Liquid Hydrogen is taking-off: How to make your airport Hydrogen ready?

IHAC 2023 – Edinburgh
September 7th 2023

Hydrogen Airport | GROUPE ADP | Air Liquide

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- The **first engineering and consulting JV** specialized in helping airports integrate **H2 projects within** their **infrastructures**

- **Air Liquide** brings its **60+ years long expertise in H2**, from the production of renewable or low-carbon hydrogen, to liquefaction, storage, and the distribution of H2 for aircraft

- **Groupe ADP** as a global airport operator leader contributes with its **expertise in airport infrastructure and operations**

One ambition

Support the creation of a H2 ready airport network

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Meet the Team

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Operating Team

+20 experts from Groupe ADP & Air Liquide

LH2 unique benefits

Enhancing the potential of hydrogen

HIGHER ENERGY DENSITY & HIGHER PERFORMANCE
vs Battery & vs GH_2

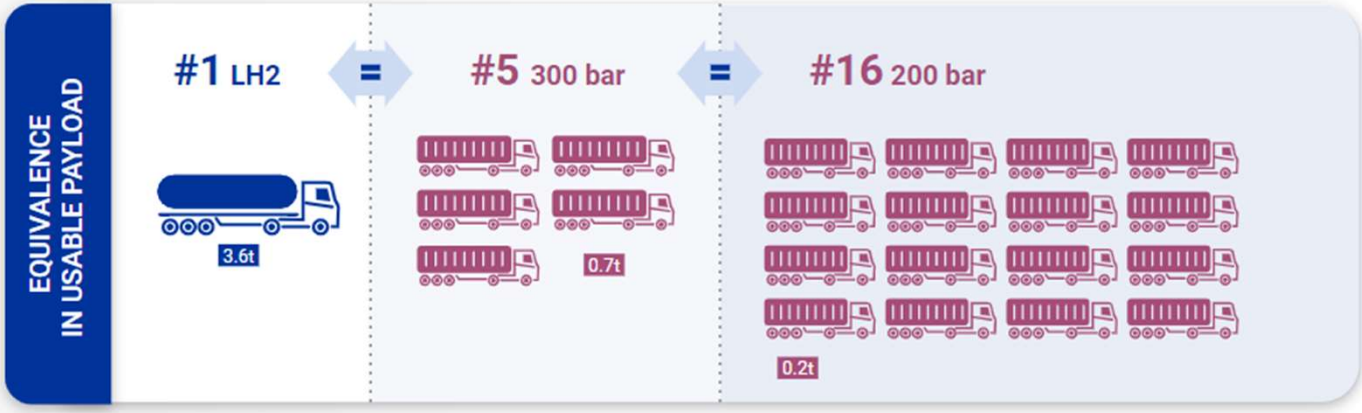
Only true ZERO EMISSION
vs E-fuels
(CO2, NOx, contrails…)

