



SIZABLE

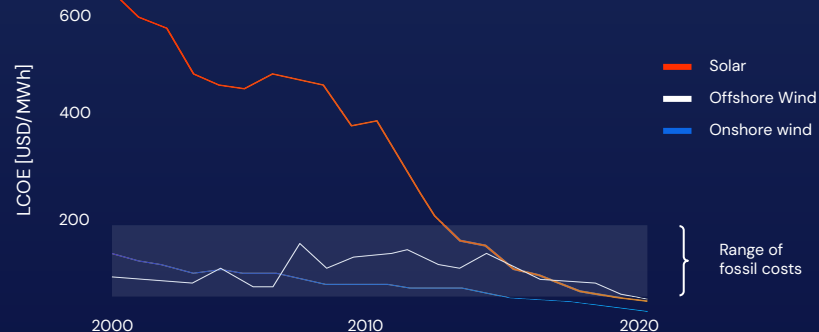
Utility-scale energy storage with offshore pumped-brine

The definitive long duration energy storage (LDES)

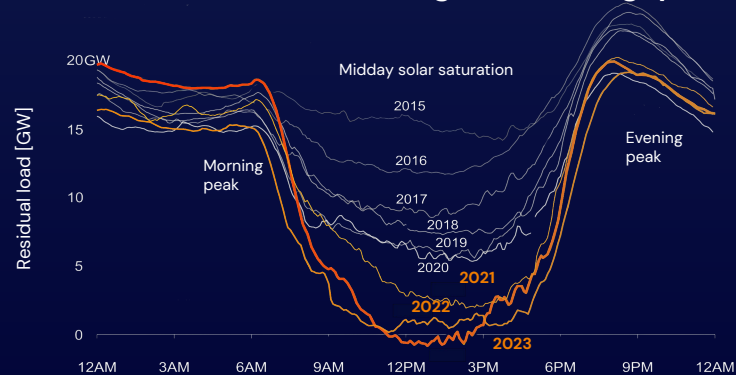
As we increase our reliance on **variable renewable energy**, new challenges arise

Long Duration Energy storage becomes essential to ensure system resilience and grid stability

Solar and wind power have grown cheaper than fossil fuels...

