

Low carbon hydrogen supply chain

*Maritime Conference, Floro,
September 18th, 2019*

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Floro, Norway

**H2 ENERGY WBL
EUROPE**

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60 years of development in Hydrogen for our customers

14 bn
m³ / yr

Production & Supply chain

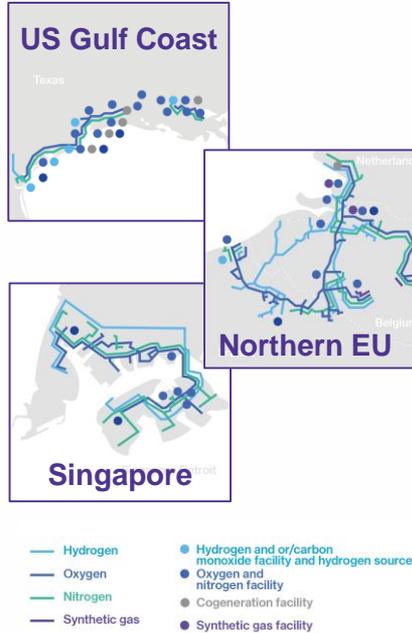
Production



Supply-chain (GH₂ / LH₂)



Distribution Networks



Markets Segments

Process industries

Oil & Gas



Steel, Glass



Electronics



Space Transport



AL - Electrolyser scaling up

100
MW+

Scale up
*Preparing the
next step*



Hydrogenics announces \$20.5m private placement and technology partnership with Air Liquide

By Anne Sampson | 2 January 2019

HYBALANCE One of largest PEM
In operation

1,25
MW

2019

20
MW

Air Liquide signs long-term power purchase agreement for renewable electricity

Press release | Friday, November 30, 2018



MEDIA RELATIONS

2018

BECANCOUR
Largest PEM project
Under execution

Air Liquide invests in the world's largest membrane-based electrolyzer to develop its carbon-free hydrogen production



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< 2017

more than 30 electrolyzers in operation worldwide
usual range: 50 - 100 Nm³/h H₂
Mainly Alkaline technology

ONSITE

A complete & integrated low carbon solutions portfolio



CertifHy aims to develop the 1st European-wide Green and Low Carbon hydrogen GO scheme

Air Liquide fait un investissement stratégique dans la production d'hydrogène décarboné par électrolyse

Communiqué de presse | Jeudi 24 janvier 2019



Air Liquide joins innovative large scale Carbon Capture and Storage project in Norway

News | Monday, September 9, 2019



CHIN

LATE

Air Li
Impr
Paris



- Design and build Group's industrial gas production units

- Solution oriented towards our gas customers
- Plant life-cycle optimization
- Supporting operations



H2 for mobility : already a reality worldwide - AL Examples

Americas



Mobility for Professionals

US+EU
2013-2017
9 sites



Mobility for Consumers
US North-East
2015
12 HRS + Supply chain



Mobility for Consumers

California
2014-2018
5 HRS
30 tpd LH2 plant

Europe



Mobility for Consumers
Paris
2015-2018
4 HRS



Mobility for Consumers
Germany
2014
27% of 100 HRS

ME - Asia



Mobility for Consumers
Japan
2014-2017
6 HRS
25% of 80 HRS
by 2021



Mobility for Consumers
Dubai HRS
2016

Key Elements

> 100 HRS built worldwide
> 40 HRS* for FCEV
(controlled by AL)

> Member of 2 consortia
developing HRS networks,
each time with 25% of
80-100 HRS

H2 Supply chain in
the US and Denmark

ALIAD
Venture Capital

5 Startups

* HRS: Hydrogen Refuelling Station

Let's scale up !



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Developing our skills in the operations of PEM electrolyser

1,25
MW

In operation



Hybalance plant, Hobro, Denmark

20
MW

In execution



Becancour, Canada : the world's largest membrane-based electrolyzer

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Key drivers for investments in low carbon H2 production

- Serving growth markets ⇒ **develop new H2 markets**
- **Clear long term** framework for environmental attributes
- **Level playing field** between alternative pathways taking into account the different objectives
- **Phased** approach: aligning environmental and economics

Air Liquide to build first world scale liquid hydrogen production plant dedicated to the supply of Hydrogen energy markets

News | Wednesday, November 28, 2018

