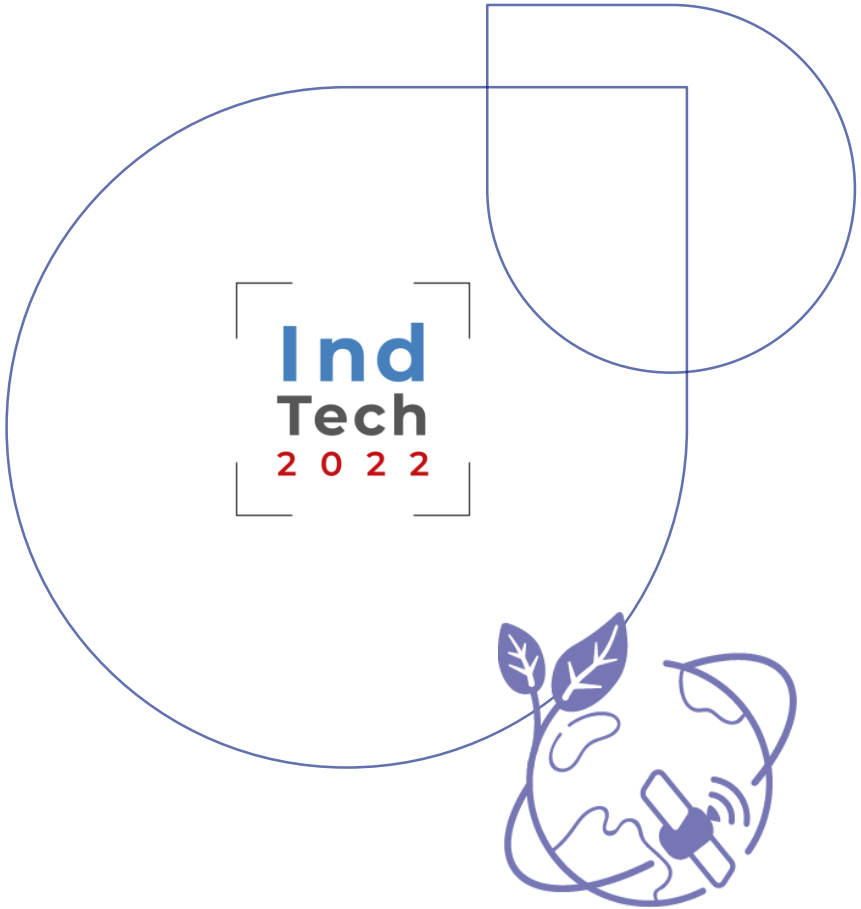
Conference on Industrial Technologies

IndTech22

Global Markets & Technologies

27/06/2022
Grenoble



Speaker’s presentation

Marie PORTIER

Innovation Business Unit

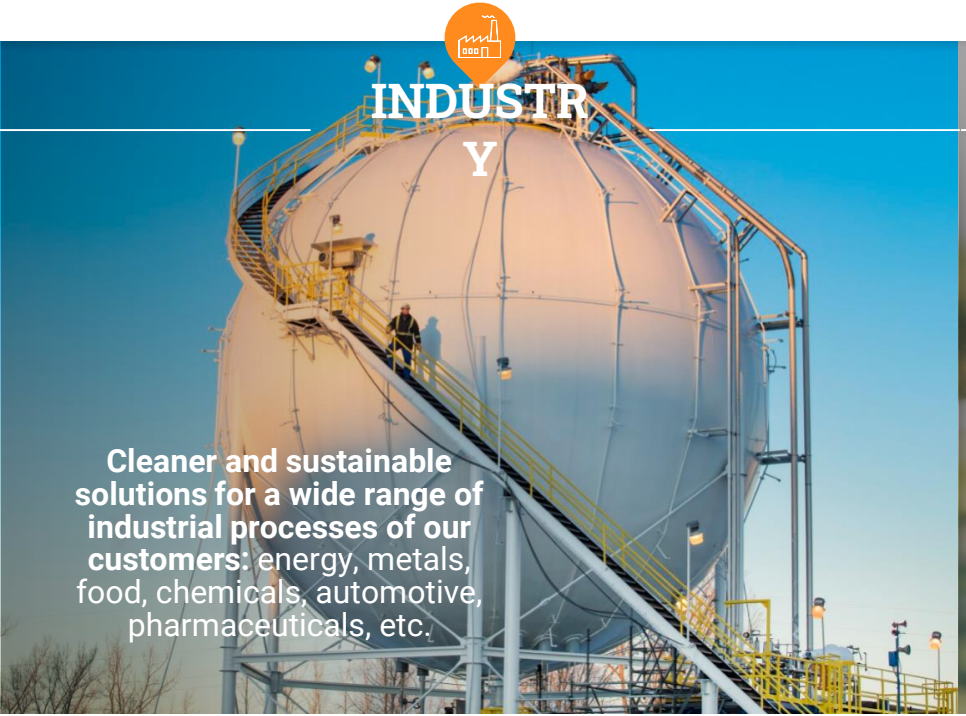
Agenda

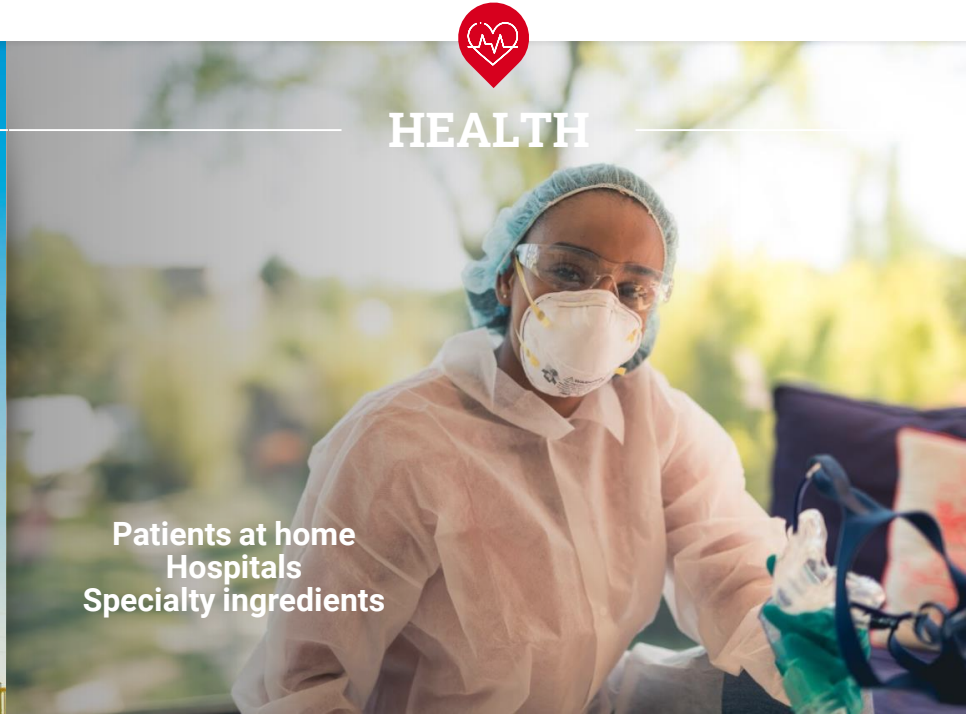
1. Air Liquide in brief
2. Science & Industry: towards two-way innovation
3. Take away
4. Q&A

01

Air Liquide in brief

A world leader in gases, technologies, and services for…





Our scientific territory: Essential small molecules

Oxygen, nitrogen and hydrogen are essential small molecules. They embody Air Liquide's scientific territory and have been at the core of the company's activities since its creation in 1902.

Separating the components of **air** to take advantage of their properties

OXYGEN | **NITROGEN** | **ARGON** AND **RARE GASES**

Producing molecules from the **natural resources** of the planet

HYDROGEN | **HELIUM** | **SILANE** | **ACETYLENE** | **CARBON MONOXIDE**

2021 Key Figures

~66,400
EMPLOYEES

PRESENT IN
75 COUNTRIES

MORE THAN
3.8 MILLION
CUSTOMERS & PATIENTS

REVENUE
€23.3bn

NET PROFIT (GROUP SHARE)
€2.6bn

INVESTMENT DECISIONS
€3.6bn

02

Science & Industry : towards two-way innovation

(Feeding *research into practice* and *practice into research)*

Use case n°1: Turbo-Brayton
from ISS to LNG shipping

In **1995**, AL-aT was in charge of developing **ISS MELFI** (Minus Eighty degree Laboratory Freezer for ISS) refrigerator to preserve biological samples.