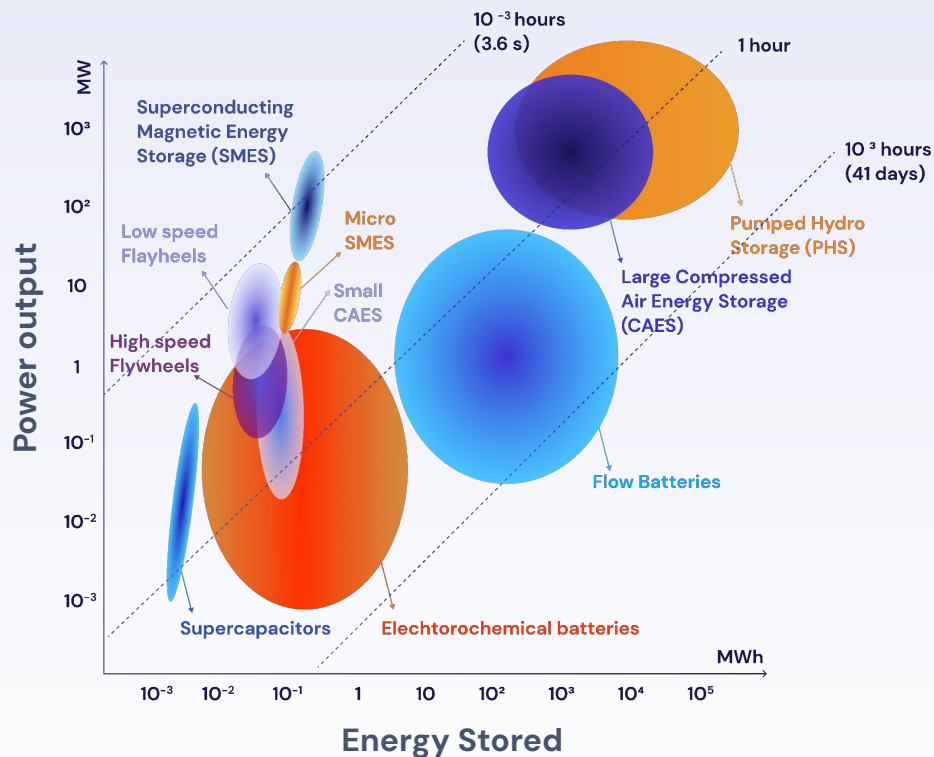


...but we need storage to fill the gaps



The bottleneck

Pumped-hydro: only legacy solution for utility-scale storage

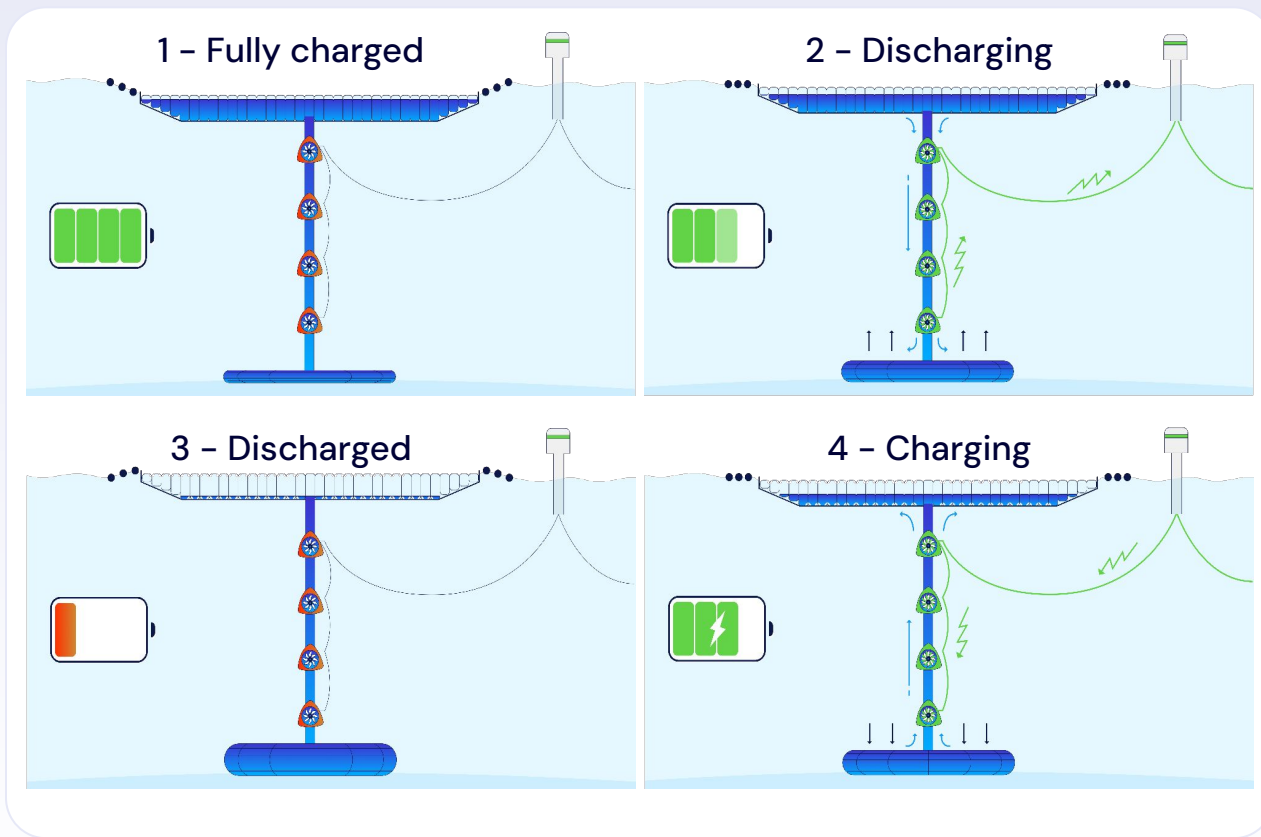


⊕ PROS

- Lowest cost for long duration energy storage
- Long lifecycle
- Spinning reserve (i.e. inertia) keeps lights on

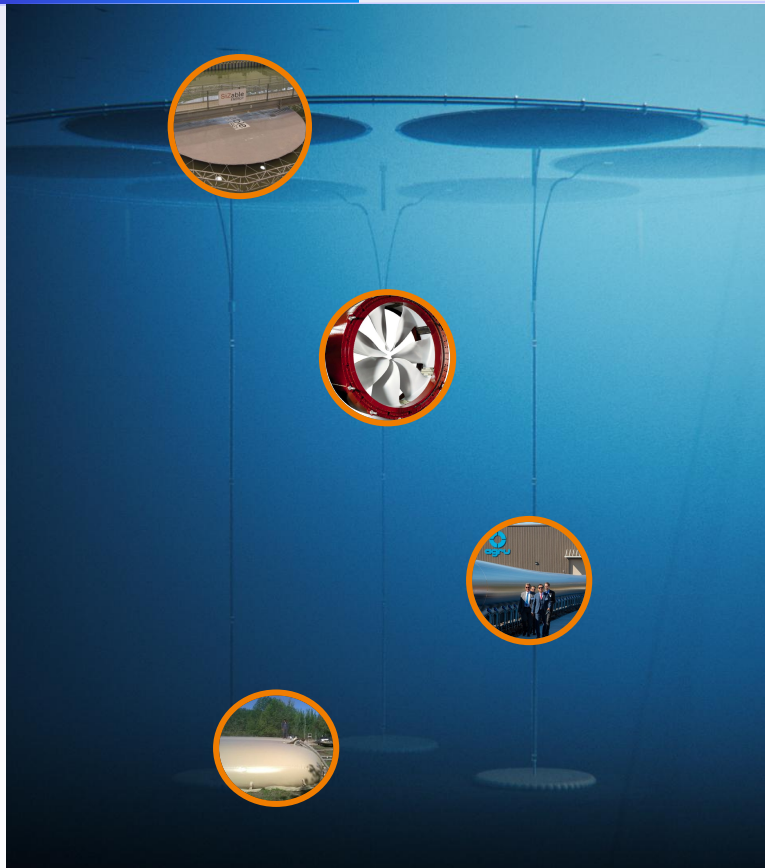
⊖ CONS

- Limited availability of sites
- Significant land use
- Lengthy and costly authorizations



A new technology, inspired by pumped hydro, based on the gravitational potential stemmed from density difference between seawater and **saturated sea salt brine**, which is:

- ~20% heavier than seawater
- less corrosive than freshwater



Leveraging existing technologies



Modular and scalable design



Short development and deployment times



Ideal coupling with floating wind and PV

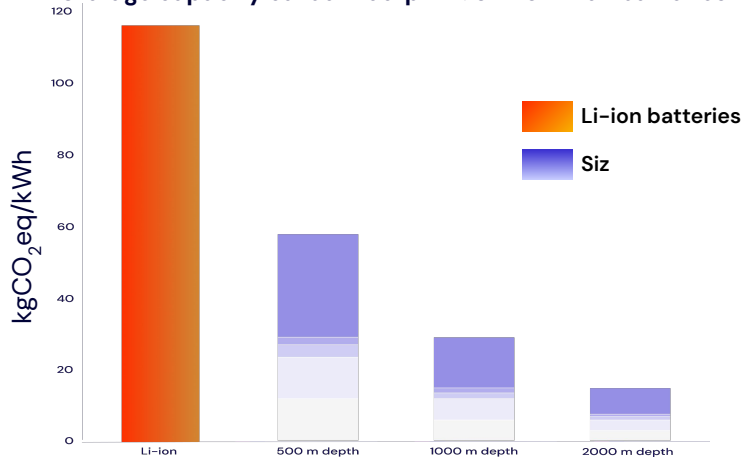


High round trip efficiency



Utility-scale, GWh+

Storage capacity carbon footprint: Siz vs Li-ion batteries



The most sustainable storage:

Minimal carbon footprint

No harmful or polluting materials

No scarce materials to be mined

High social acceptance:

No land use

Not visible from the shore

Local manufacturing and assembly

Great standalone, unbeatable with floating wind:

Shared cost of export cable & offshore substation

Shared supply chain and O&M activities

All-in-one authorization procedures

“

* "Long duration storage [...] can boost the net present value of the [co-located] wind farm up to 50%"

Enel Foundation - Large Scale, Long Duration Energy Storage, and the Future of Renewables Generation

Highly competitive CAPEX/LCOS (€/MWh)
for 8–24 hour duration

Carbon footprint (kgCO₂eq/kWh)

