



H2 MARINE AS

WEBINAR, 14.12.2021

ZERO EMISSION AQUAFARM SERVICE VESSELS

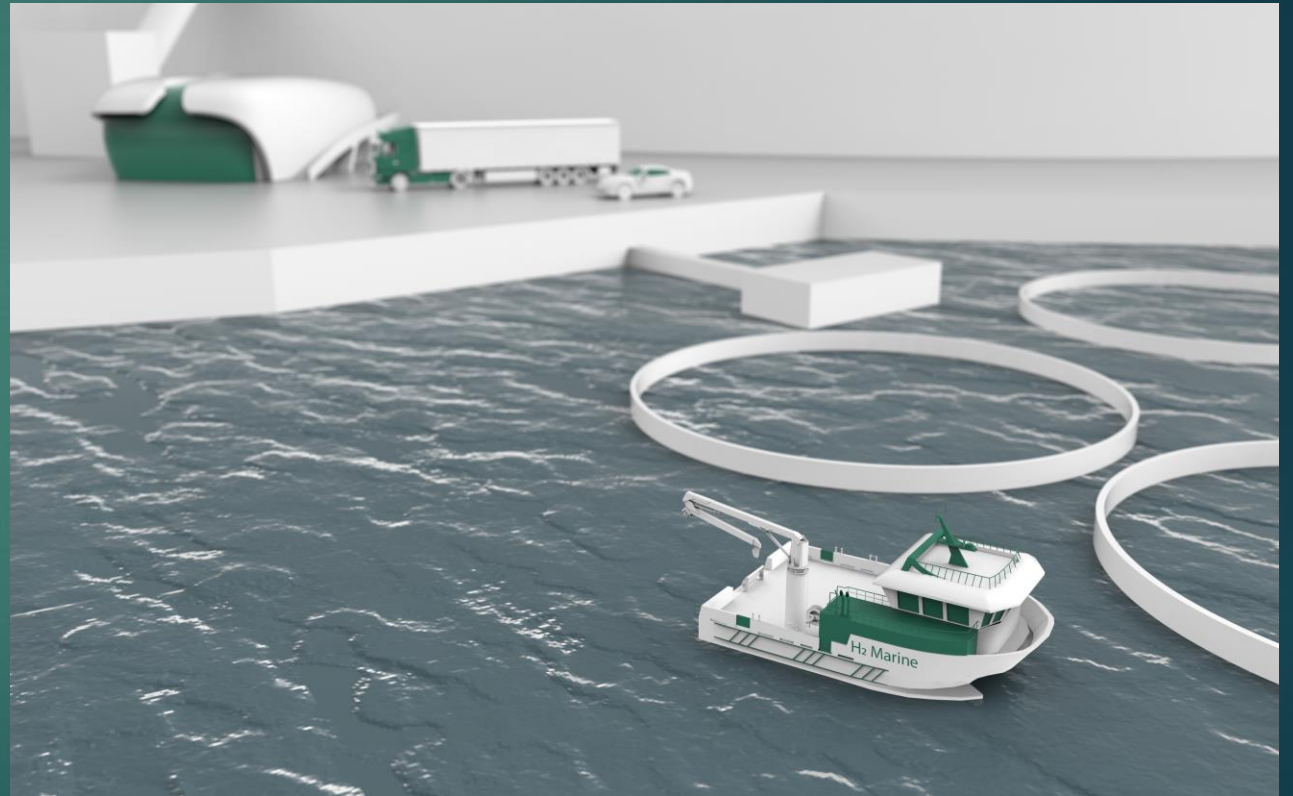
*„THE MOST COST EFFICIENT SOLUTION FOR PRODUCTION AND BUNKERING OF
GREEN HYDROGEN TO ZERO-EMISSION AQUACULTURE SERVICE VESSELS“*