>>> Solution developed:

- The reverse Turbo-Brayton principle

- ❑ This technological breakthrough was then tested for electricity routing with superconductor cables
- ❑ Finally, the Turbo-Brayton finds its market : **LNG Boil Off Gas Reliquefaction** in Shell bunker vessel to **reduce the GHG footprint of LNG shipping**

2006 2017

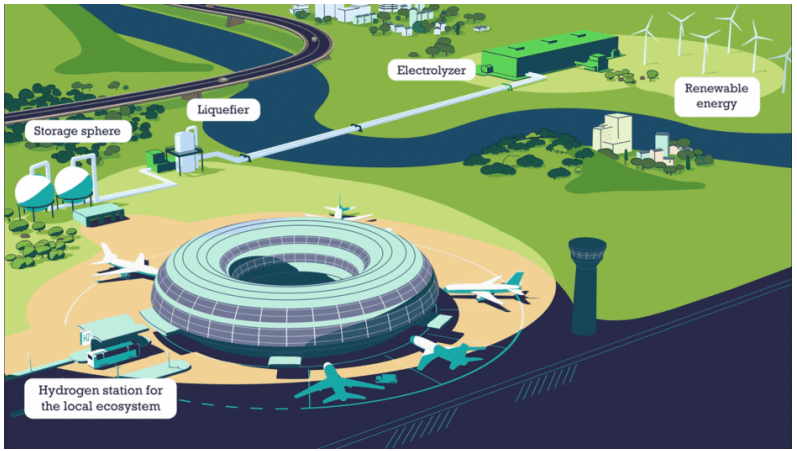
Installation of Minus Eighty Degree Laboratory Freezer for the ISS (MELFI) in the International Space Station

Air Liquide Turbo Brayton for LNG Boil Off Gas Reliquefaction in Shell bunker vessel

Use case n°2: H2
from space rocket to Hydrogen Clean Mobility

Since **1980**, Air liquide has developed solutions for production and utilization of H2 for space activities (ARIANE program)

- ➔ These skills are used for the supply chain of H2 for mobility (storage , distribution, refueling station)
- ➔ Working to develop low Carbon Emission aircraft



03

Take away

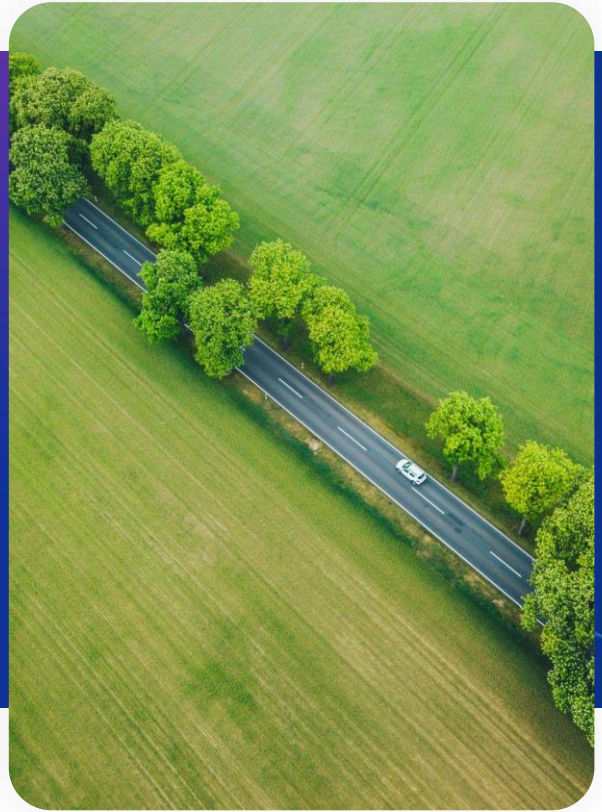
Take away

- The appropriation of scientific innovation by industries allow to push back the frontiers of scientific research to create value and new businesses in other unexpected fields.

- A strong & successful Innovation to Market strategy relies in the alignment of :
  - Market & Societal needs
  - Technologies maturity
  - Industrial Infrastructure readiness

04

Q&A



Thank you