

# MICEDD

## DEEPWATER DEVELOPMENT

28 - 30 March 2023 | Millennium Gloucester Hotel | London, UK

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# FluiDeep: An Innovative Subsea Storage and Injection Solution for Chemicals Management

Manuel Simionato, Riccardo Giolo, Saipem

# Content

- Why
- Technology Description
- Application Cases & Value Proposition
- Qualification & Industrialisation
- Conclusions

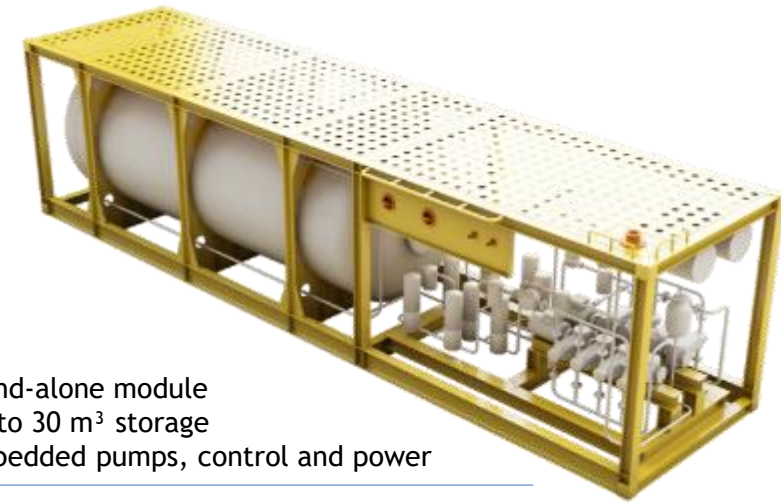
# Why

- Unlocking new reserves maximising the use of existing topside facilities
- Long tie-backs and satellite discoveries
- Production increase
- Subsea fields electrification

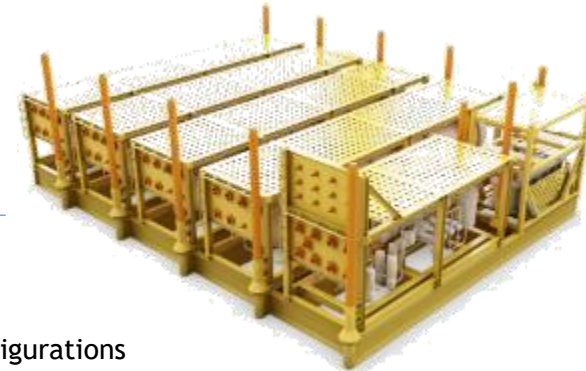


# Technology Description

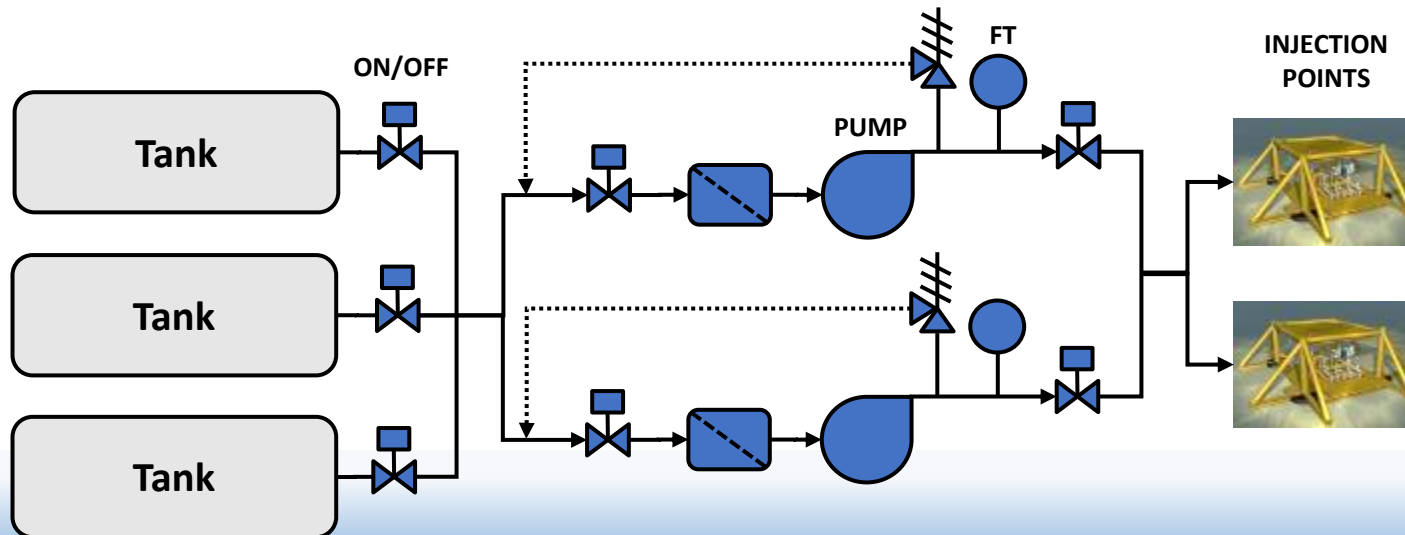
- Wide range of chemicals (flow assurance, preservation, disinfection, etc.)
- Fit for shallow and deep-water projects down to 3.000msw (~10.000ft.)
- Modular design to form bespoke configurations
- Two storage solutions and reciprocating pumping technology
- Possibility of redundancy for pumping unit and control distribution
- Refilling strategy base case change-out of units / tank modules



