

4th Meeting of the Platform for Coal Regions in Transition

Breakout session on "Energy Storage"

Magellan & Barents

Renewable
storage for
renewable
power

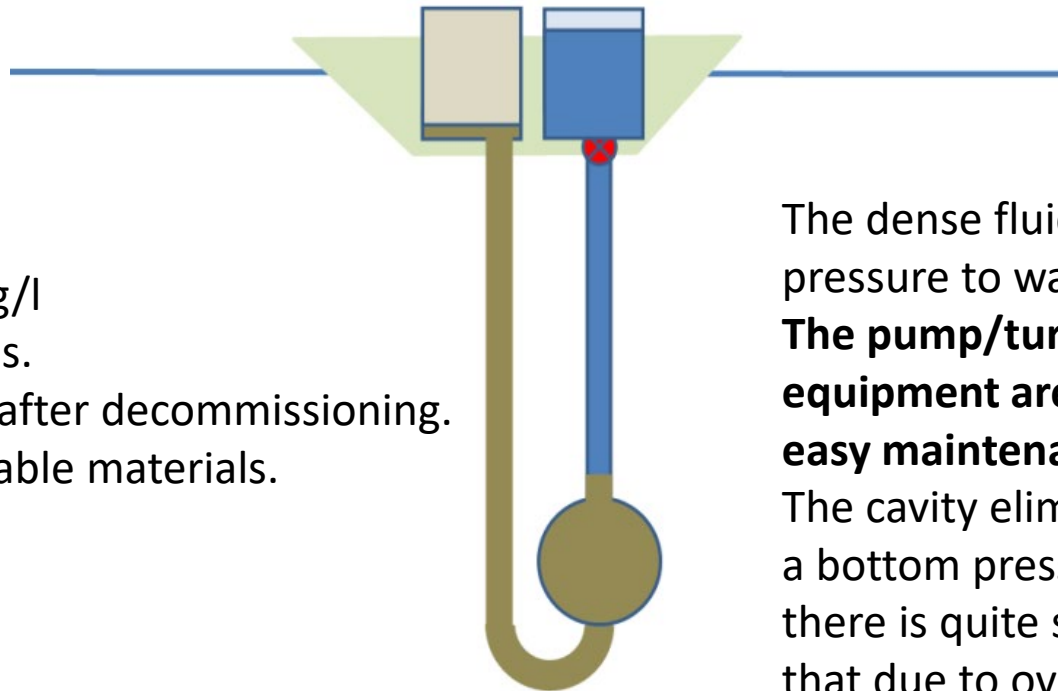
Monday 8 April, 16:40 – 18:30

Borschette Center, Brussels





DENSE FLUID + WATER



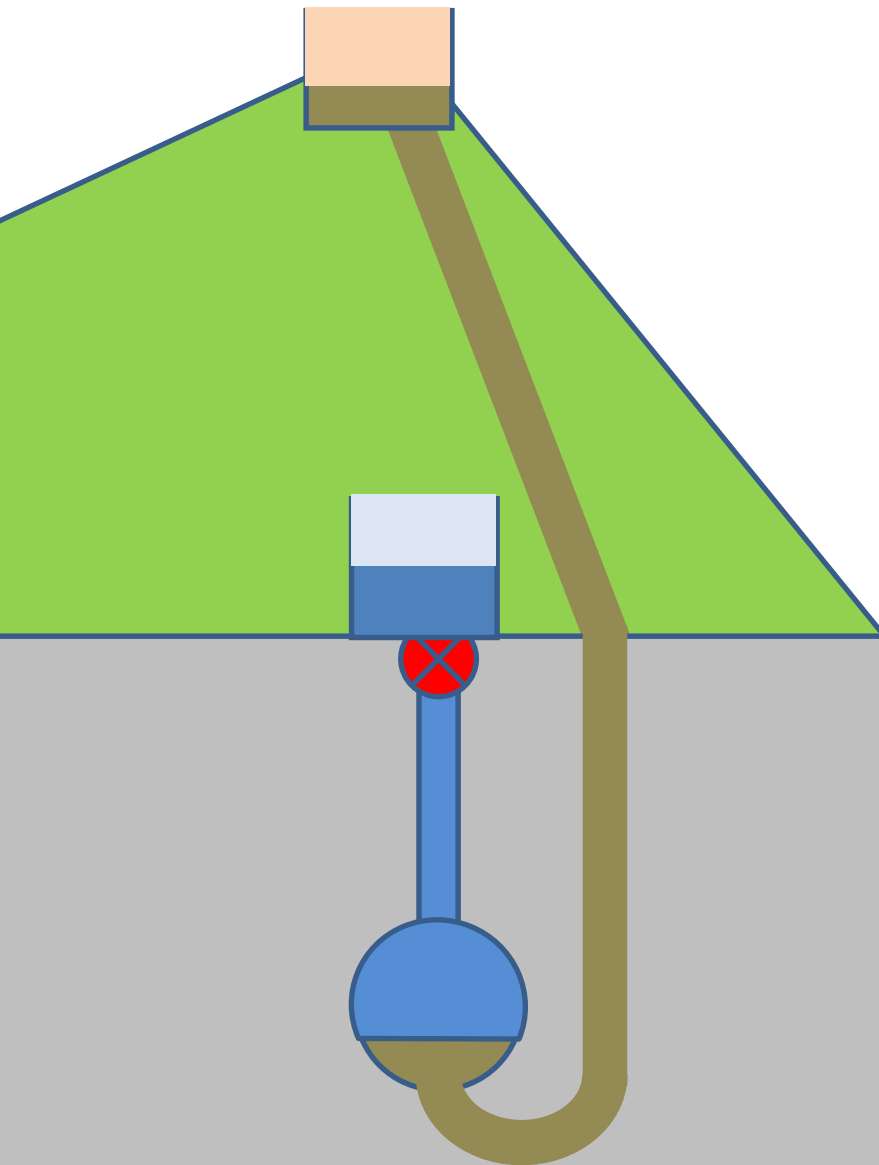
DENSITY >3 Kg/l
Inert, harmless.
Retains value after decommissioning.
100% recoverable materials.

The dense fluid transfers pressure to water.
The pump/turbine and electrical equipment are on the surface, for easy maintenance.
The cavity eliminates the need for a bottom pressure vessel. Pressure there is quite stable and close to that due to overburden.

