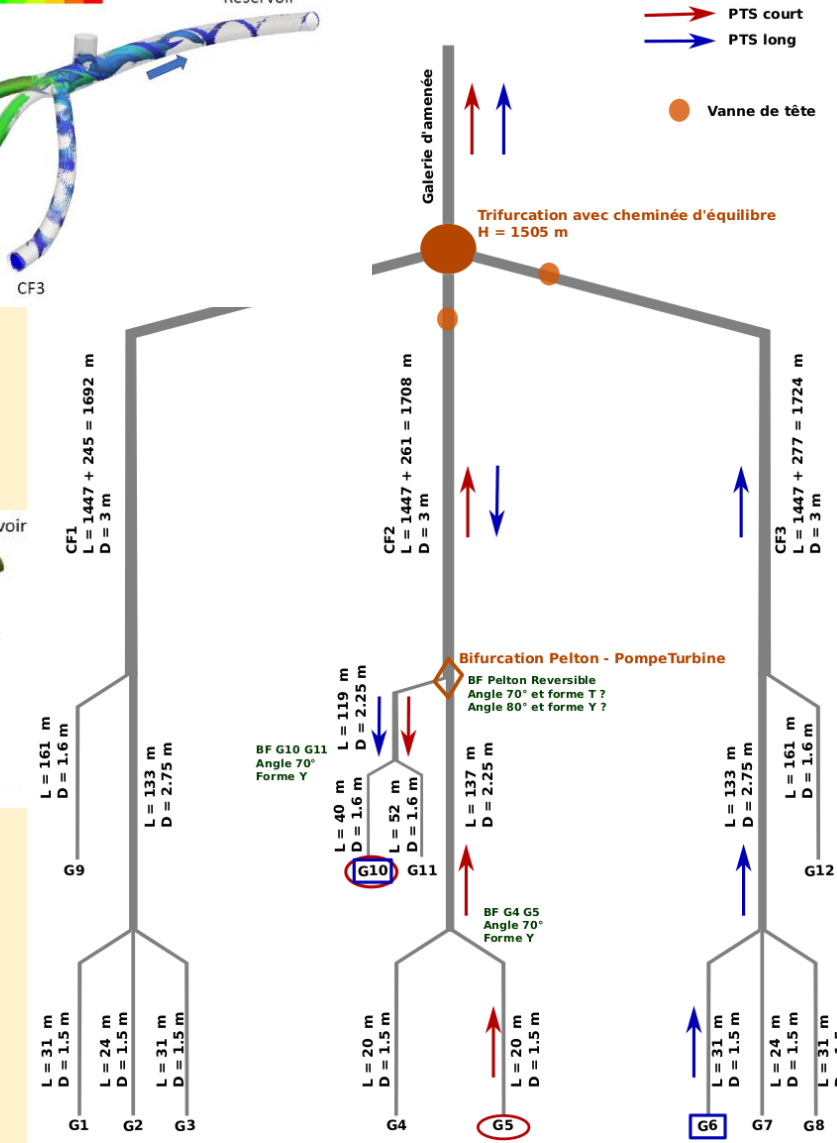
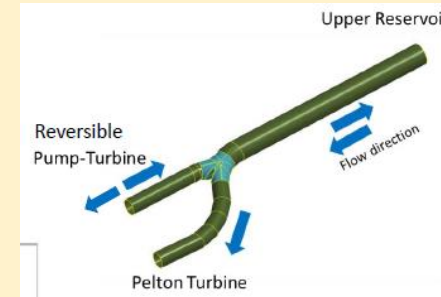
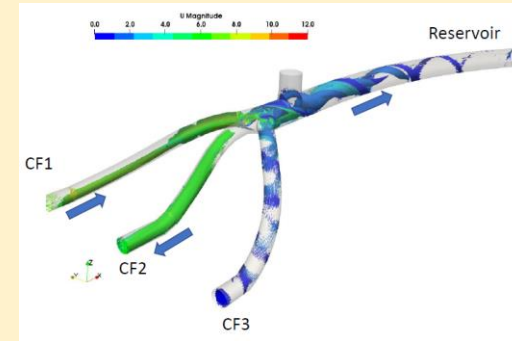