TOMAS FIKSDAL, CTO H2 MARINE

H2 Marine

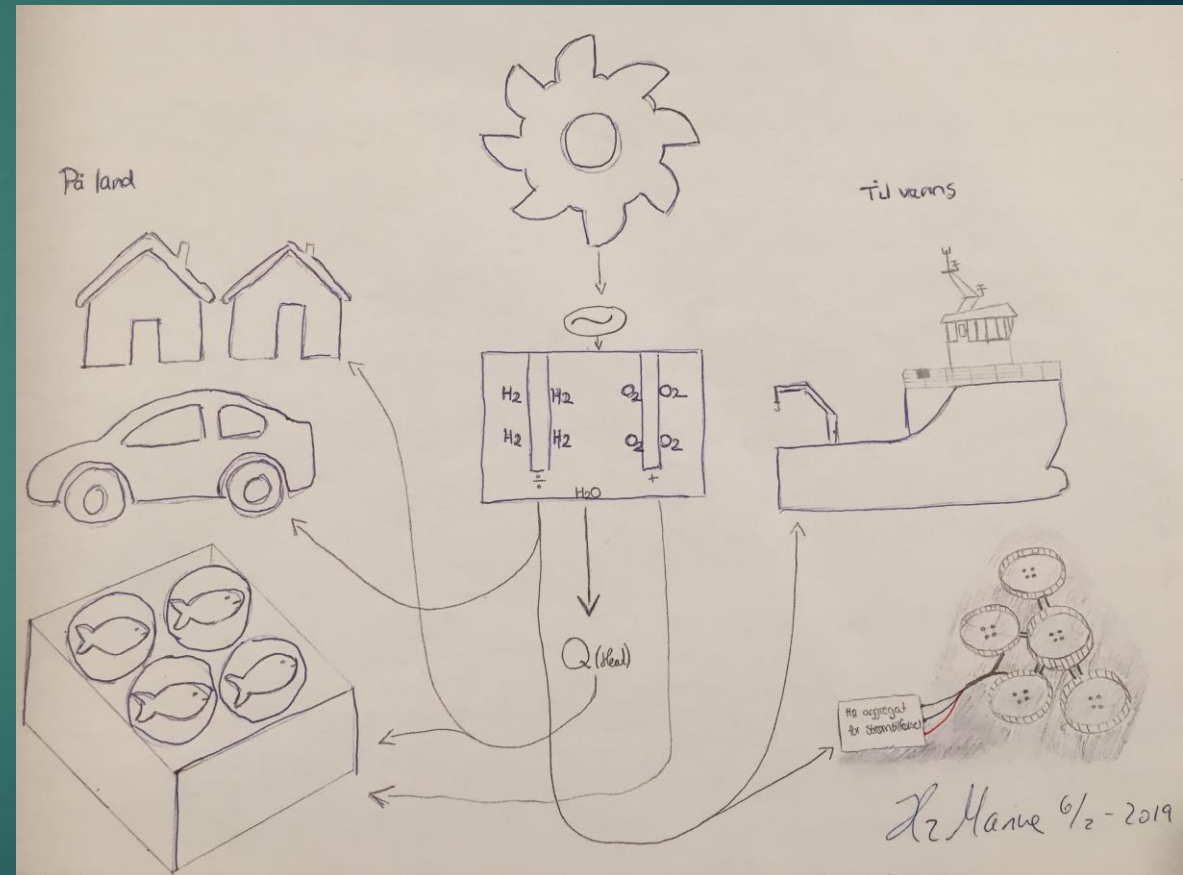
► ***Zero Emission concept for the aqua culture industry:***

- Electrolysis of water using renewable energy
- Hydrogen as fuel for service vessels and as fuel for power generators
 - 1 diesel service vessel: 230.000 kg CO₂/year
 - 1 diesel feeder barge: 150.000 kg CO₂/år
- Oxygen to onshore smolt plants
- Usage of waste heat