Fluidity video: <https://photos.app.goo.gl/myPc8yyKnn9JEqHy8>



MINES IN MOUNTAIN VALLEYS ARE IDEAL



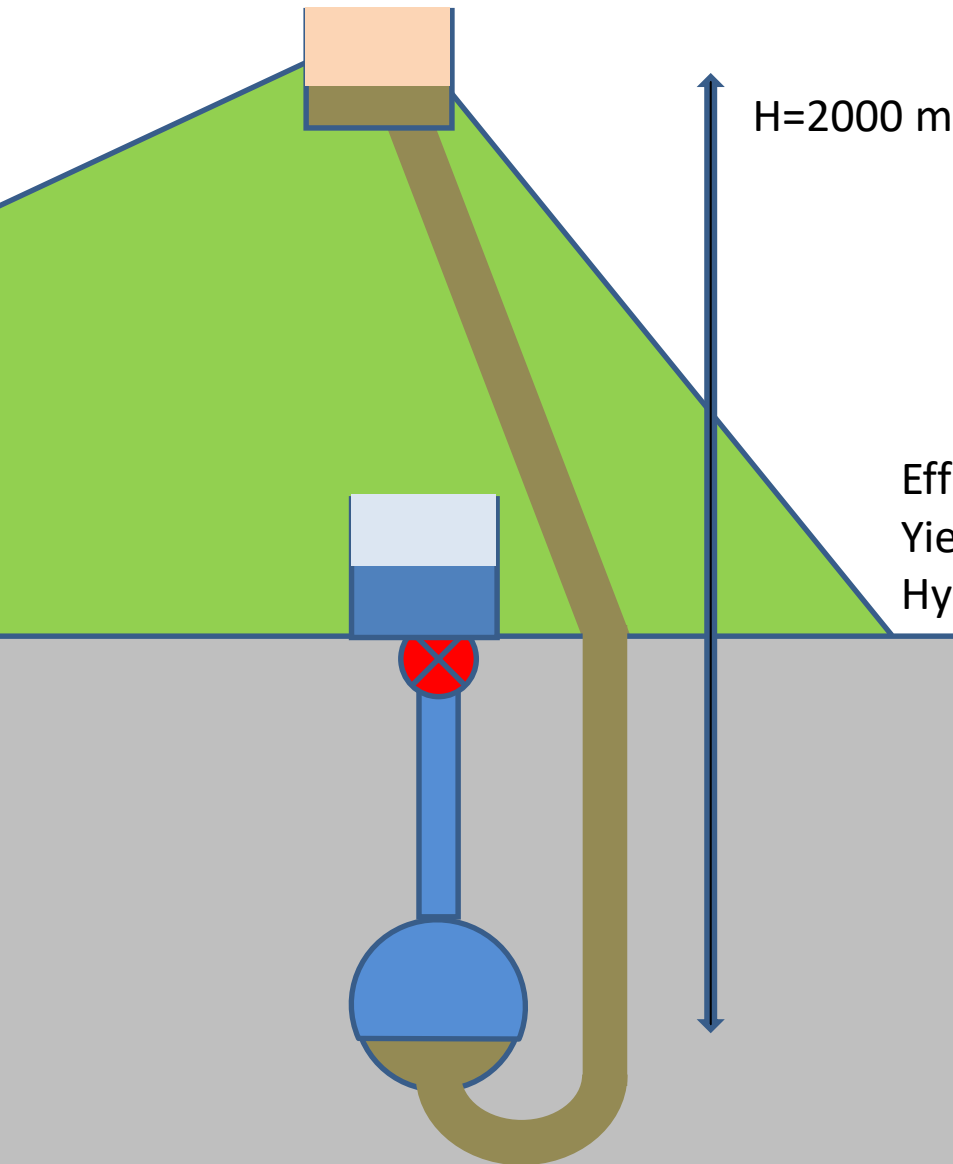
This works well in mine pit + hilltop for increased head.

Flow rate and tank size are then smaller, for the same power and energy storage capacity.

Coal mines in mountain valleys, such as in Asturias, are very suitable.



HOW MUCH POWER AND ENERGY?

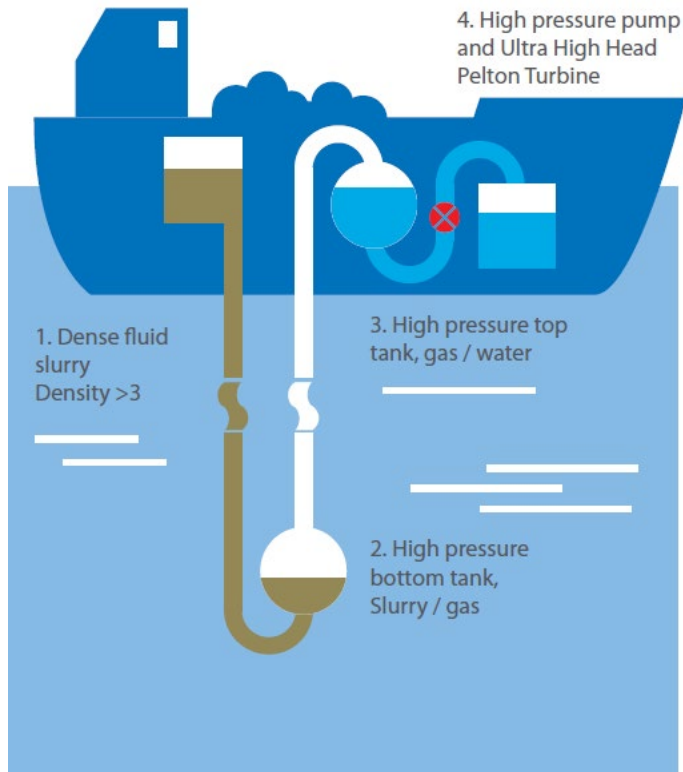


If we assume flow rate $Q=1\text{m}^3/\text{s}$
and total height $H=2000\text{ m}$:
Power is some 50 MW.
Energy storage capacity depends
on tank volume:
 $3.600\text{ m}^3 \Rightarrow 50\text{ MWh}$
1 MWh requires just 72 m³