Security of supply – limited exposure to
geopolitical risks

Round Trip Efficiency

Energy & power modular & scalable

Site independent design

Deployment time

Long lifetime

Physical inertia/spinning reserve

TRADITIONAL PUMPED HYDRO



–



80%
no degradation



>7 yrs

>50 yrs



LI-ION BATTERIES



4x



85%
degradation



<1 yrs

<15 yrs



SIZABLE



1x



80%
no degradation



<2 yrs

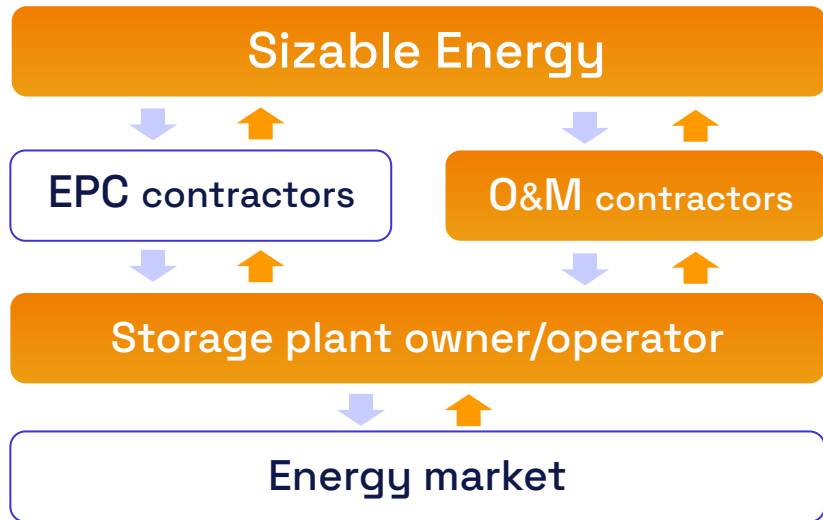
>25 yrs



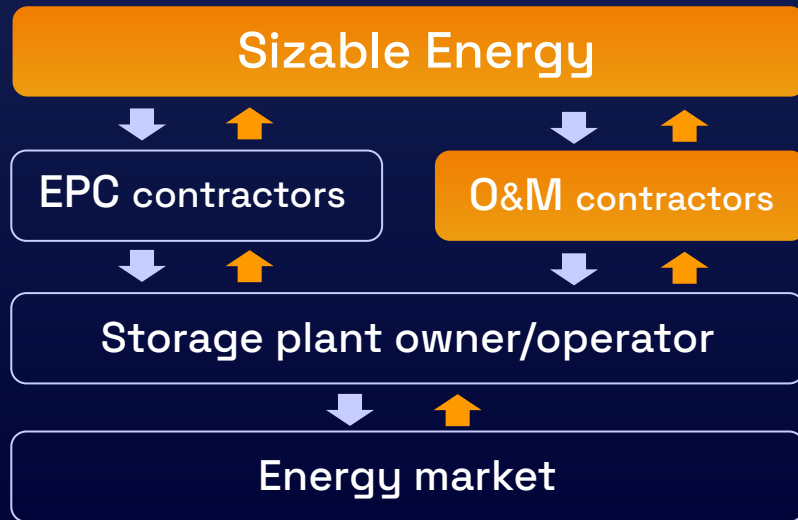
	Compressed CO ₂ 	Subsea flywheel † THALERON	FLOW BATTERIES	Thermo-Electric 	Offshore PHS SIZABLE
Lifecycle	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★
Economics for 8-24 hours duration	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★
Round Trip Efficiency	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★
Minimal land use	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★
Simplicity of spinning component	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★
Capability of providing spinning reserve	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★
Main challenges	Large heat exchangers and thermal energy storage required to achieve acceptable thermodynamic efficiency	High-speed, high-mass, rotating components; high operational loads on thrust bearing system	Reduced round-trip efficiency at higher current/power densities	Challenging handling of large volumes of high and low temperature fluids	Competitive only at utility scale (tens of MW and above) for 8-24 duration

[Initial go-to-market strategy: first 100 MW]

Storage as a Service



[Long term go-to-market strategy]
**Supply of key components +
monitoring and maintenance services**

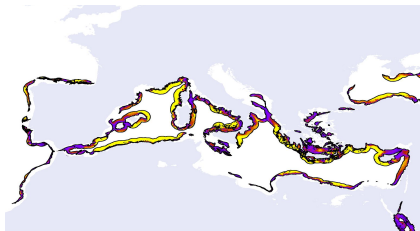


↓ Goods (e.g. IP, service, equipment) ↑ Cashflow

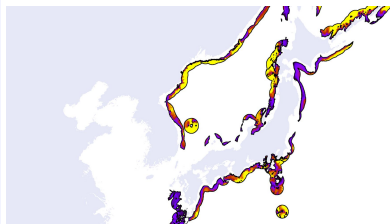
Globally suited, locally embraced: our technology unlocks potential markets worldwide



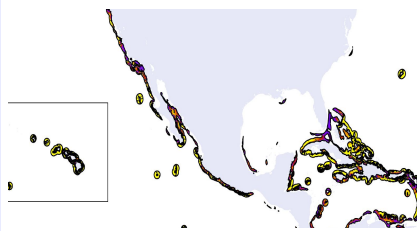
Mediterranean



East Asia



North & Central America



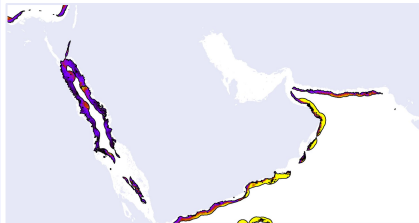
South America



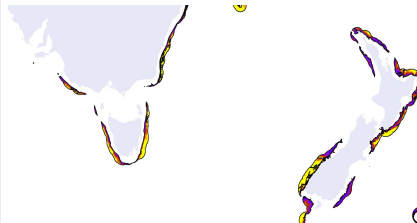
India & Maldives



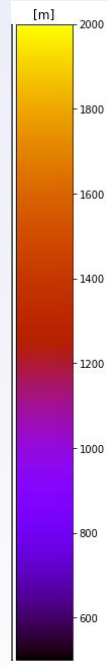
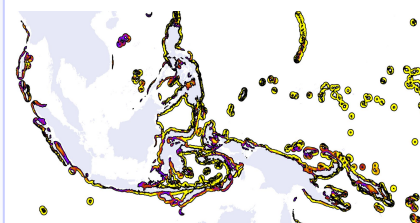
Middle East



Oceania



South-East Asia



**All highlighted areas represent suitable Sizable locations at depth 500-2000 m near countries w/ confirmed energy storage market needs*