- Stand-alone module
- Up to 30 m<sup>3</sup> storage
- Embedded pumps, control and power

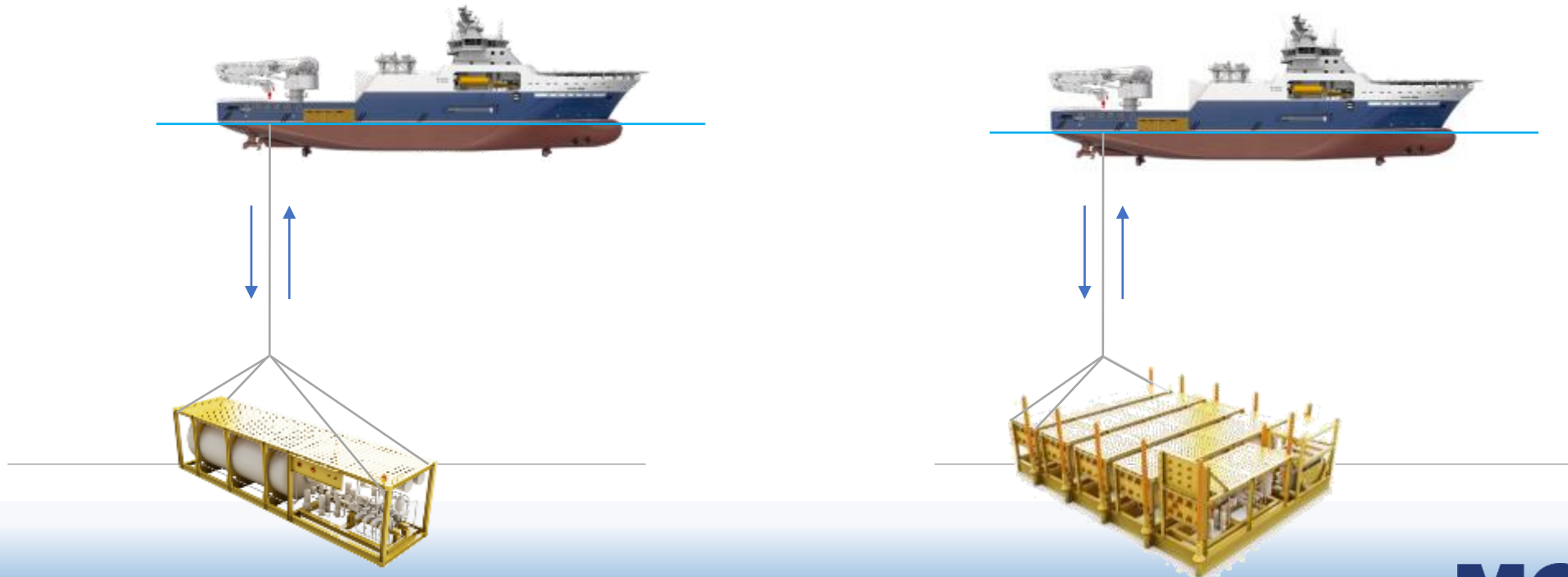


- Bespoke configurations
- Ideal for large storage requirements
- Pumps, control and power independently retrievable