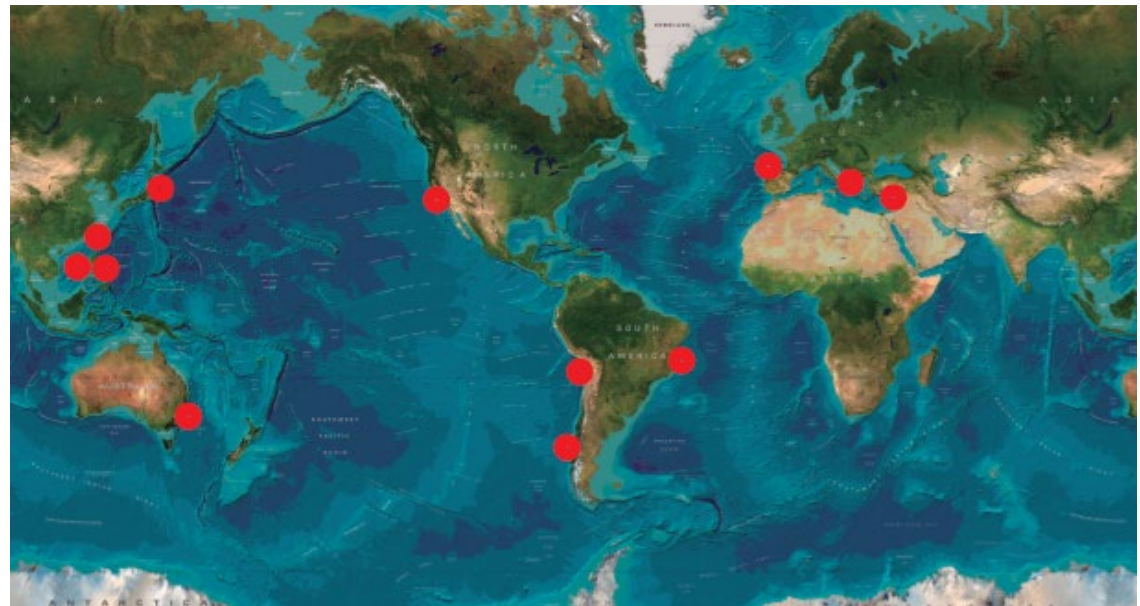
Efficiency is similar to conventional pumped hydro.
Yield is up to three times more.
Hydro power equipment is on the surface.



First on land. Then offshore.



A marine version can provide GWh scale storage.
Near shore marine escarpments exist close to big markets.
Avilés canyon, 4500 m deep 20 miles from shore, is unique.



MAGELLAN & BARENTS, UNCONVENTIONAL PUMPED HYDRO.

Project	Unconventional pumped hydro using dense fluids.					Description	<p>Prototype plant to ensure the fluid is adequate and can be removed, and installation methods can be verified. Cavity is conditioned to verify it withstands pressure and will not leak. We do not need a complete hydro power plant, but just a proof of concept.</p>		
Cost	Total	Year 1	Year 2	Year 3	Year 4				
Period	36 months	Minimum support required		75K				Employment	Construction phase: 20 workers on average
Partners	<p>Leader:</p> <p>Magellan & Barents</p> <p>Other partners: FAEN</p>								
Cost	3.6 M€	100 K€	0.5 M€	3 M€					



A second chance.

Coal miners started modern industry and prosperity.

Their ingenuity, braveness and cooperation spread technologies and put natural resources to good use.

That process was not clean, but we now have an opportunity to correct that by developing clean, renewable storage, with the miners, in the mines.

THANK YOU!

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