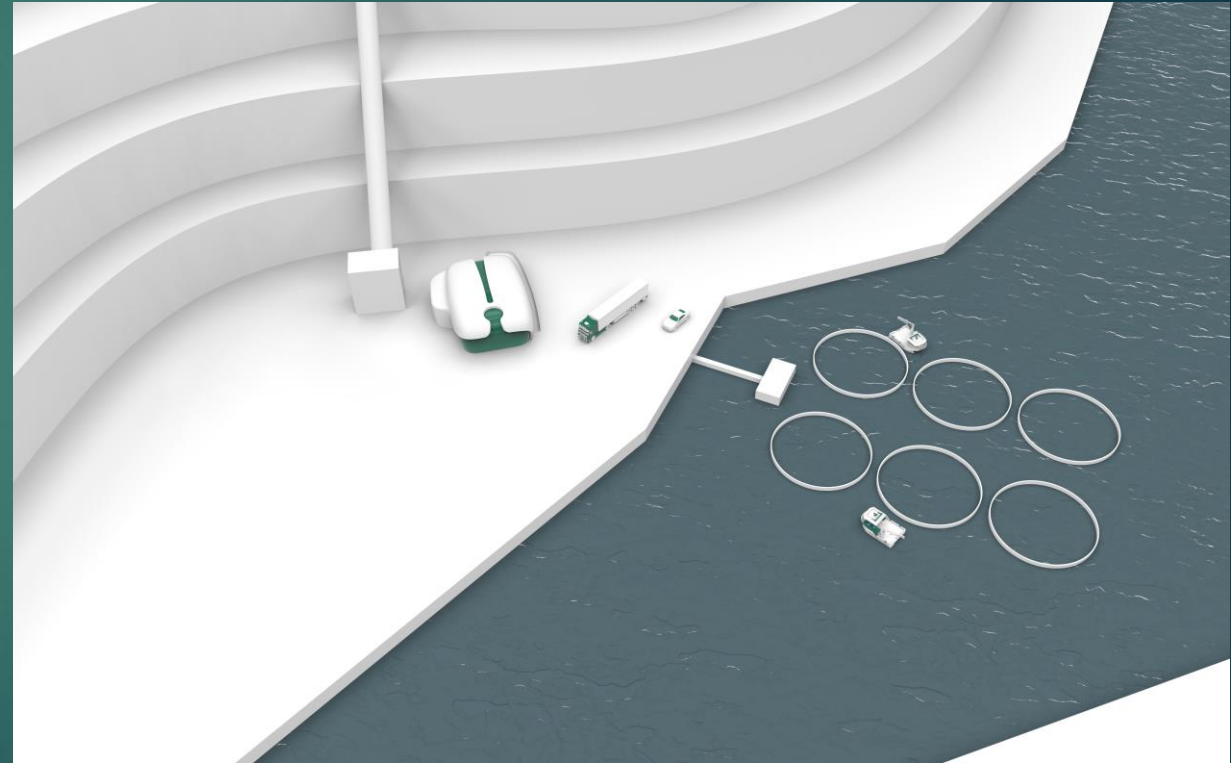
Business idea H2 Marine

- ▶ The concept gives fish farming companies the opportunity to reduce their environmental emissions significantly without increasing costs
- ▶ The customer shall experience the same flexibility and ease of operation as with today's diesel-based solutions
- ▶ No similar concept has been realized yet and our solution will represent a new and unique offer that combines several needs
- ▶ H2 Marine's revenues will come from sale of hydrogen, oxygen and waste heat



Why focus on aqua culture?

- ▶ Aqua culture:
 - ▶ Consumption of all products
 - ▶ Target to becom «greener»
 - ▶ Strong economy
 - ▶ Often family owned companies, short decision gates
 - ▶ Often access to local renewable energy



Complete value chain consortia receives huge funding

E24

Børs Aksjelive Tips oss! E24+ Meny

Får 28 millioner til hydrogenbåt til oppdrett

Prosjektet for å bygge en hydrogenbåt til oppdrettselskapet Midtnorsk Havbruk får 28 millioner fra staten, kunngjør statsminister Erna Solberg.



Illustrasjon av den hydrogenrevne arbeidsbåten for oppdrettsbransjen som nå får støtte fra Pilot-E-5
© Moen Marin



KOMPLETT
LEVERANDØR AV
FØRFLÅTER I BETONG



Hele konsortiet samlet med statsrådene Iselin Nybo, næringsminister og Guri Melby, kunnskaps- og integreringsminister.

Prosjektet ZeroKyst ble i dag bevilget 120 millioner kroner gjennom Grønn Plattform-ordningen. Med det blir Lofoten sentral i fremtidens utslippsfrie sjømatnæring.

Her er pressemeldingen fra Zero Kyst 6. september:

En stor gruppe selskap skal utvikle og fase inn lav- og nullutslippsløsninger. Prosjektet ZeroKyst ble i dag bevilget 120 millioner kroner gjennom Grønn Plattform-ordningen. Med det blir Lofoten sentral i fremtidens utslippsfrie sjømatnæring.