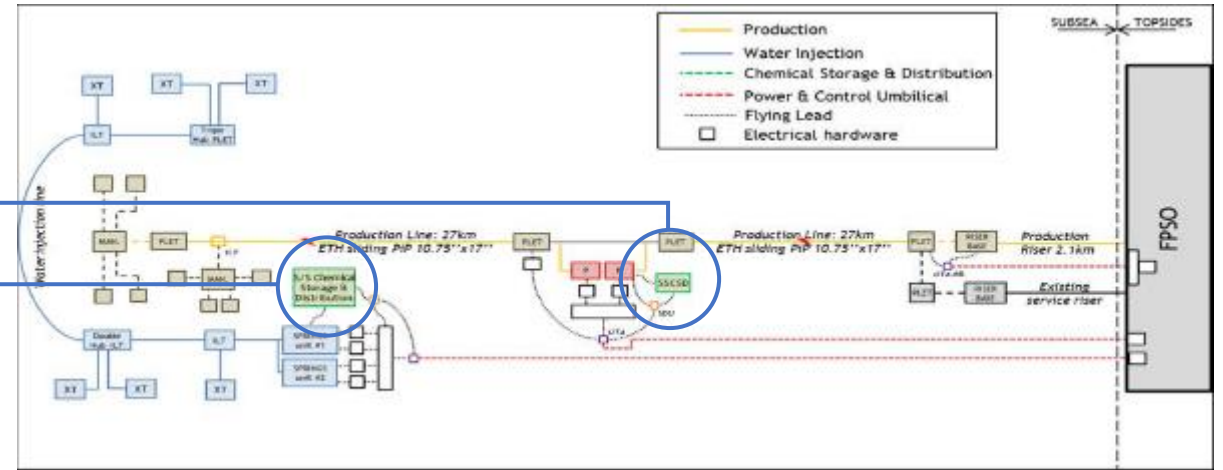
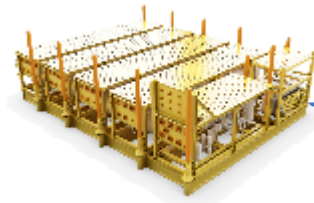
# Technology Description

- Change-out based on «lightweight» modules (< 70t) to exploit vessels that do not need heavy cranes
- No chemical injection downtime during storage tanks change-out
- Refilling & maintenance operations at the service base
- Condition monitoring capabilities

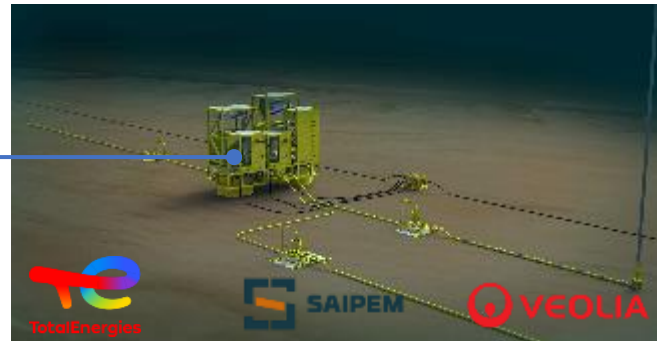
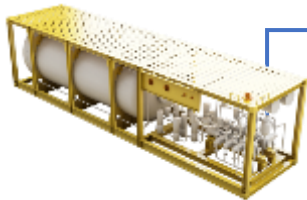


# Application cases

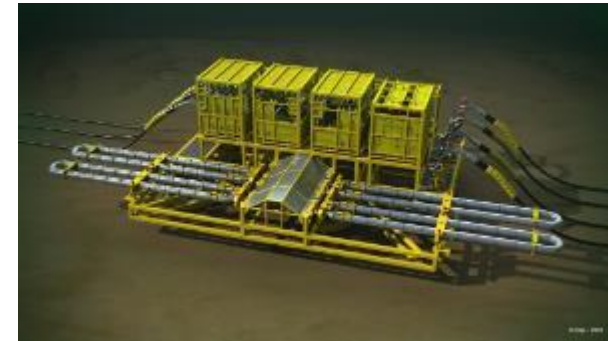
- Subsea production



- Subsea processing



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Sea Water Desulfation & Injection



**SPOOLSEP**  
& Produced water treatment



**Vertical MultiPipe**

- Temporary intervention operations (e.g. subsea hardware maintenance scenarios)