NON TOXIC
vs NH_3

MOST COMPETITIVE TCO

Road logistics: more viable at scale vs GH_2

Minimum storage & transport costs



LH_2 as a fuel: best compromise vs E-fuels and NH_3

Ideal for low & mid range, energy intensive mobility applications

Overseas LH_2 carrier: most competitive for LH_2 end use vs NH_3

Avoiding NH3 cracking and H2 reliquefaction

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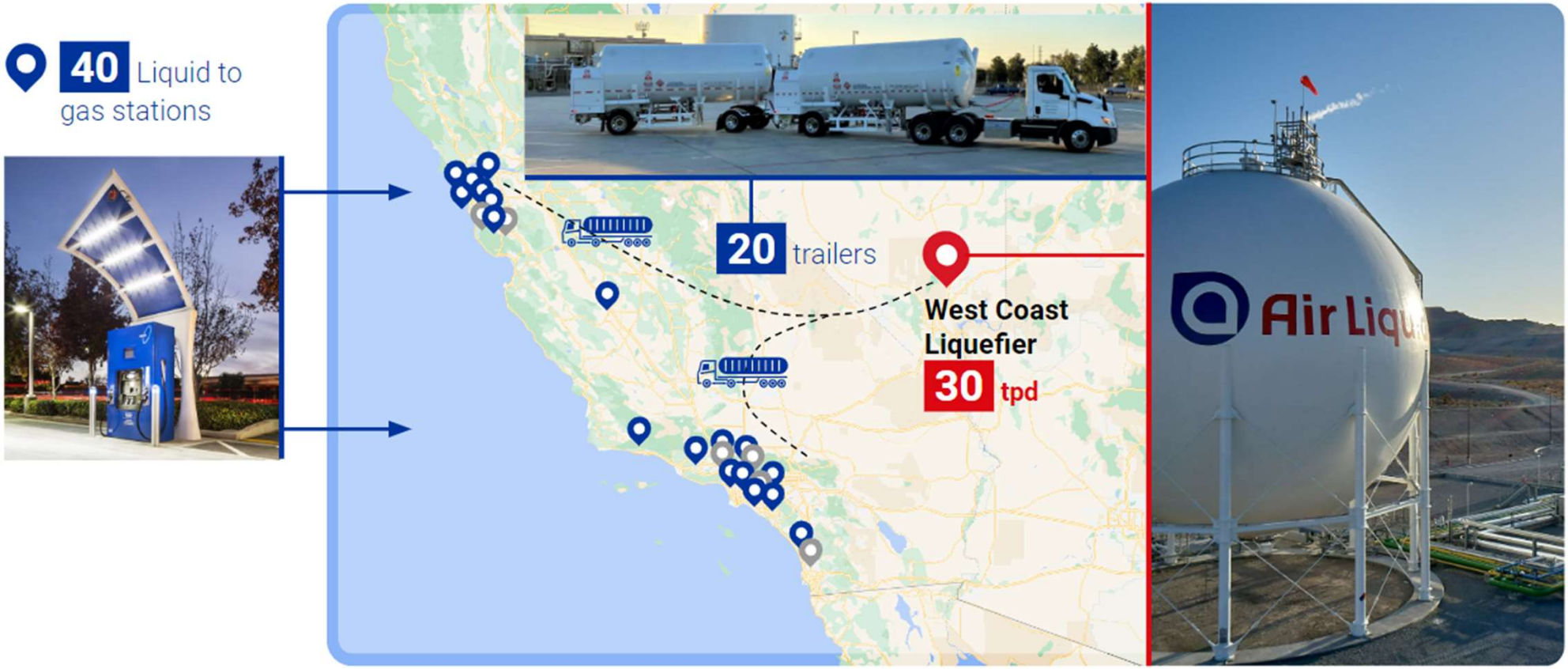
LH2 continuous deployment in the public area

Example of LH2 road supply chain in US, West coast



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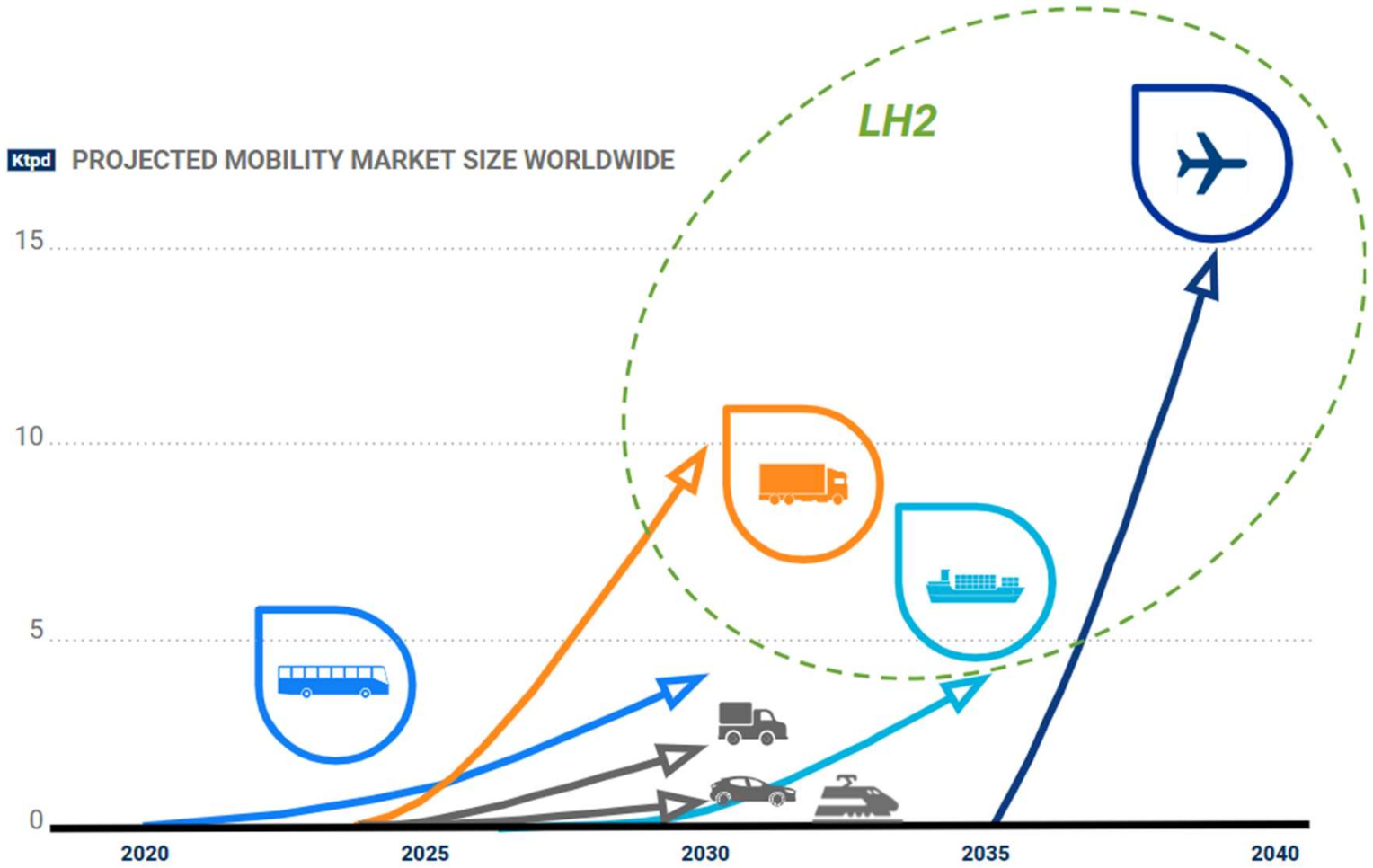
A market expected to take off by 2040