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Hydraulic Short Circuit Technology

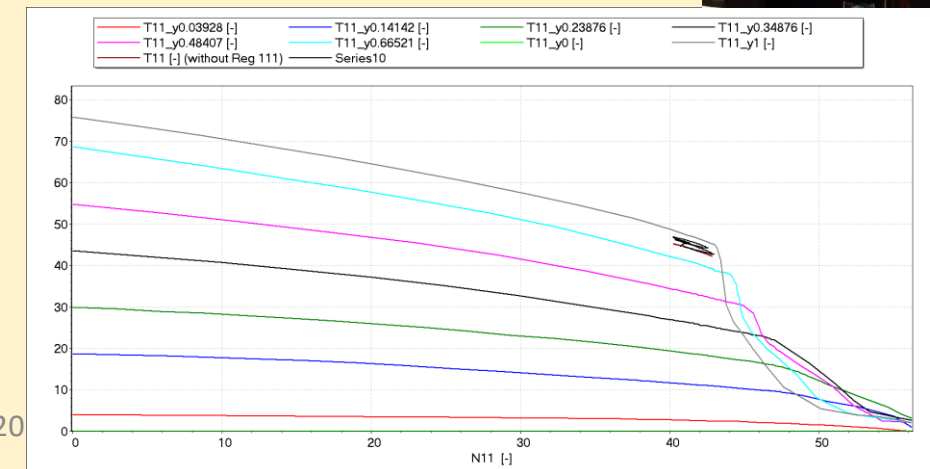
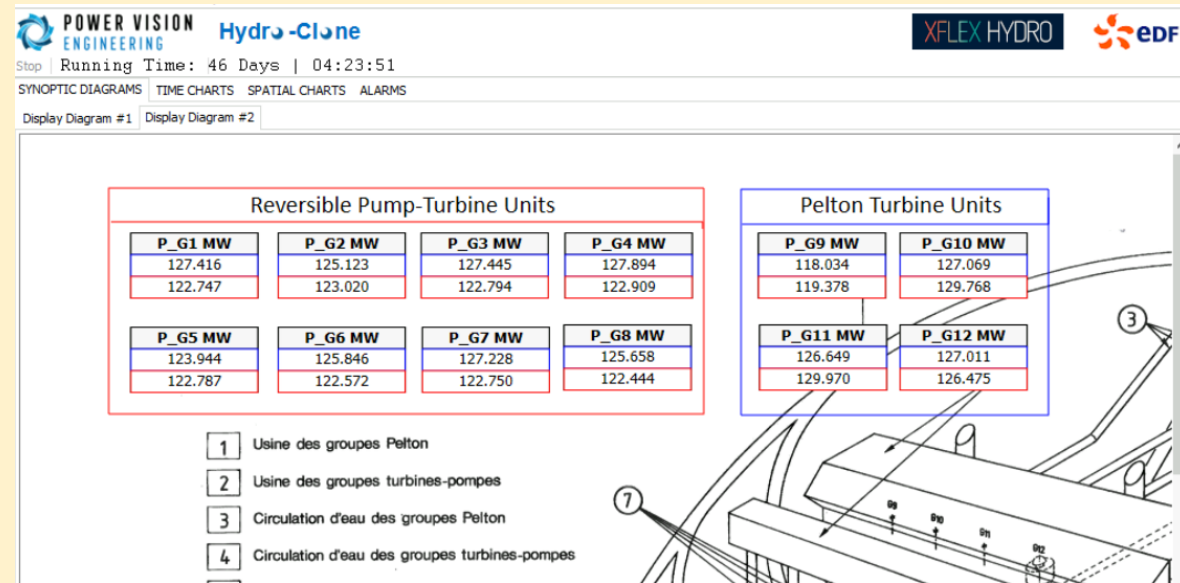
- Units not designed for HSC
- Operates Pumps and Pelton units together
 - Short route or long route
- Water By pass at penstock junction
 - Bifurcation or Trifurcation
- Extensive CFD and simulation
 - To detect any off design situation
 - Run Emergency Shut Down scenario
 - Check hydro transient behaviour
 - Water tunnel pressure
 - Surge shaft water level
- Demo includes a digital twin of the whole scheme