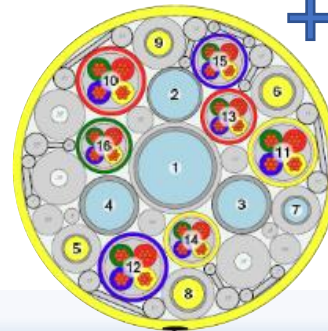
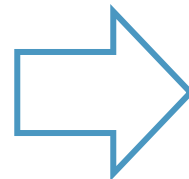
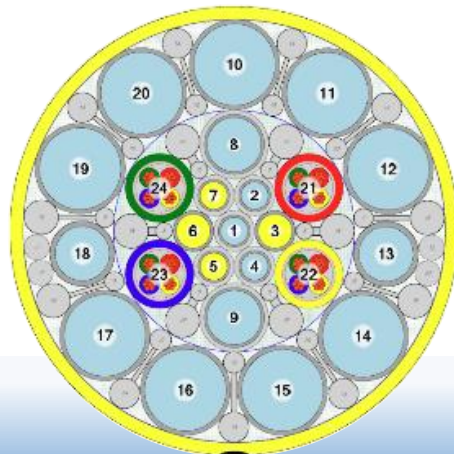
# Value Proposition

- Reduction of umbilical costs (CAPEX)
- Very attractive when implemented on all-electric architectures (umbilical replaced by electrical cable)
- Debottlenecking of congested topside
- FLUIDEEP units can be relocated based on actual needs (e.g. phased field development scenarios)
- No chemicals handling and dedicated personnel on the topsides (increased Safety)
- Less energy to pump fluids on long tie-backs scenarios (Improved Carbon Footprint)

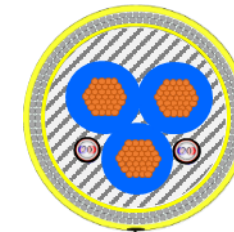
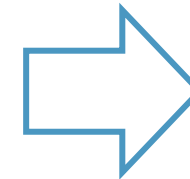
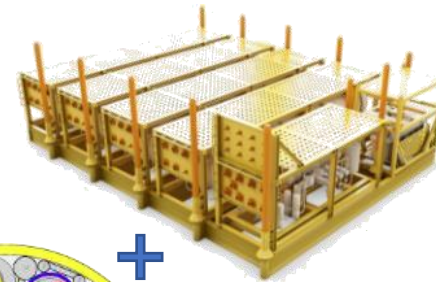
## Unlocking of opportunities for

- Longer tie-backs
- Brownfields EOR (supplement existing umbilicals)
- Marginal fields