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Airport concentrates H2 users

Airports potential to become H2 Hubs

In a net-zero world, **hydrogen** use grows **in many segments**.

H2 representing up to **22% of the overall energy demand** in 2050.

LH2 to represent more than **50% of the global H2 transport** needs by 2050.

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Our unique expertise

3 phases along H2 implementation for airports

Phase 1

Opportunity & Pre feasibility studies

- H2 needs assessment
- H2 supply chain scenario
- H2 airport infrastructure scenario
- Preliminary H2 airport infrastructure implementation roadmap and planning

Now !

Phase 2

Detailed engineering studies

- H2 production (if any), liquefaction, storage infrastructures detailed engineering studies
- H2 airport infrastructure detailed masterplan study

Medium Term

Phase 3

Project implementation

- Assistance in construction of H2 Infrastructures
- Assistance in operation of H2 Infrastructures

Long Term

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Opportunity & Feasibility studies

LH2 at airport: understanding today and tomorrow's scenarios

Implementation assessment at Masterplan level of H2 infrastructure

From external H2 supply & storage at airport...

... to in situ H2 production and/or liquefaction

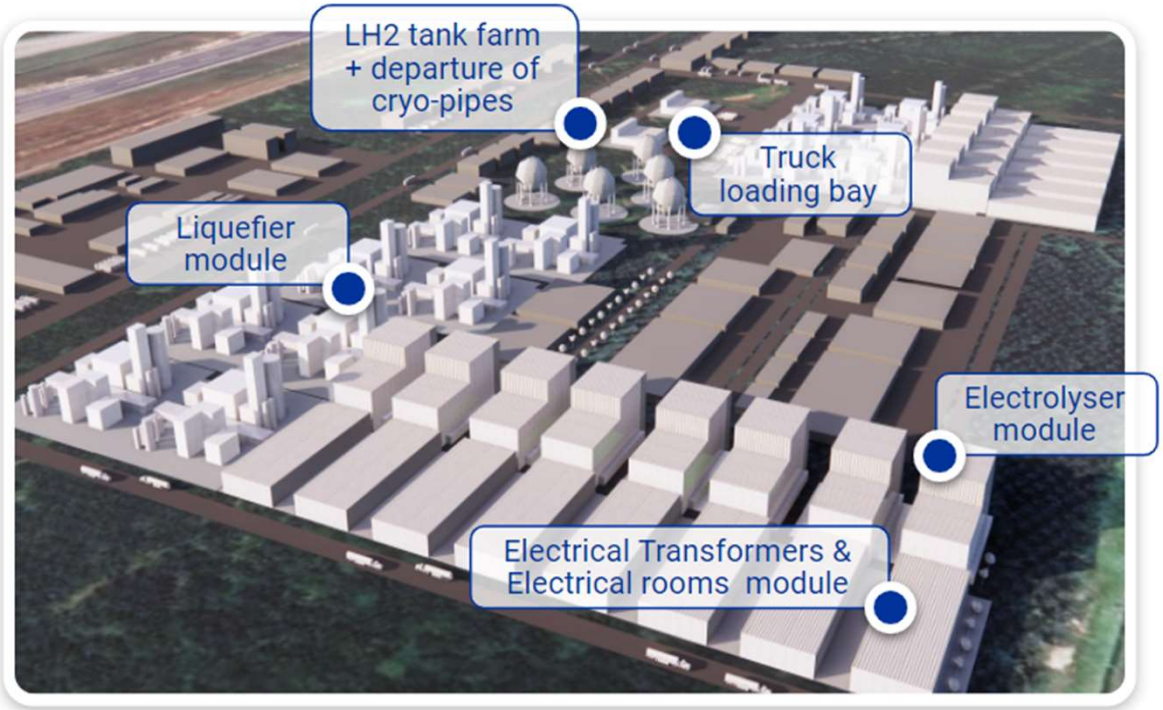
H2 production and liquefaction

Large airport 2060 scenario

Up to **600** flights LH2
& **700** T/d **Per day in 2060**

Up to **1,7** GW **Electric power & energy needed in 2060**
& **13,8** TWH/Year

Up to **30** HA **Surface requirement at the airport in 2060**



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