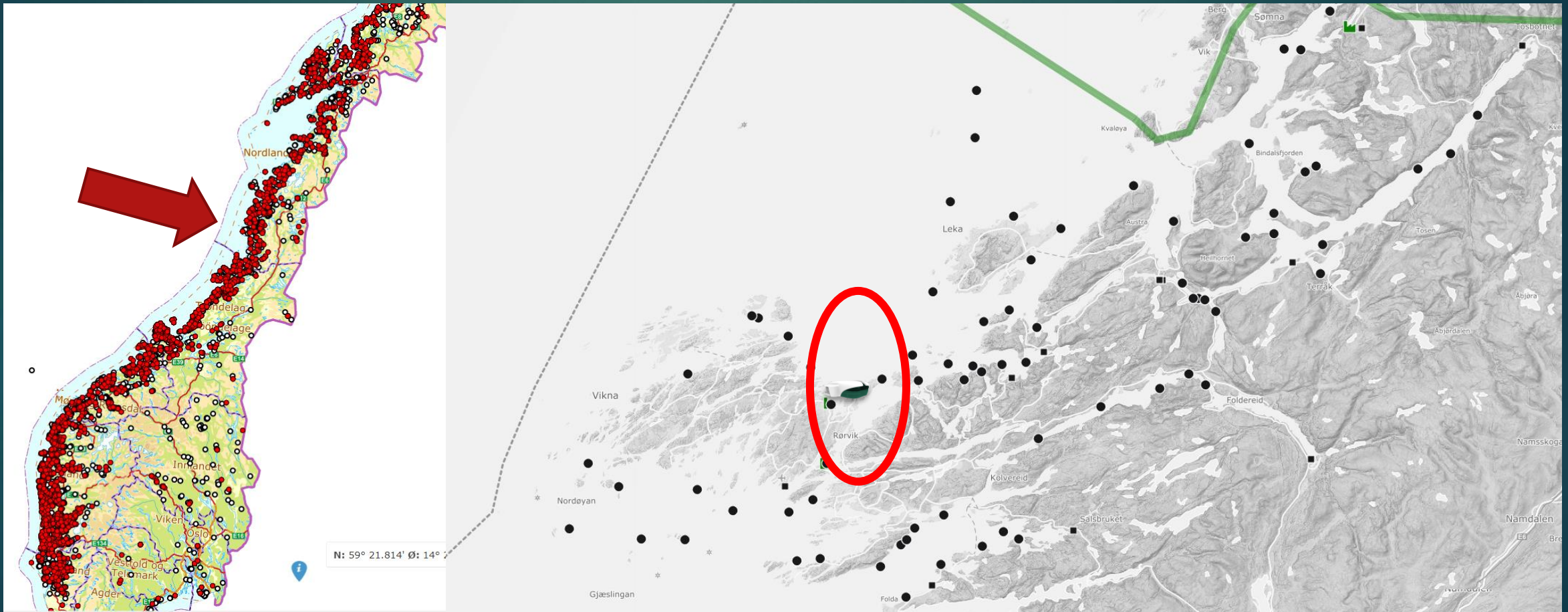
- Med ZeroKyst skal vi styrke norsk verdiskaping og eksport gjennom grønn vekst. Vi skal demonstrere at både nye og eksisterende fartøy i sjømatnæringen kan bli utslippsfrie, og bidra til 50 % utslippskutt fra fiskeri- og

- ▶ H2 Marine is part of two consortia receiving huge R&D funding
- ▶ Committed end customer and high probability of realization
- ▶ Commissioning and testing 2023
- ▶ Great business potential for all parties, both national and international
- ▶ Opens for other vessel segments and end users
- ▶ **H2 Marine: Lower CAPEX and OPEX makes lower hydrogen costs**