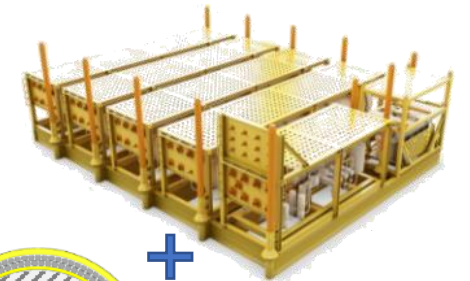
Oil field tie-back example



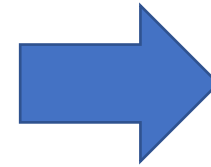
- 35% OD



- 50% OD



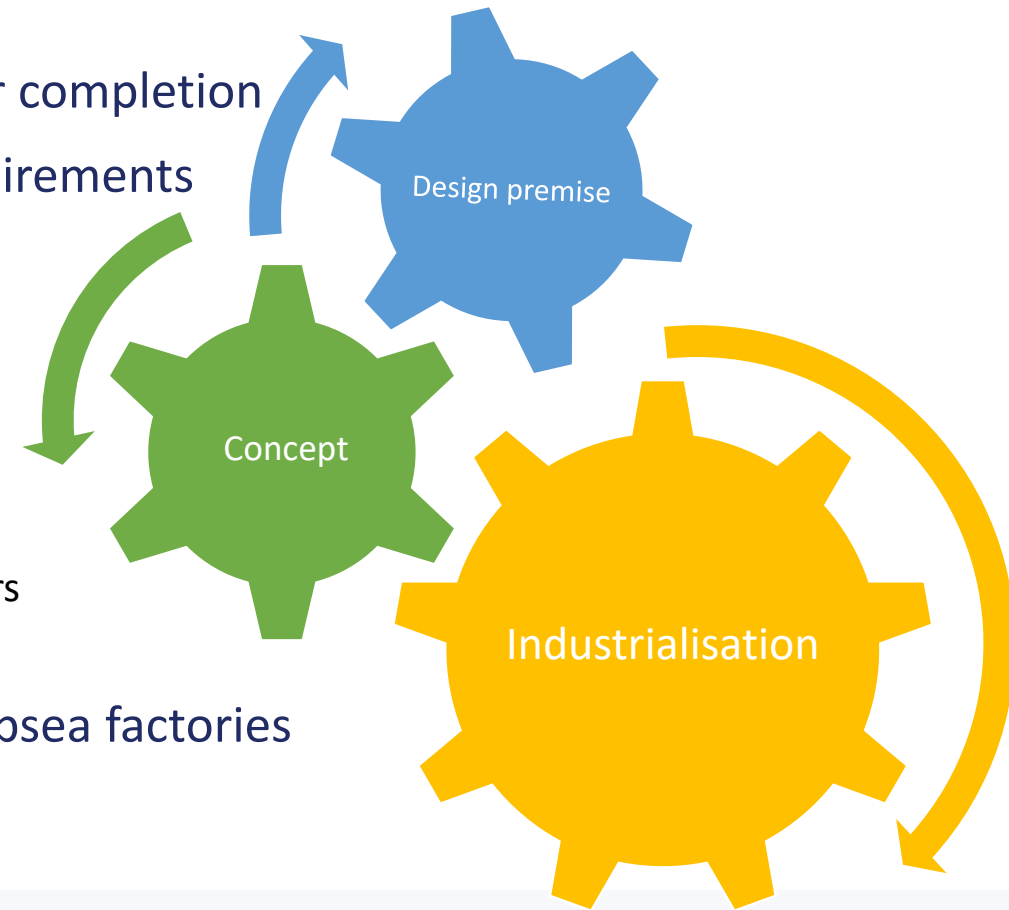
+ All-electric field





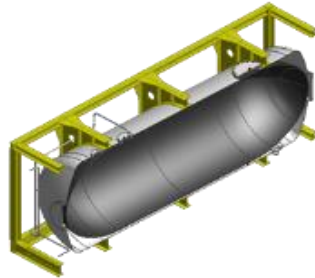
# Industrialisation Programme

- Programme Started by Saipem in 2019 and currently under completion
- Enhance flexibility & application range to meet future requirements
  - Modularization, application range approach
- Establish, qualify and secure the supply chain
  - Meet industrially recognized standard
  - API 17 Q – Technology Readiness level  $TRL \geq 4$
- Utilize available expertise
  - Joint Developments, collaborations with industry partners / suppliers
  - Individual technology development & qualification where required
- Exploit and widen the industrial platform developed for subsea factories