Revenue projections

€1B/yr

by 2035

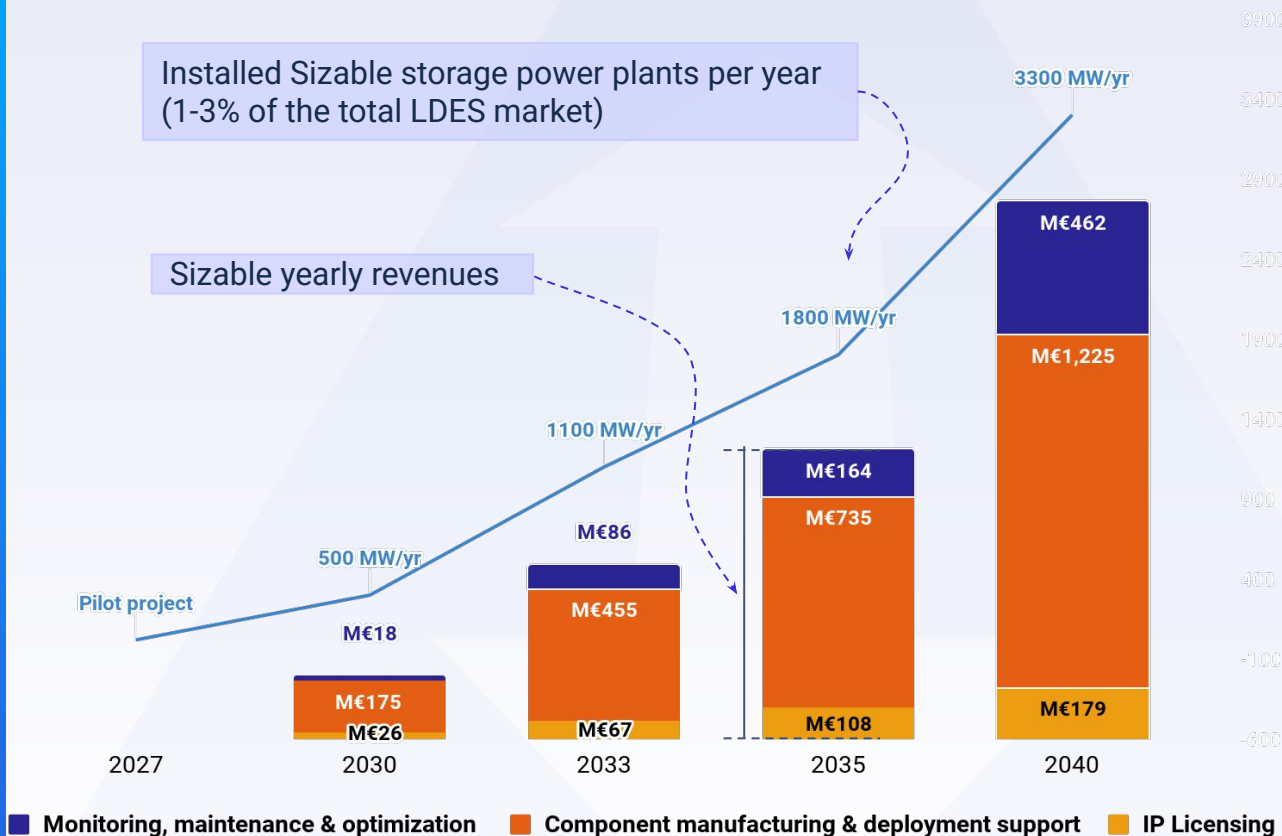
Revenue stream

IP Licensing	~5% CAPEX
Component manufacturing ⁽¹⁾	450 k€/MW
Monitoring & optimization ⁽¹⁾	25 k€/MW/yr

⁽¹⁾ Expected profit margin ~ 25-30%

SIZABLE

On track to be a €1B/year business by 2035



Team

The ones to make it happen



Manuele Aufiero, PhD

Founder, CEO



International academic R&D experience in EU and US: modelling, simulation & design of experimental campaigns

10+ years of experience in consulting for deep-tech startups in the advanced nuclear and energy sector



Carlo Fiorina, PhD

Co-founder



Associate professor at Texas A&M
Co-founded Milano Multiphysics nuclear consultancy company w/ Manuele in 2015
Sizable IP strategy director



Stefano Bernardi

Co-founding investor



DeepTech investor with multiple unicorn investments.
Incubated Sizable Energy investment and led the pre-seed round.



Simone Biondi

Business development lead



Ilmas Bayati

Offshore testing lead



Mirko Millefanti

Procurement and Mechanical design



Lorenzo Gardoni

Energy engineer



Sara Maffioli

Geoinformatic engineer

Advisory Board



Roberto Casula

Former CTO of



Gianfilippo Mancini

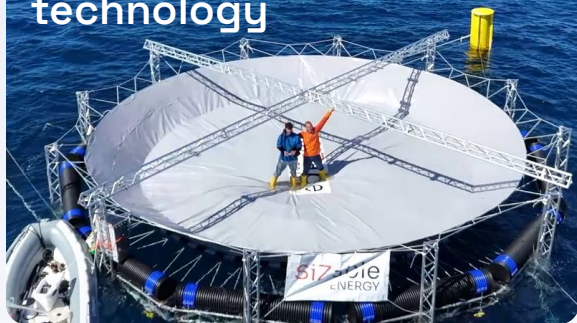
Former CEO of



Former Executive Director at



With our 700k€ pre-seed we've already proved and de-risked our technology



Intellectual Property

- 4 patents granted
- FTO concerns the potential to deploy PV panels on top of floating reservoirs

Technology

- Fully integrated kW-scale Proof of concept (PoC), tested in both the lab and at sea
- Identified and secured supplier for key components

Scaling

- Established joint working group with Prysmian Group
- UNIGE environmental Impact assessment – Accidental brine release

Commercial

- Iren and Edison Loi
- Grid connection authorization for the first Sizable commercial plant secured



Validated external barrier and floating reservoir against reference waves – University of Padova

2023



Tested both floating and bottom reservoir assemblies in reference environmental conditions – University of Salento

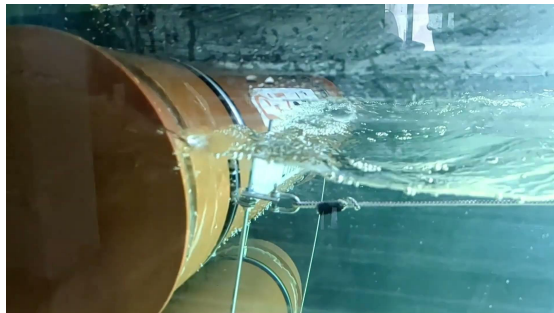
2024



Complete proof of concept (POC) at sea, at 30 meters depth, in the Noel laboratory of Reggio Calabria University

2025

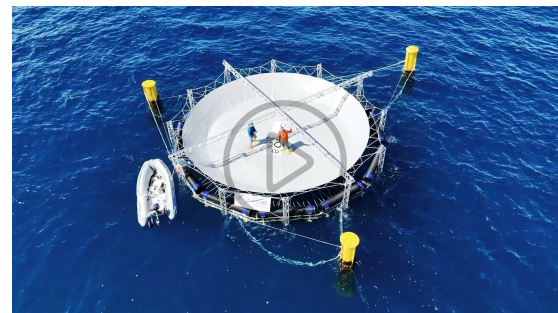
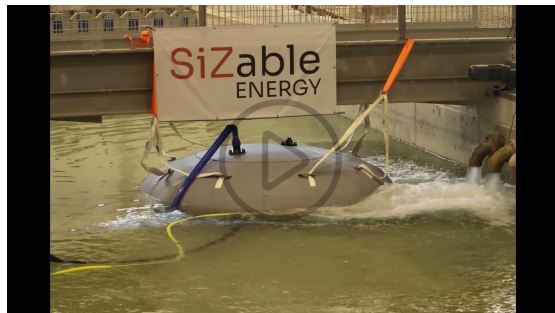
Backup slides



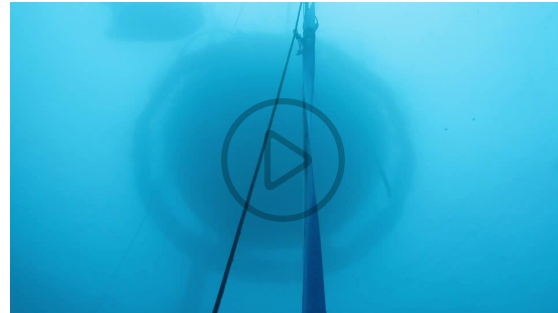
Validated external barrier and floating reservoir against reference waves ✓



