ARIANEGROUP
RESTRICTED

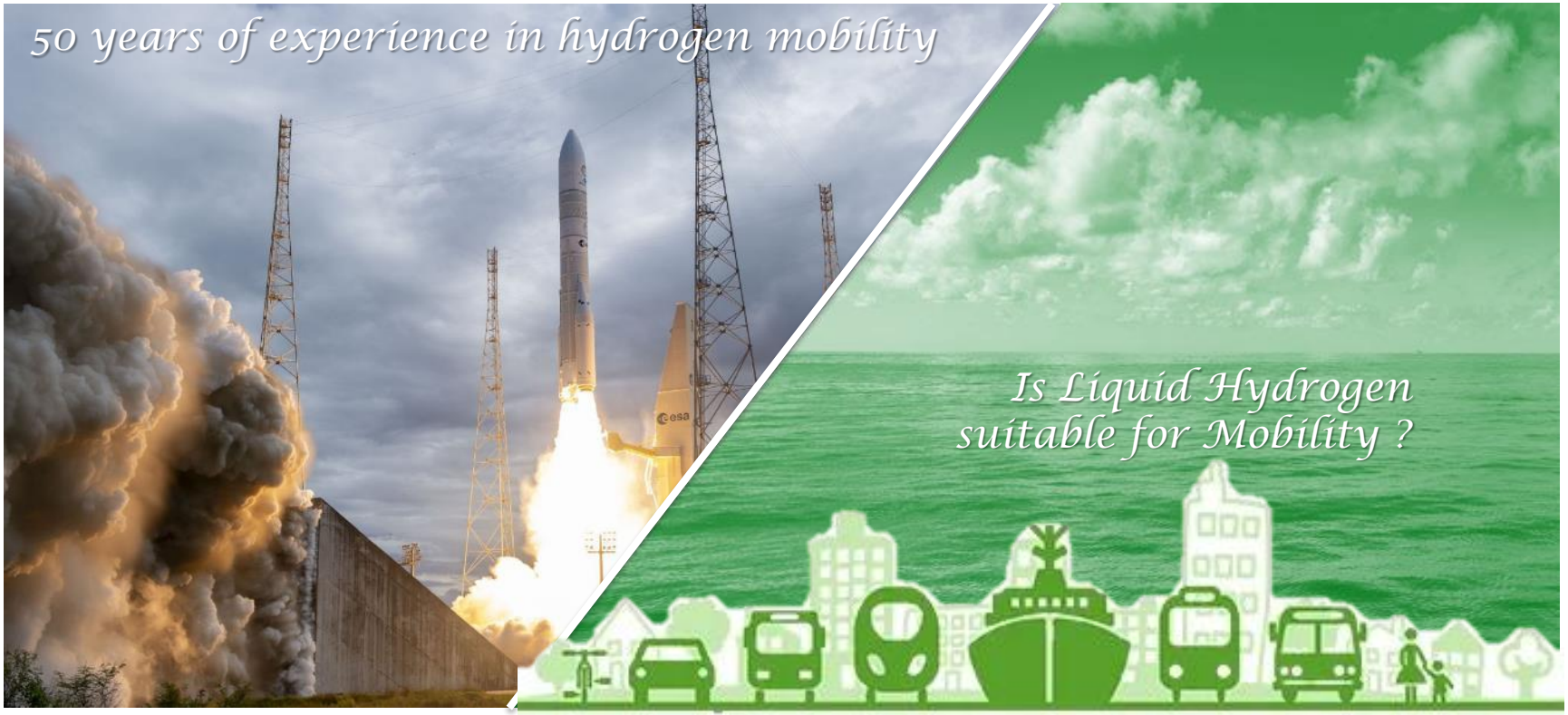
SEA TECH WEEK

GREEN FUELS FOR THE MARITIME SECTOR: LIQUID HYDROGEN

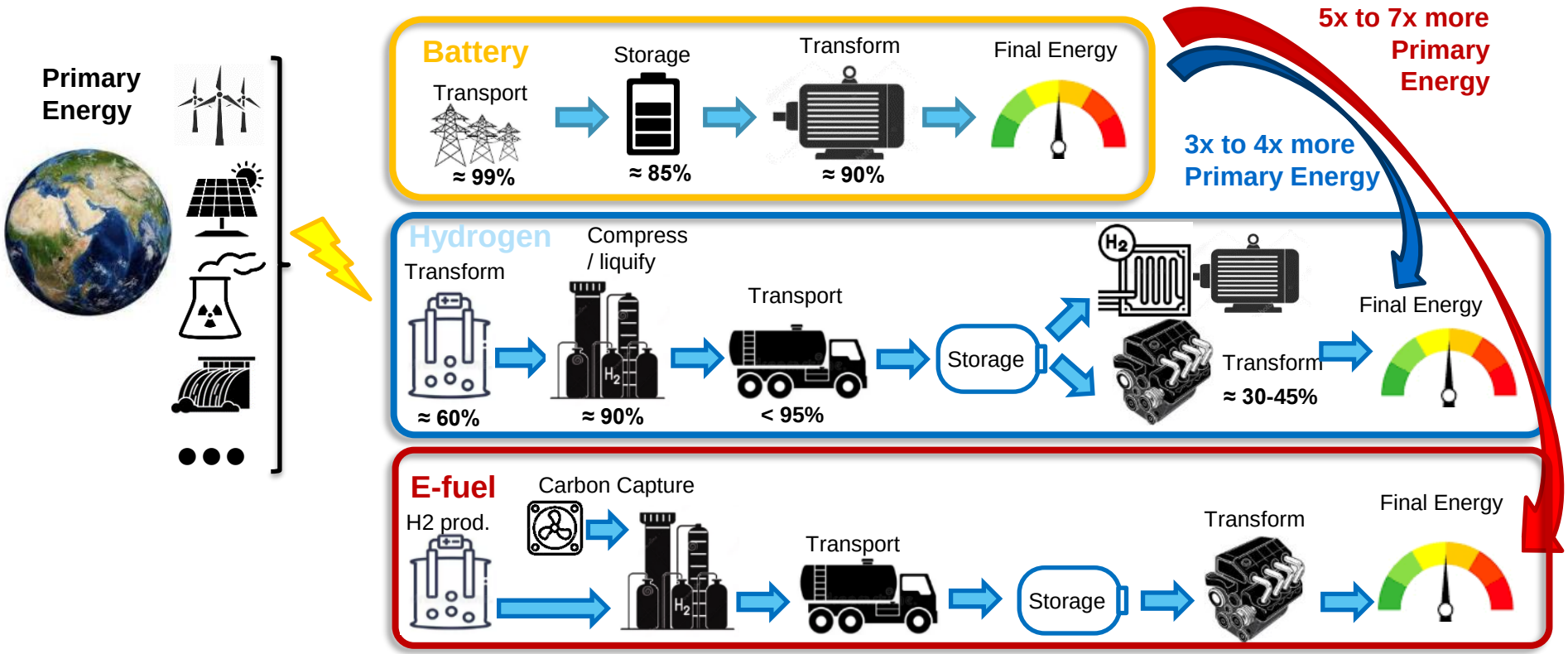
October 16th, 2024

Brest

LIQUID HYDROGEN : FROM SPACE TO DECARBONIZED MOBILITY

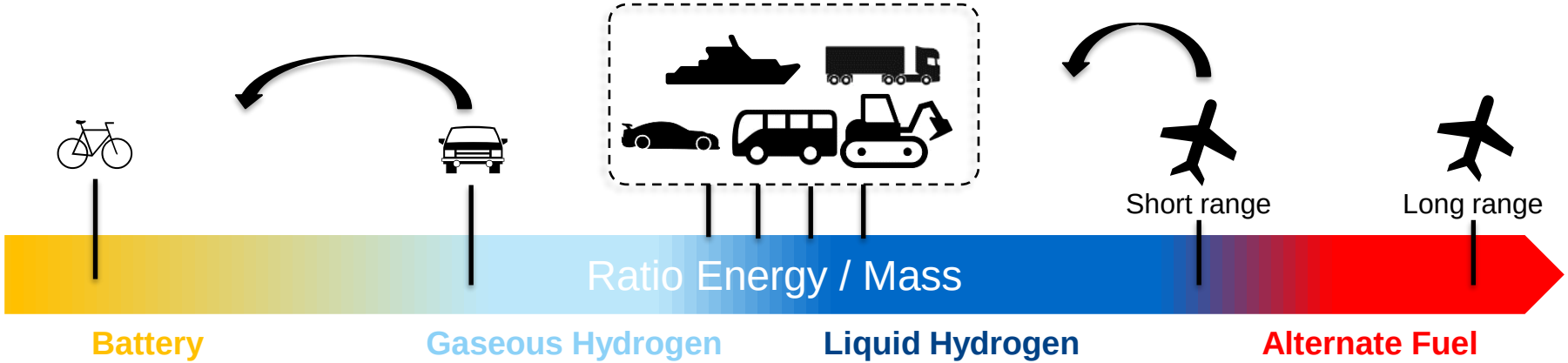


A DIVERSITY OF TECHNOLOGIES



Who can afford to pay 3x to 7x for the same service ? **Those who do not have the choice !!**

A DIVERSITY OF TECHNOLOGIES



Some systems (individual cars) have switched to batteries … including accepting an impact on the service (range reduction …)

Some systems require alternate fuel (long-range aircraft)

Most systems are « in the middle » … and « competition » between energy cost & operational impact is still open !

LH2 ADVANTAGES IN COMPARISON WITH GH2

Volume, Mass and integration

LH2 can offer a significant decrease of the **volume** and the **mass** of the tank in comparison with GH2 due to the **higher volumic mass** and the **low pressure** of the storage.

Safety

The reduced **volume** of the tank in comparison with can facilitate the integration to improve the **safety** in case of accident. The **low pressure** of the storage will significantly reduced the blast effect in case of failure of the tank

Refueling

LH2 flow-rate (**>5t/h**) will be significantly superior to GH2 flow-rate (**100kg/h**)

Boil-off management

Thermal insulation can be optimized to reduce Boil-off below LH2 consumption

Engine efficiency

The **low temperature** of hydrogen can improve the **density of the mixture** in a combustion engine and the **cooling of the engine**

LIQUID HYDROGEN AS A STANDARD

Space Launchers

Aeronautics

Hydrogen Station Supply Chain

Motorsport

…

No alternative energy can compete with petroleum-based system efficiency, but Hydrogen is the best solution to reach high ratio Power / Mass.

Even if Liquid Hydrogen will never be THE universal solution, Liquid Hydrogen will irremediably appear as the best technical solution for professional applications with intensive use like heavy duty.

LIQUID HYDROGEN IN MARITIME : ARIANEGROUP VISION

Supply-Chain and refuelling

- LH2 Transport

- LH2 Distribution (Refueling station)

DelHyVEHR
Large (700 m^3), high flow-rate (> 5t/h) and complex station … for no boil-off.

Station for prototypes
Direct from trailer (< 50m3)
Small and transportable station

End-users