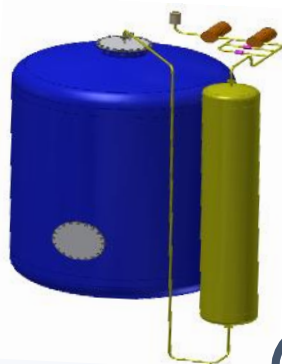
# Building Blocks

BLADDER STORAGE



TRL 1 2 3 4

LIQUID BARRIERS STORAGE



TRL 1 2 3 4



PUMP & MOTOR UNIT



TRL 1 2 3 4



ELECTRIC ACTUATOR



TRL 1 2 3 4



FLOW METER



TRL 1 2 3 4



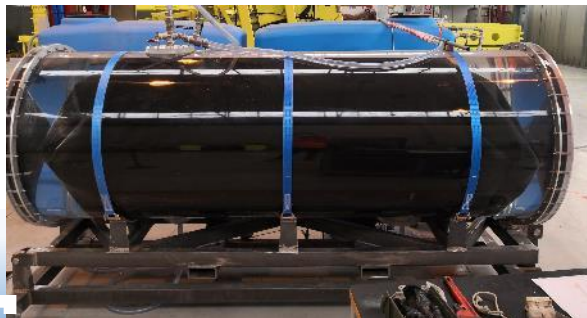
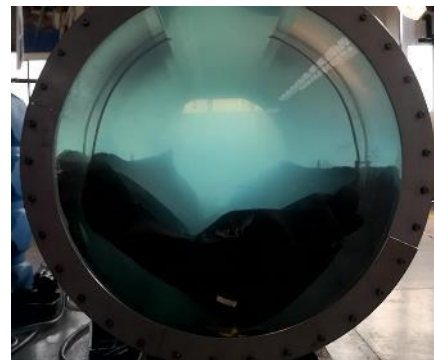
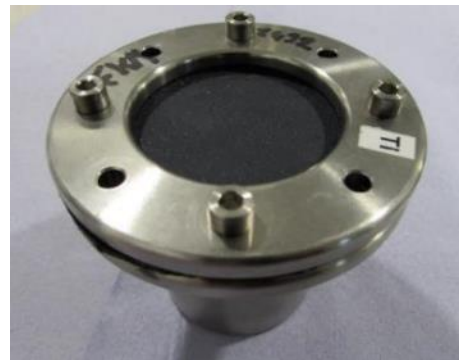
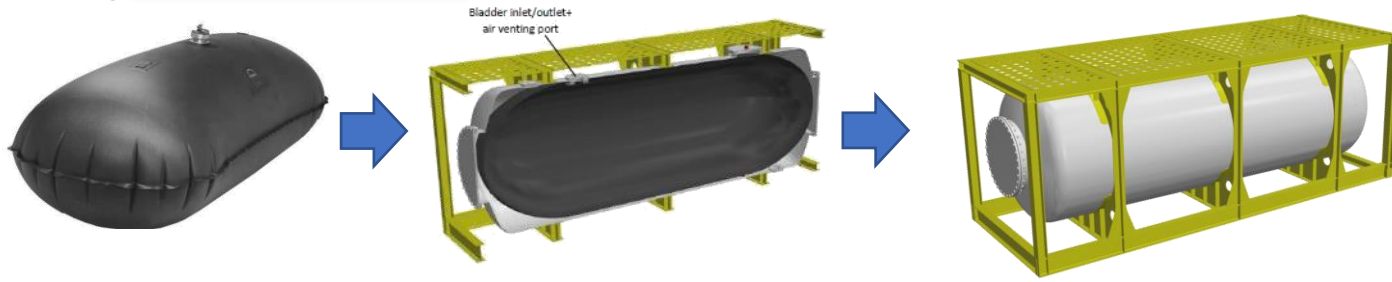
CONTROL SYSTEM



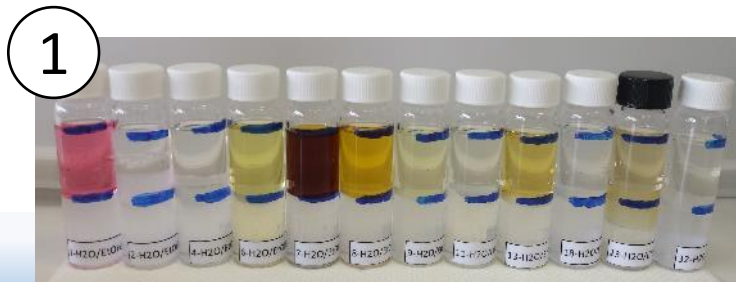
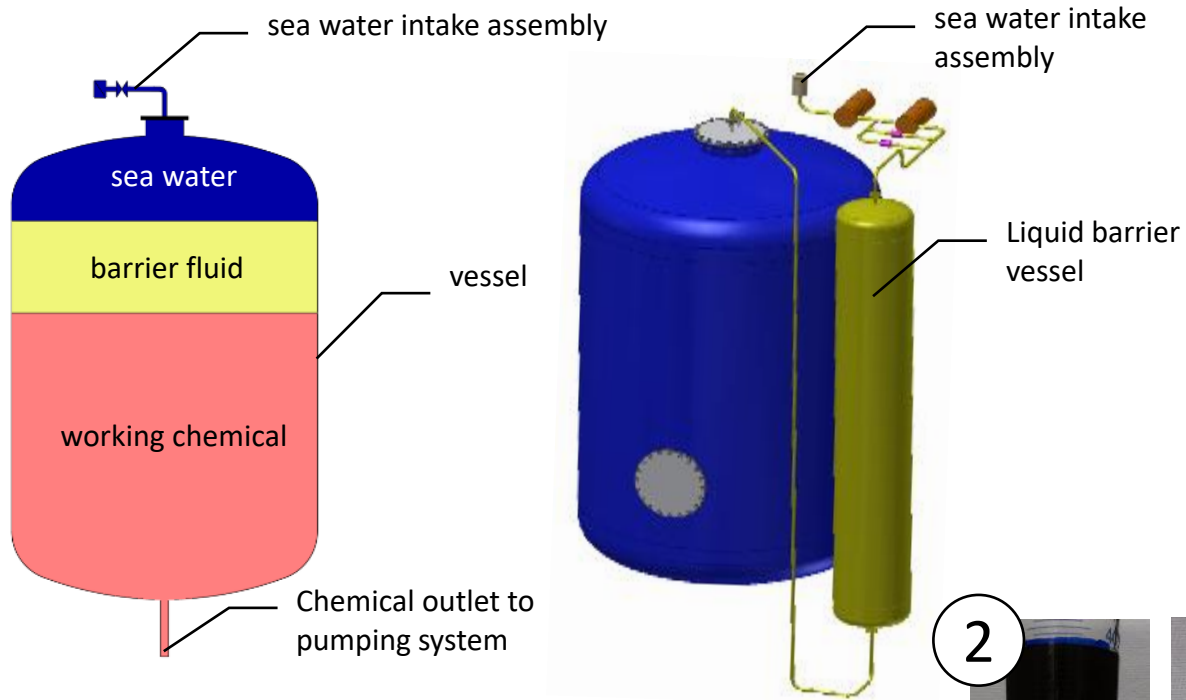
TRL 1 2 3 4