Tested both reservoir assemblies in reference environmental conditions ✓

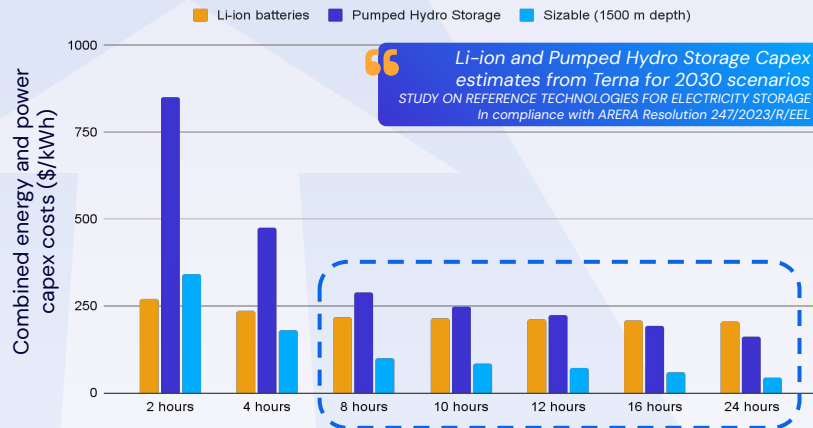


Deployed proof of concept at sea ✓



Global race to the lowest CapEx

Material and component capex costs (energy and power)



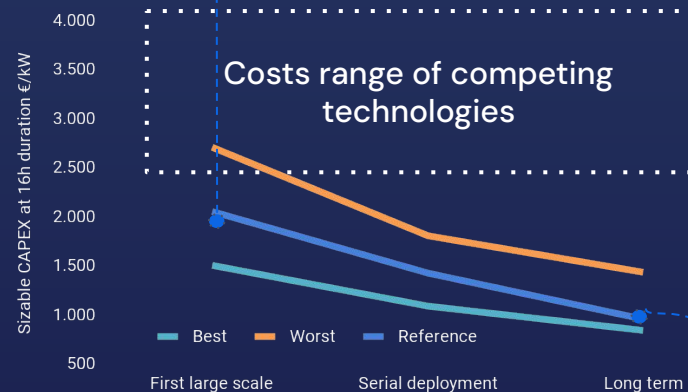
Long Duration Energy Storage (LDES) at 8–24h+ service duration is required to ensure grid stability and resiliency as the share of variable, renewable generation increases

Policy framework to support LDES deployment is **soaring**

Given a technology neutral policy, the most competitive technology will secure a significant market share

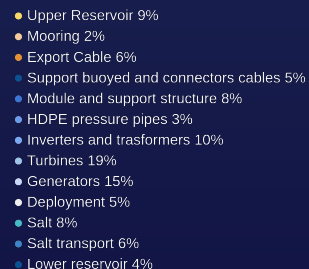
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First quotations obtained confirm initial costs for commercial deployment



Reference 500MW/8GWh SIZABLE plant at 1500 m depth:
~500 M€ of investment cost
~10 M€/year of maintenance

Energy and power capex



Sizable revenues as components provider

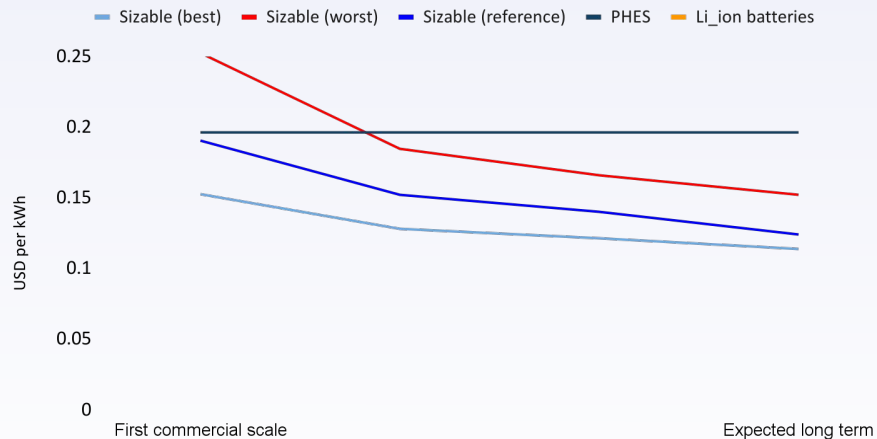
LCOS comparison overall assumptions: 16 hours duration, 2.5 cycles/week

Sizable: 1300 m depth, 30 km dist, Standalone deployment, 15-45 years life cycle, 80% round trip efficiency

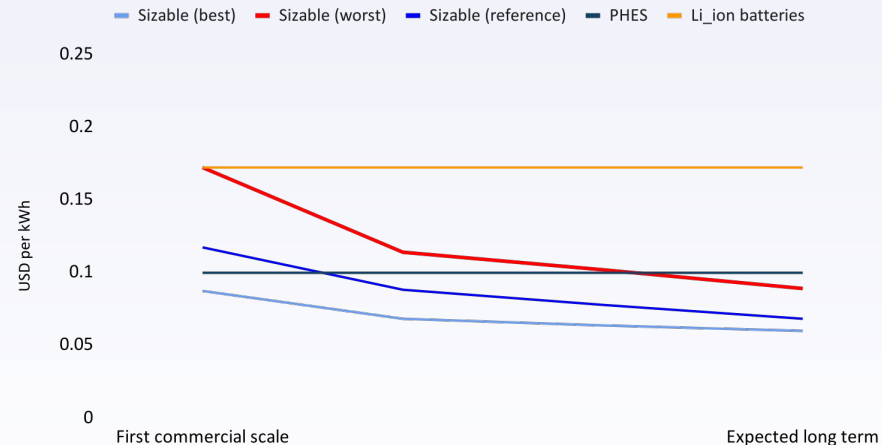
Pumped hydro energy storage: 50 years life cycle, 80% round trip efficiency

Li-ion batteries: 15 years life cycle, 91% round trip efficiency

Case 1 with: 8% interest rate and 0.06 \$/kWh cost of energy



Case 2: 3% interest rate and 0.028 \$/kWh cost of energy





Exploits the energy potential given by an heavy weight lifted inside a vertical borehole



Exploits the energy potential given by concrete weights lifted within a steel structure

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Exploits the energy potential given by sea salt brine flowing inside an HDPE penstock, located offshore

Mass	Concrete/steel	Concrete	Unrefined salt
Height (m)	100 - 1000	120	500 -1500
Energy density (kWh/ton)	0.27 - 2.7	0.33	1.4 - 4.1
Material price (\$/ton)	80 - 400	80 - 400	10 - 20
Material carbon footprint (kg CO ₂ equiv/ton)	500-900	500-900	~100
Infrastructure	Vertical borehole and heavy duty lifting cables	Steel infrastructure and heavy duty lifting cables	HDPE extruded pipes and geomembrane reservoirs

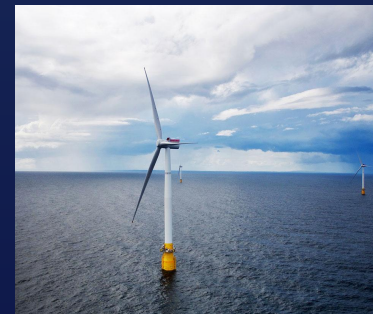
Environmental Impact and Authorization

Relevant aspects to be considered in an Integrated Pollution Prevention and Reduction permit:

Local reduction in the water oxygenation below the upper reservoir

Local reduction in sunlight penetration below the upper reservoir

Impact of mooring lines (potential entanglement of marine life, etc)



Leverage on existing/upcoming floating PV and wind authorization frameworks

Sizable upper reservoirs feature ~1 order of magnitude less surface wrt floating PV, per MW of installed power

Sizable upper reservoirs features several times less mooring lines wrt floating wind, per MW of installed power



The University of Genova's DICCA conducted in-depth studies on SiZable technology, analyzing its environmental effects on salinity levels in the ocean.



