



H₂ Energy

At the heart
of the energy transition

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2019 Key Figures



~67,000
EMPLOYEES



PRESENT IN
80 COUNTRIES



MORE THAN
3.7 MILLION
CUSTOMERS &
PATIENTS



REVENUE
€21.9bn



NET PROFIT
(GROUP SHARE)
€2.24bn



INVESTMENT
DECISIONS
€3.7bn



OXYGEN



NITROGEN



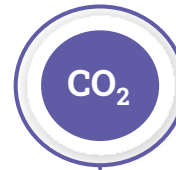
ARGON
AND RARE
GASES



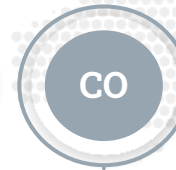
HYDROGEN



HELIUM



CARBON DIOXIDE



CARBON
MONOXIDE

Air Liquide has nearly 50 years of hydrogen development for industries

Production & Supply chain

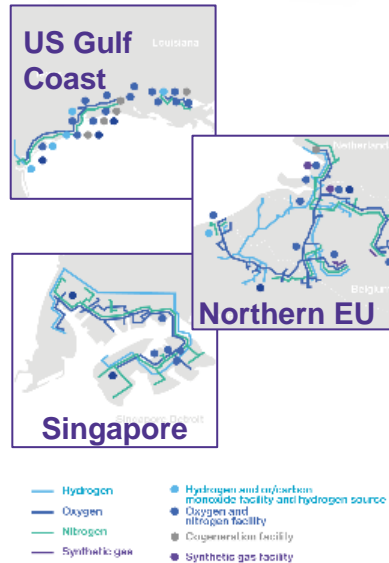
Production



Supply chain



Distribution Networks



Markets Segments

Process industries

Oil & Gas



Steel, Glass



Electronics



Transportation

Space



Key Figures

14 Bm³/yr

1,850 km H₂ pipeline

46 large H₂/CO plants

40 electrolyzers in operation

2 B€ sales

A photograph of an Air Liquide hydrogen fueling station. In the foreground, a blue and white hydrogen fueling dispenser is visible, featuring the Air Liquide logo and a digital display showing 'Sale \$', 'Kilograms', and 'Price per kg'. A red and white 'EMERGENCY SHUT-OFF' sign is mounted on the dispenser. In the background, a blue semi-truck is parked, with 'H2 Only' written on its side. The truck's side also displays identification numbers: 'CA 504785', 'MC-27461-P', and 'US DOT 1048755'. Below these numbers, it says 'HEAVY-DUTY PROGRESS PC' and 'BY TOYOTA HYDROGEN FUEL CELL'. A warning sign on the truck reads 'NO SMOKING FLAMMABLE GAS HYDROGEN GAS NO ODOR'. The scene is set outdoors in front of a building with a corrugated metal roof.

Air Liquide Investments in North America



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Air Liquide new investments in North America



1st large scale **renewable liquid hydrogen** production plant dedicated to the Hydrogen energy markets

- Investment: **\$150M**
- Capacity: **30 tons per day (40,000 FCEVs in the West Coast)**
- Location: **North Las Vegas, Nevada**
- Construction: **Began in 2020; operations & delivery in 2022**



World's Largest PEM Electrolyzer to supply ~100% decarbonized hydrogen for Canada and the East Coast Markets

- Investment: **\$40M** (additional investment to existing site with liquefier)
- Capacity: **>8 tons per day (20 MW PEM electrolyzer)**
- Location: **Bécancour, Québec**
- Construction: **Began in 2019; operations & delivery by year-end**

Bécancour



Nevada Construction



Becancour Site



Becancour Site - Aerial view





Hydrogen for Airport Ground Applications

 Air Liquide

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Hydrogen supply to an Airport - Demand

LAX: What would a hydrogen based ground fuel infrastructure look like

In a given year, LAX ground operations consume

(Source LAWA: 2000 LAX Operations)

25M gallons of diesel

115M gallons of gasoline

1700 thousand therms LNG/CNG

Diesel consumption

13%	ground support equipment
4.5%	stationary equipment
8.5%	on airport vehicles
74%	off airport vehicles

This is equivalent to about **35tpd H2**



Hydrogen supply to an Airport - Production

35tpd H2 Production

SMR - similar to our project in NV (30tpd)

Note: this is 1/8th the size of large scale, industrial SMR

Electrolyzer - 80MW - 4X our Quebec project

Onsite or Offsite production?

Hydrogen supply to an Airport - Supply

35tpd H2 Supply

Liquid Delivery - on road

~8 trailer deliveries per day

Gaseous - on road

~ 70 trailer deliveries per day (!)

Gaseous - pipeline

Small offtaker - is there an existing pipeline?



Hydrogen supply to an Airport - Storage

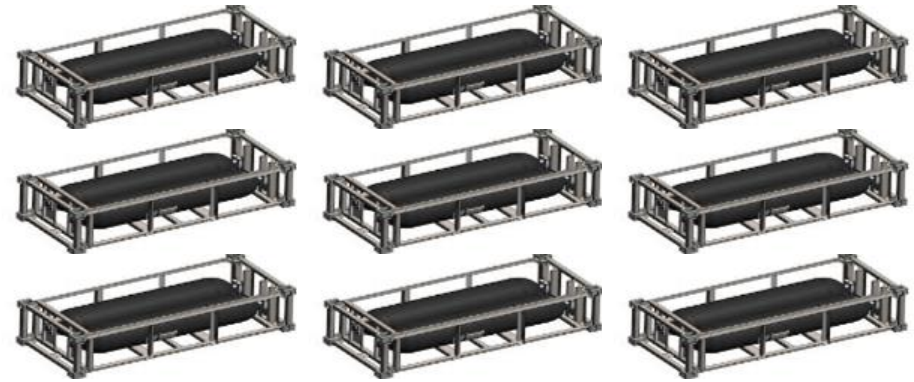
**35tpd H2 Consumption x 2-3 days backup
= 70-100 tons of storage**



Liquid storage
Sphere(s)

Gaseous storage
HP cylinders

Gaseous - pipeline
No (very limited) storage needed



Hydrogen supply to an Airport - Dispensing

Typical H2 Stations - in the field and in planning

Offroad (warehousing)

Current US:

1 tpd, liquid

4 dispensers

LDV

Current CA: collocated at gasoline stations

0.8 tpd, gaseous and liquid supply, some with onsite production

4 dispensers, 350 and 700 bar

HDV

Planned US: 10+ tpd, liquid supply, some with onsite production

4-8 dispensers



Hydrogen supply to an Airport

The challenge is scale

Production, supply and distribution - proven at scale

Applications - vehicles in service and under development

Dispensing infrastructure - leverage existing

CLEAN
MOBILITY
by  Air Liquide

Thank you!

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