Digital Twin : Hydro CLONE[®]

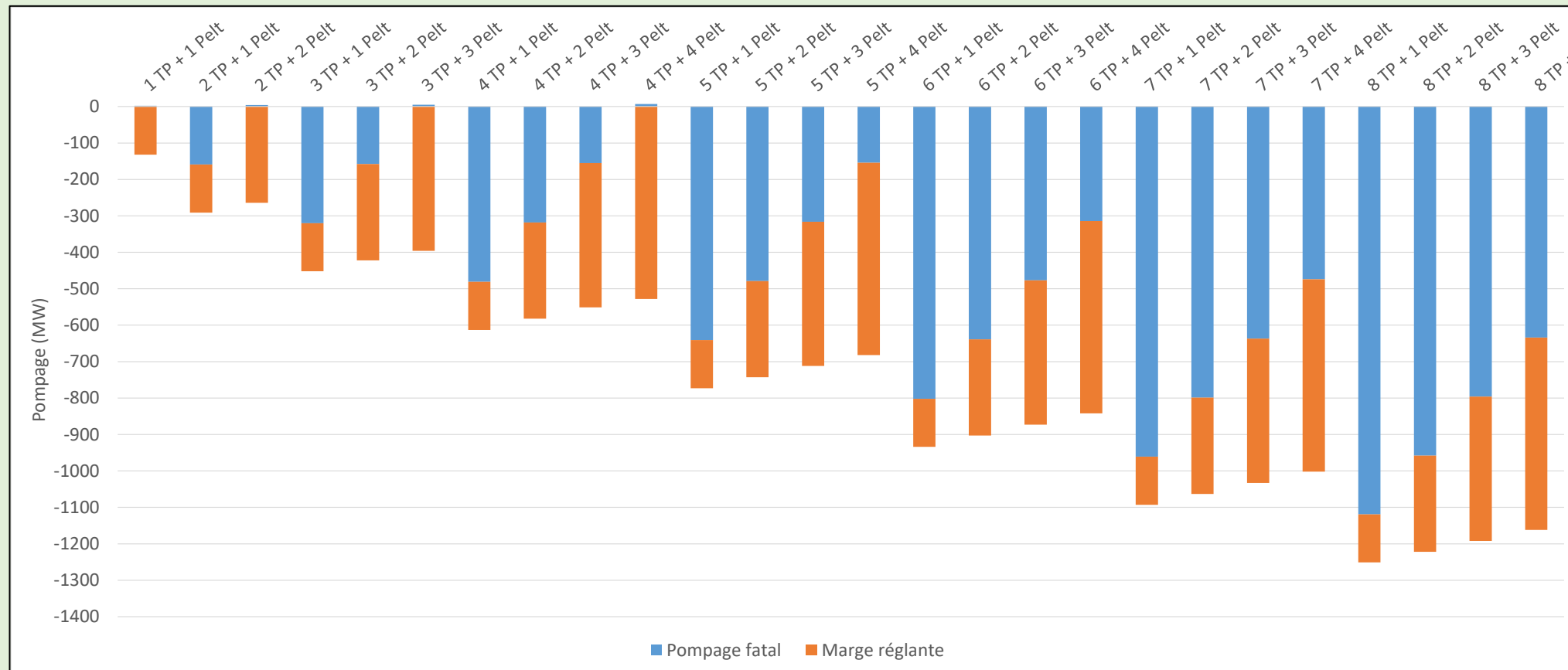


- Collects data from all 12 units + waterways
 - 130 parameters collected
- Runs locally
 - with cyber secure remote link
 - Remote access for maintenance
 - Remote access for data collection
- Improves plant and unit status assessment
 - Pelton efficiency loss



Regulating Power in Pump mode

- Adjustable power in pump mode
- Offers frequency control from demand side
- Up to 500MW as aFRR band available in 100s



Future Developpment

- Achievement of team work
- HSC proves easy to operate
- Regulating power during low demand periods is of interest for grid operators
- HSC operation at Grand Maison will continue and extended to all 4 Pelton units
- Target date summer 2023





Thank you