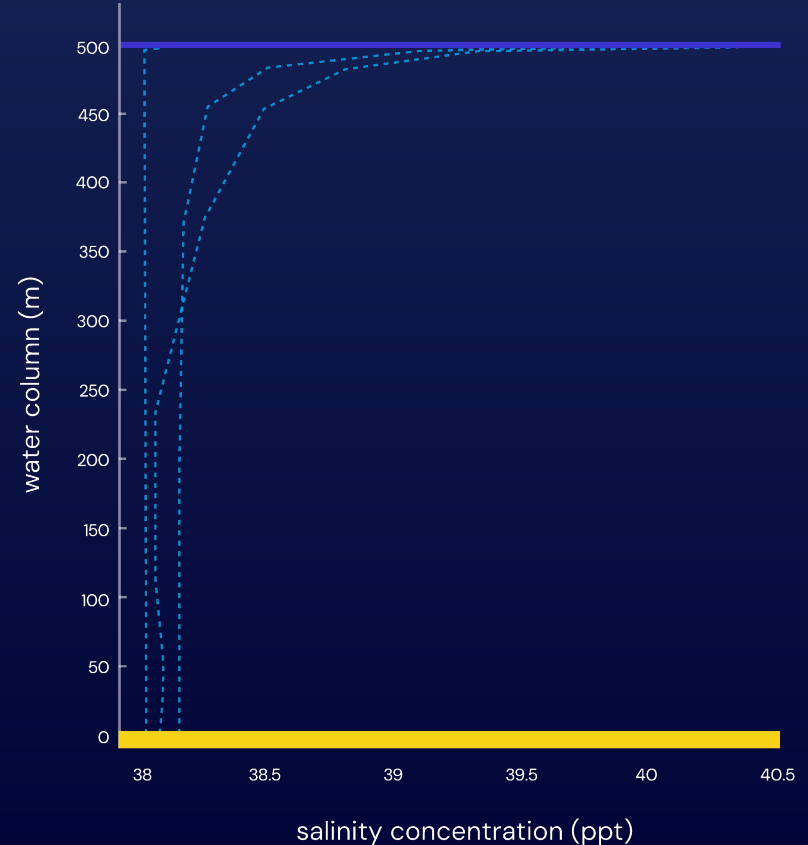
UNIVERSITÀ DEGLI STUDI
DI GENOVA

The **DICCA** (Dipartimento di Ingegneria
Civile Chimica e Ambientale) of the
University of Genova

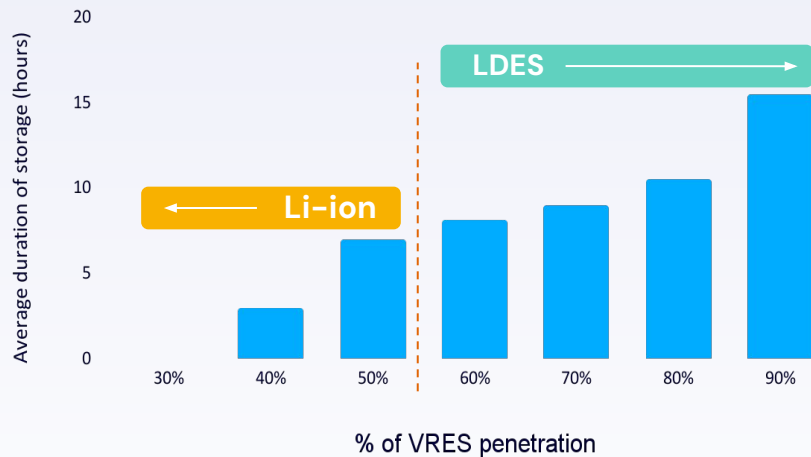
"In conclusion, under challenging environmental conditions with limited water mixing, salinity values in the water column increase by a maximum of about 6.6% shortly after the reservoir breach, primarily near the surface. Meanwhile, changes near the bottom are much smaller, approximately 0.5%, and also quickly return to normal levels shortly after the incident."

"The salinity values return to ambient levels shortly after the break, as they can be diluted in the vast water body of the open sea."

Accidental brine release

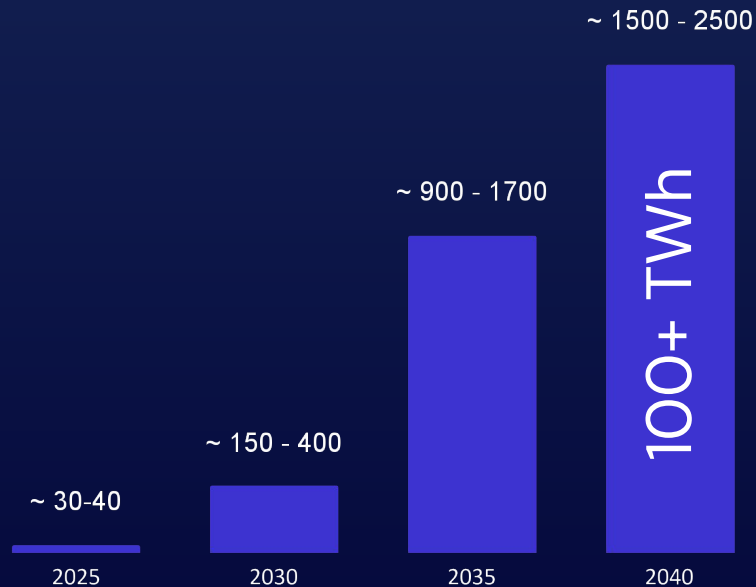


Storage duration requirements increase as the share of variable renewable energy grows



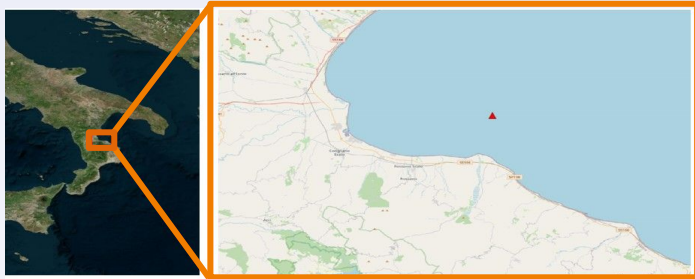
Source: *The Time for Long Duration Energy Storage is coming*, IDTechEX Research

Cumulative installed power capacity (GW)



Source: *Net-zero power: Long-duration energy storage for a renewable grid*, McKinsey&Company

Grid connection authorization (STMG) **granted** for Sizable first commercial plant (10 MW) by Italian electricity transmission grid operator Terna



SiZable Role:

- **Technology provider** (support, IP licenses, permits)
- **Project shareholder** (SPV)

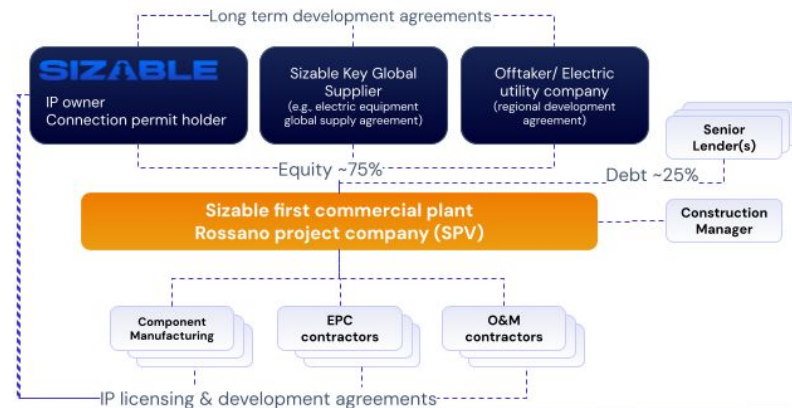
We've already attracted interest from key players like IREN, EDISON, and POSEIDON, with all three providing Letters of Intent (LOI) in our technology.