# Bladder storage

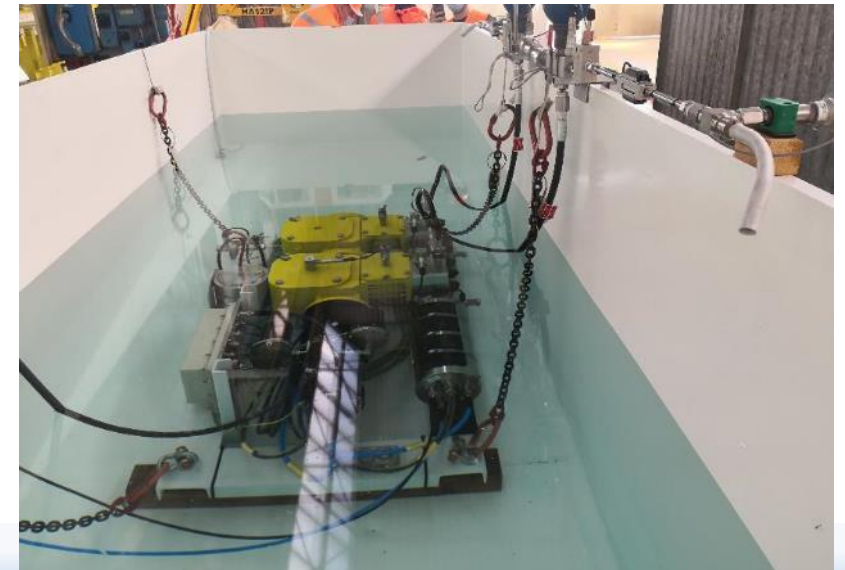
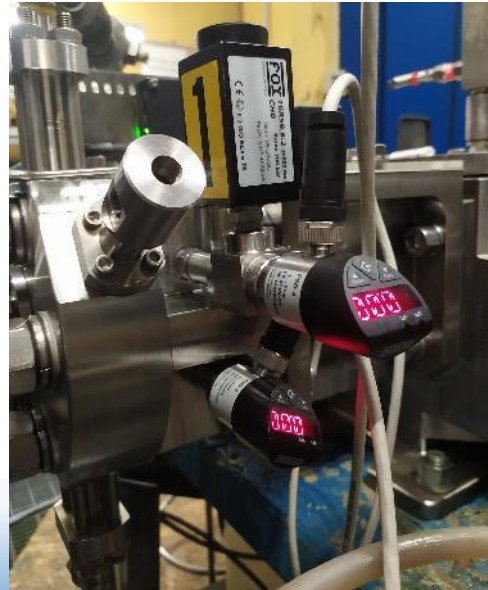
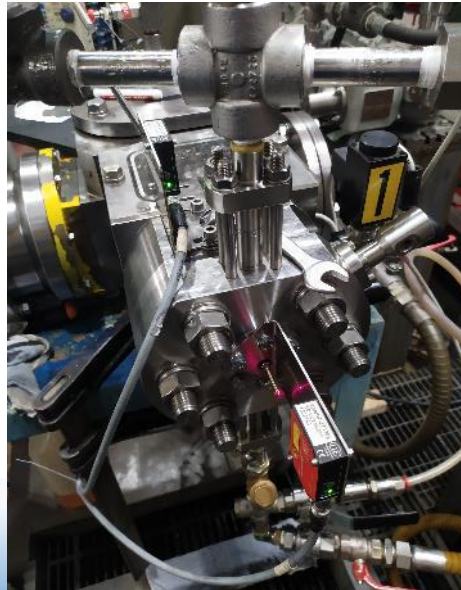
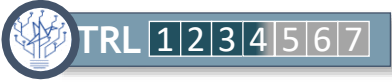
TRL 1 2 3 4 5 6 7