Pilot-E Value chain



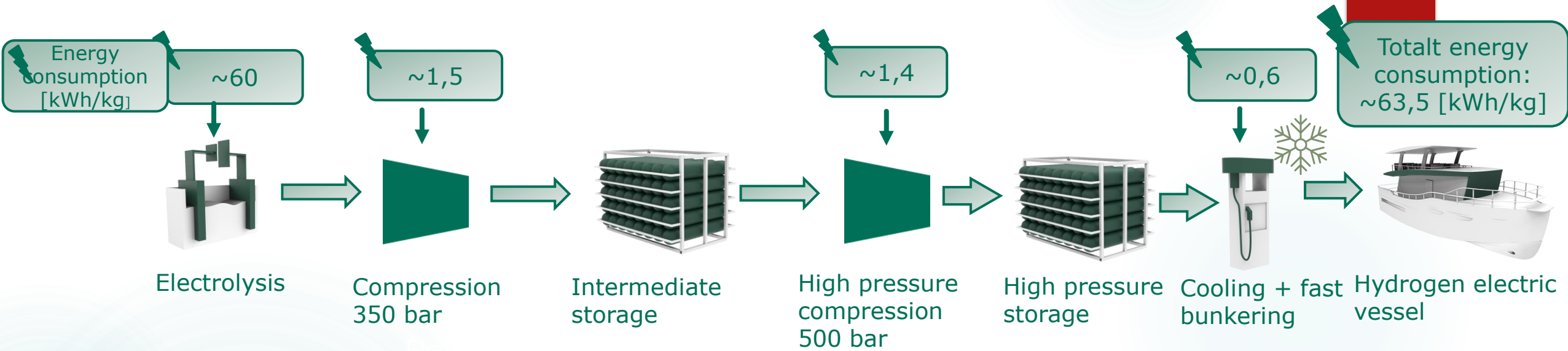
Over 1.300 fish farms in Norway.
1 «hub» is planned to deliver hydrogen as fuel to 15-20 service vessels



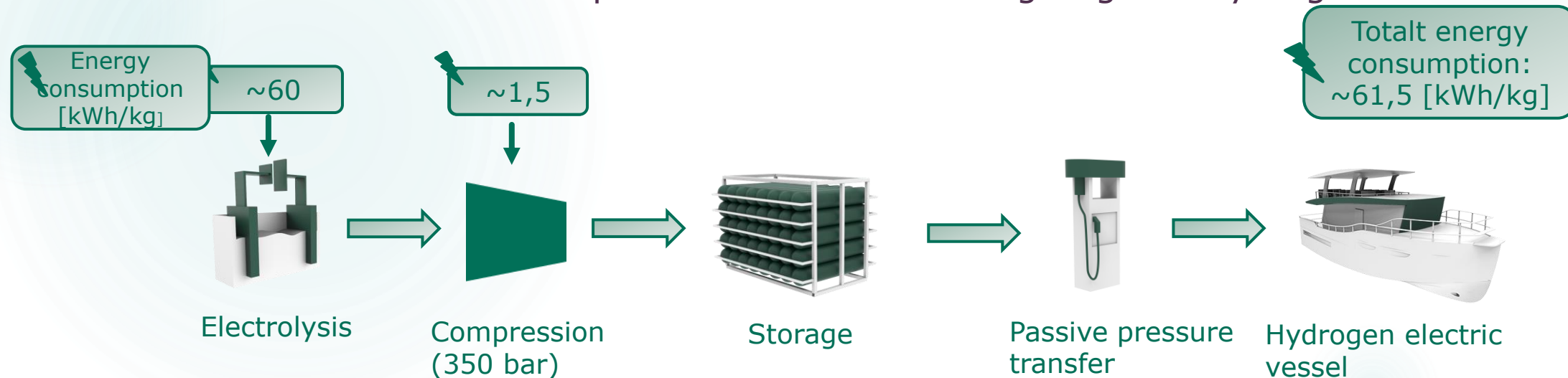
H2 Marine`s innovative solution

- ▶ As few as possible components
- ▶ Lower CAPEX
- ▶ Lower OPEX
- ▶ Mobile and integrated storage- and bunkering system
- ▶ Flexible solution