POSEIDON
WIND ENERGY

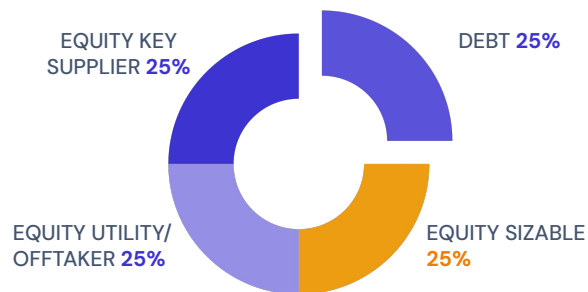
iren

EDISON
EDF GROUP

SIZABLE



~€30m CAPEX financing of the first Sizable small scale commercial plant





*Closely interacting with SAIPEM since 2020.
LOS signed by the Corporate Head of Technology Innovation in 2021*

**Saipem is a top 10 worldwide EPC contractor*



Different utilities have already shown interest in our technology. IREN and EDISON have provided a LOI attesting their interest

**Edison and Iren are two of the top 5 Italian leading electricity providers*



Extensive interactions for request of connection for the Sizible commercial storage installation in South Italy

**Terna is the largest independent electricity transmission system operator in Europe*



We won in September 2023 the call for ideas competition organized by Prysmian Group to evaluate future collaboration

**Prysmian is the world leader in the submarine power cables market*



Phase Motion Control selected as partner for rim-driven pump-turbine for MW-scale demo and first commercial

**Phase Motion control has established expertise in the design of marine thrusters*



Serdap, involved since the PoC, is now a strategic partner for the supply of the energy conversion support structure

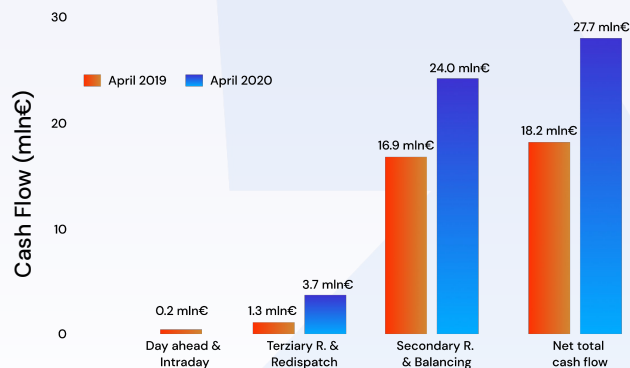
**Serdap has an established expertise in complex and custom metal structures*

Merchant investment model

Storage is optimised against wholesale & ancillary service markets

Time-shift arbitrage & balancing reserve will play a major role with growing penetration of VREs

Presenzano pumped hydro revenues (1 GW; 8 hours)



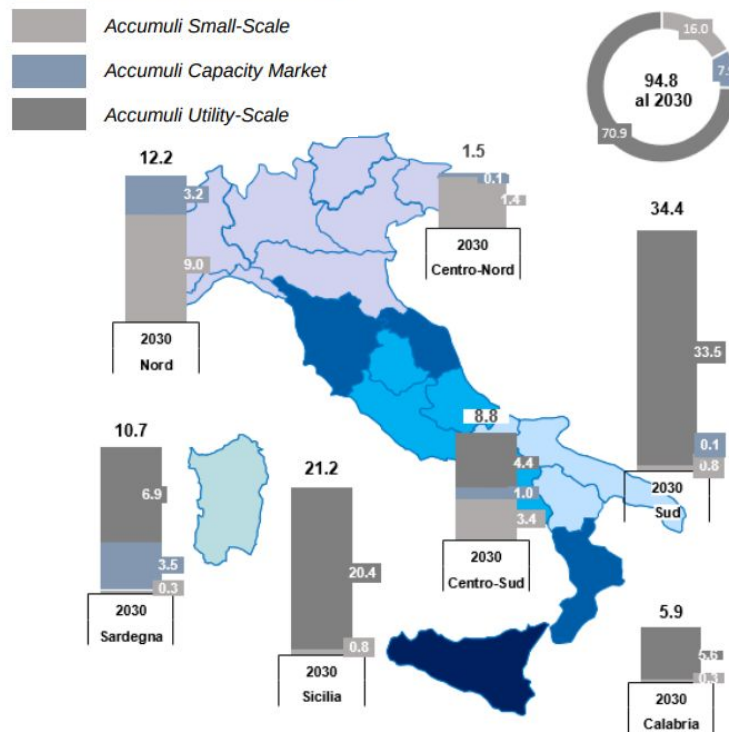
Regulated asset

Policy framework to support LDES deployment is **soaring**



Given a technology neutral policy, the most competitive technology will secure a significant market share

- Nov 2021** Capacity mechanism for storage introduced by D.Lgs. 210 (8th nov 2021) transposing EU Directive 2019/944 & Regulation 943/2019
- Jun 2023** ARERA published 247/2023/R/eel with criteria for the operation of the capacity mechanism for storage (MACSE)
- Dec 2023** EC approves €17.7 billion Italian State aid scheme to support development of centralised electricity storage system

Storage needs (GWh) in 2030 (Scenario FF55)¹

Comparison #1: Pumped Hydro Storage (PHS) vs Sizable

	PHS	Sizable 650 m Commercial pilot	Sizable 650 m Commercial
Offtake agreement	25 k€/MWh/yr	25 k€/MWh/yr	25 k€/MWh/yr
Discount rate	7%	7%	7%
Contract-delivery time	30 yrs	30 yrs	30 yrs
Storage capacity	360 MWh	360 MWh	360 MWh
Total CAPEX	81 M€	71 M€	32 M€

Financial KPIs

	IRR	NPV (M€)	Payback (yrs)
PHS	9.1%	18	11
Sizable Commercial pilot	11.5%	34	9
Sizable Commercial	26.9%	74	4

Comparison #2: Battery Energy Storage (BESS) vs Sizable

	BESS	Sizable 650 m Commercial pilot	Sizable 650 m Commercial
Offtake agreement	25 k€/MWh/yr	25 k€/MWh/yr	25 k€/MWh/yr
Discount rate	7%	7%	7%
Contract-delivery time	15 yrs	15 yrs	15 yrs
Terminal value	10%	40%	40%
Storage capacity	360 MWh	360 MWh	360 MWh
Total CAPEX	76 M€	71 M€	32 M€