# Liquid barriers storage



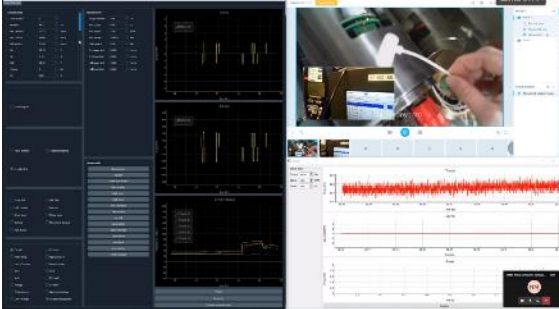
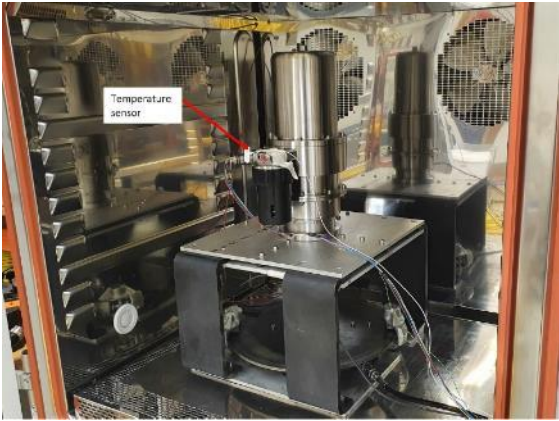
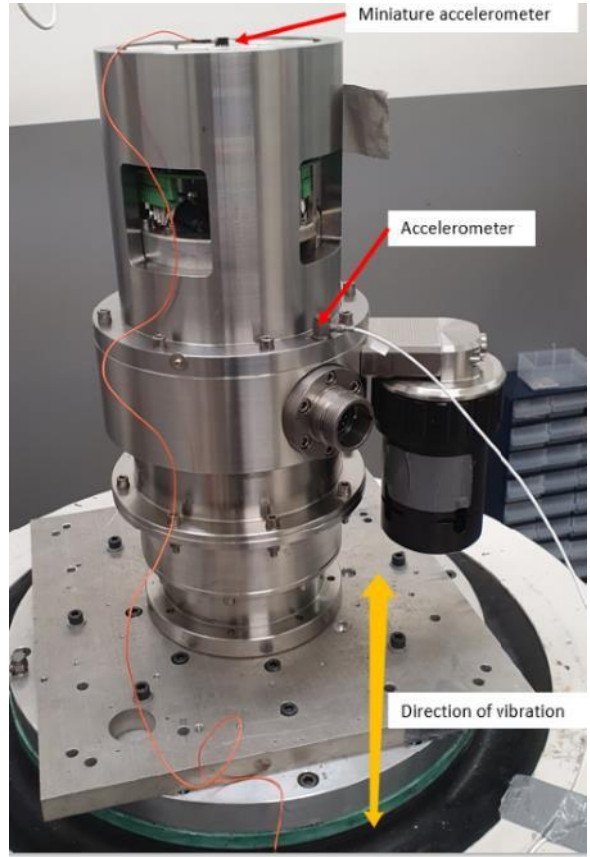
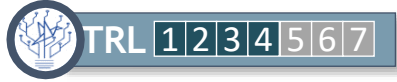
# Pump & motor unit



In collaboration with



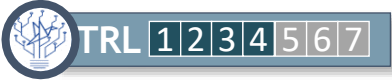
# Electric Valves Actuator



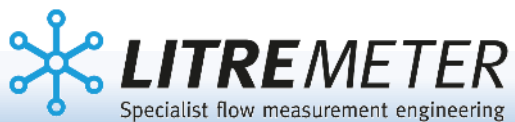
In collaboration with



# Flow measurement



In collaboration with



# Conclusions

- Enabler for long tie backs
  - minimises the topside footprint and payload (only power and control)
  - reduces umbilical costs
- Modular design to deliver bespoke system configurations
- Configurable with two different storage solutions
- Qualified according to API 17Q
- Ready for commercialisation Q2 2023
- Evaluating opportunities for the first pilot project





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