Convential value chain for filling of heavy duty vehicles / vessels



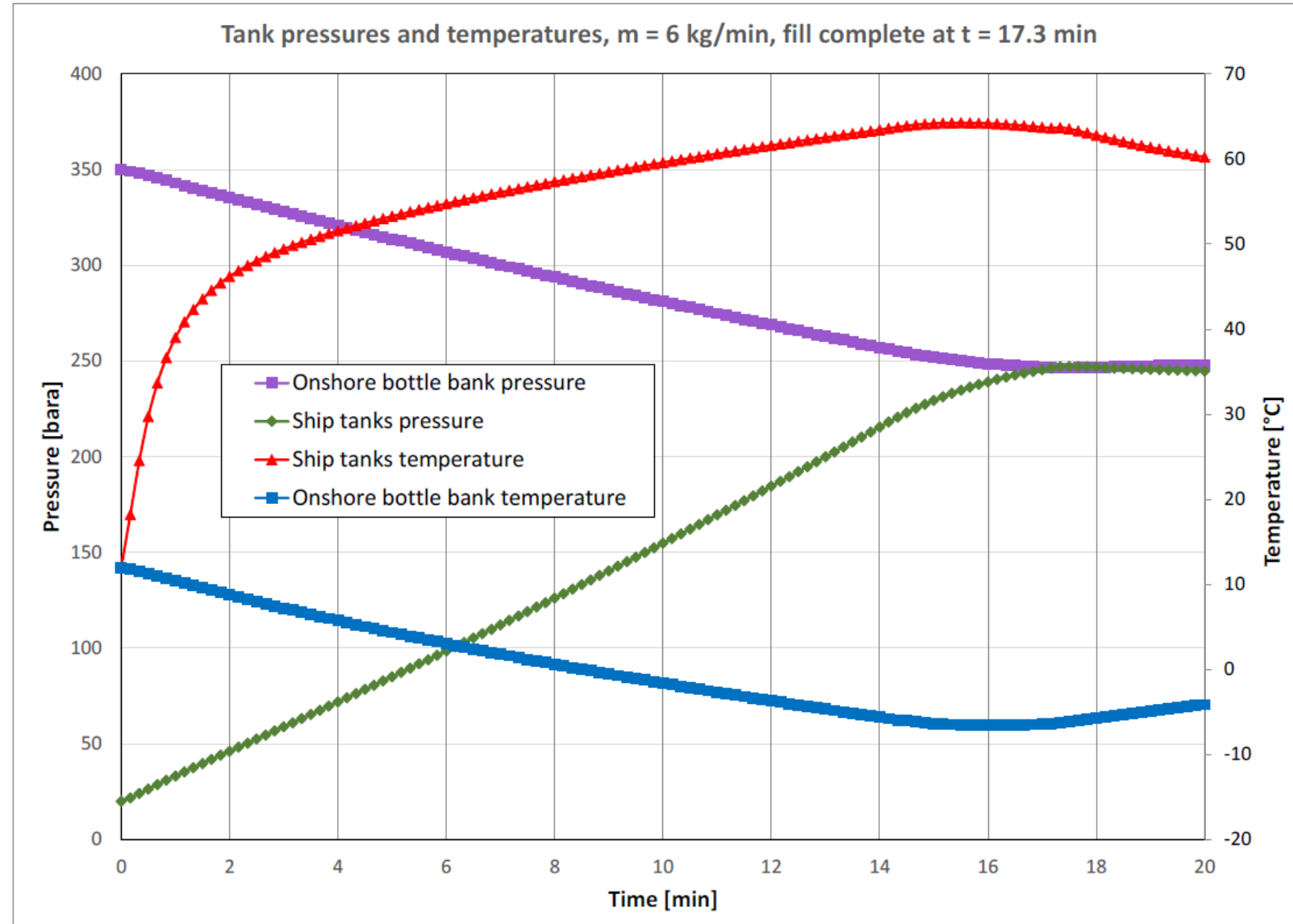
H2 Marine's value chain for production and bunkering of green hydrogen



Dynamic Simulations for transfer operation – Example

aragon

- Initial conditions on shore storage:
 - 12 °C, 350 bar
- Initial conditions working boat storage:
 - 12 °C, 20 bar
- Gas temperature limitations for storage Bottles:
 - Max: -40 °C / 85 °C



H2 Marine`s innovative solution.

Summary so far.....

- ▶ Theoretical calculations and models show that our solution will work satisfactory and within acceptable time frame (bunkering of 100 kg H₂/15 min)
- ▶ Approx 5% lower OPEX
- ▶ Approx 20% lower CAPEX
- ▶ Main suppliers choosen
- ▶ Detailed engineering including HAZOP finished
- ▶ Investment solution February 2022
- ▶ Procurement, construction and installation 2022
- ▶ Commissioning and testing Q1-Q2 2023

Thank you for your attention!
H2 Marine
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