Financial KPIs

	IRR	NPV (M€)	Payback (yrs)
BESS	7.1%	0	10
Sizable Commercial pilot	10%	16	9
Sizable Commercial	26.4%	50	4

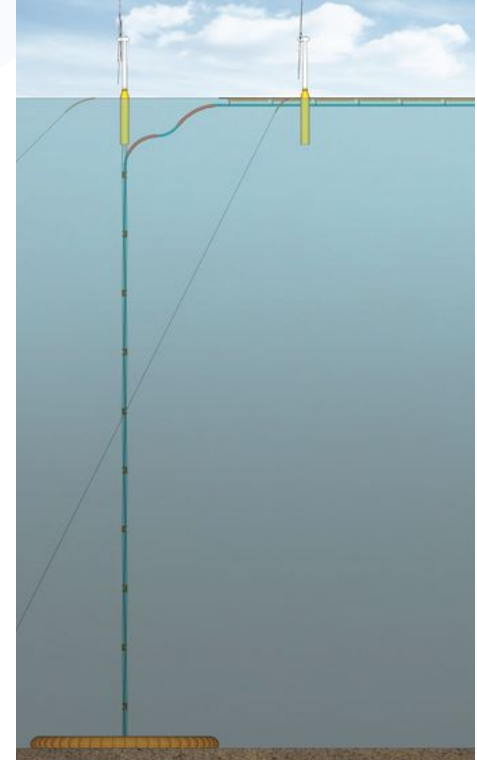
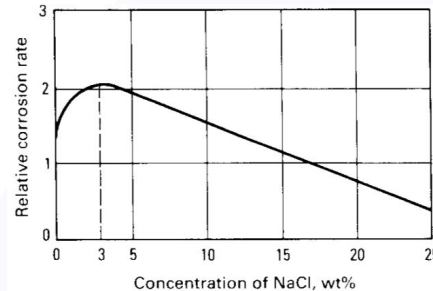
Superior financial performance starting with first-of-a-kind commercial pilot

Saturated brine **less corrosive** than freshwater

Salt is widely available
(300 mln tons yearly market)

Not polluting, small carbon
footprint (~100 kg CO₂
equiv/ton)

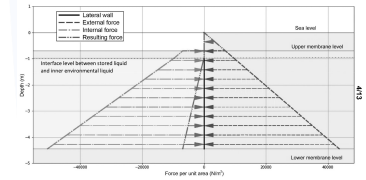
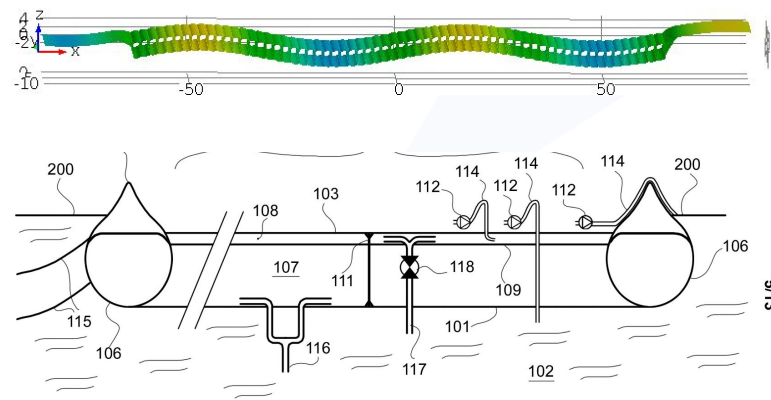
Low cost 8 – 15 €/ton (2~6
€/kWh)



Floating and bottom reservoirs

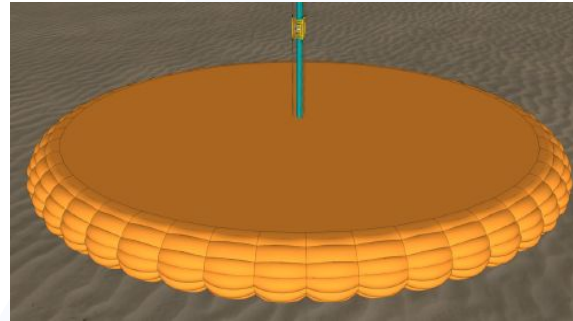
Upper reservoir modules

- Reservoir containing both brine (bottom) and sea water (top)
- Internal sea water connected with external sea water (passive pressurization)
- Tensioning elements to connect lower and upper membranes



Bottom reservoir

- Tensioned structure made of synthetic ropes (top and sides) and chains (bottom) available for mooring
- Geomembranes (same as for commercially available for agriculture)



HDPE pipes

OD 2.5 – 3.5m

SDR 41-33

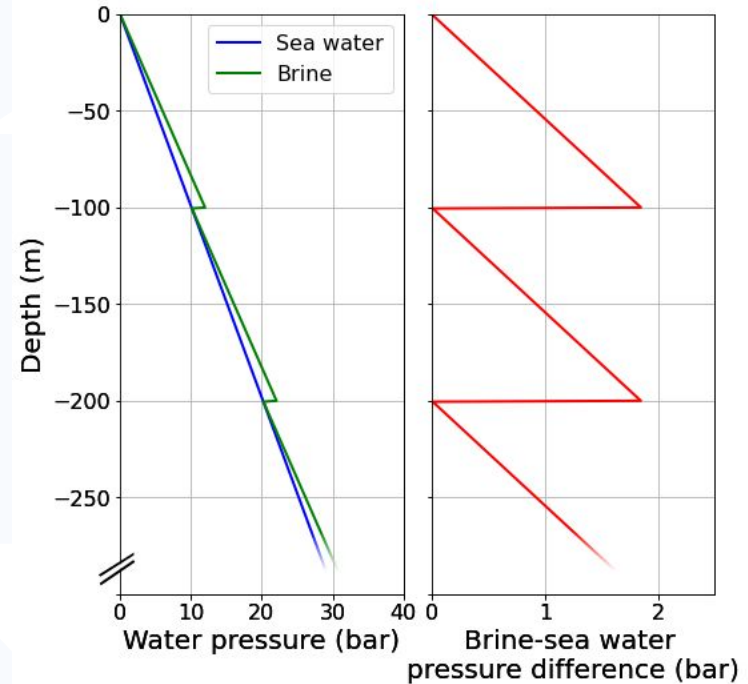
100m length per module

Single extrusion no welding

Flange support at both end

Extremely long lifetimes
(50-100 years)

Easy offshore handling



Reversible pump-turbine & support structure

Energy conversion modules

- Axial flow, fixed pitch
- Rim driven, permanent magnet, reversible
- Nominal flow rate (generation) $60\text{m}^3/\text{s}$
- Nominal rpm ~210–250
- Two regulating distributors

Maintenance and deployment strategy:

- The strategy is to have buoyancy neutral modules and pipes, to disconnect the entire column and perform maintenance onshore.
- The support structures have been designed to allow for a simplified extraction/replacement of the energy conversion modules.

