

advanced Business & Technologies Europe

# Opening new business frontiers

November 2016 | advanced Business and Technologies Europe

# Our focus

We **develop, incubate and shape** new sustainable markets for Society

to the **Energy Transition territories:**

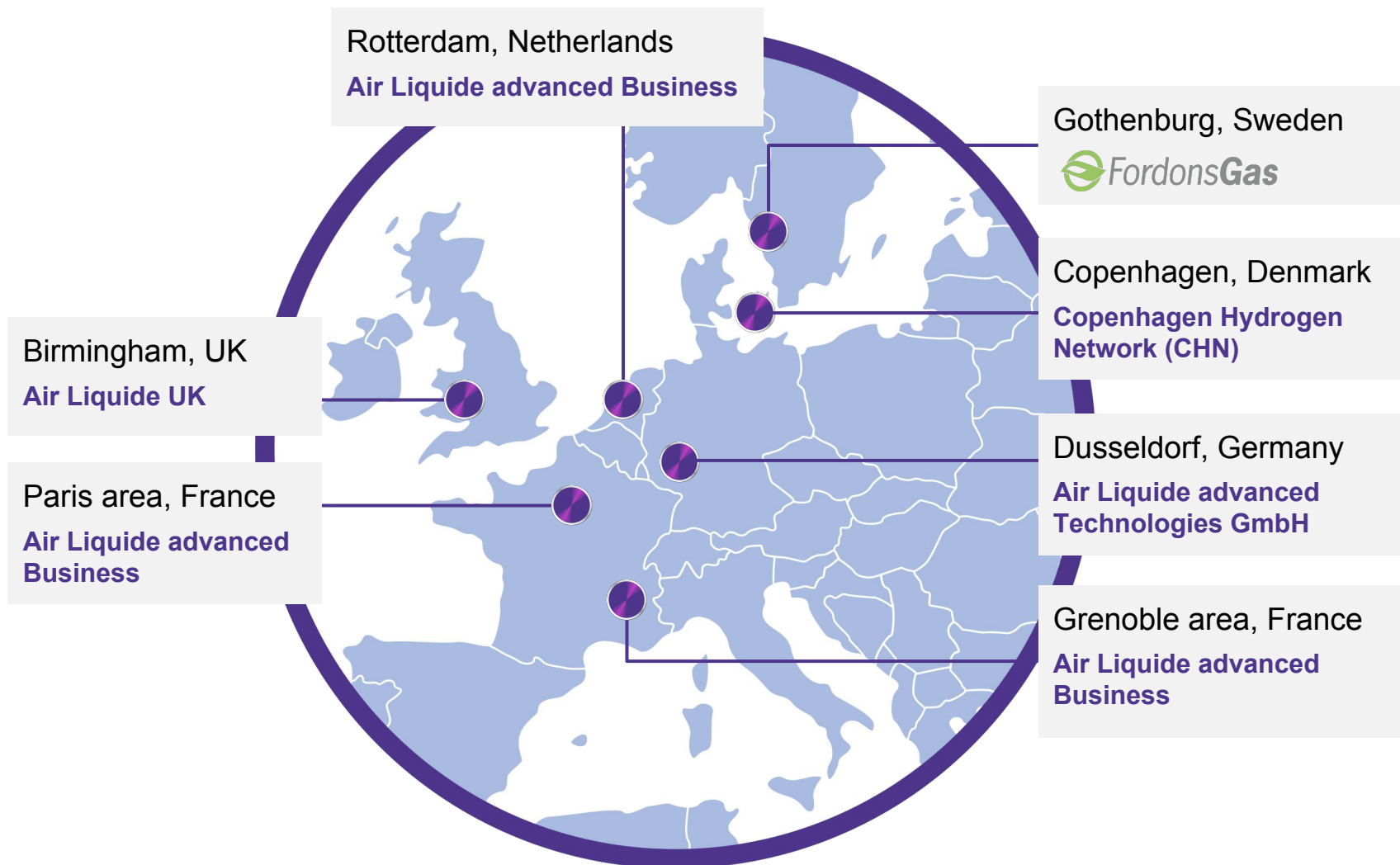
*Hydrogen Energy, biogas upgrading, biomethane and refrigerated transportation,...*

with a **collaborative spirit** and an **appetite for entrepreneurship**

*We participate to generate growth to the Air Liquide Group, opening new markets and investing in clean energy projects, within the Air Liquide advanced Business & Technologies World Business Unit.*



# Business references in Europe



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# aB&T Europe at a glance

Transitioning to  
new energies



Innovative solutions for  
customer experience



Open new  
markets

Involved in **16**  
european clean  
energy projects



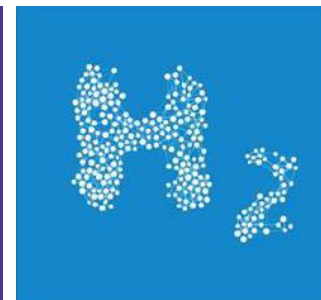
**106**  
people  
In 6 european  
countries

## Our markets

Biogas upgrading: from  
waste treatment to  
biomethan delivery

Clean Transportation:

- Hydrogen mobility
- NGV
- Cold transportation



# aB&T Europe key data

**+75**  $\text{LN}_2$  TRUCKS  
— FOR —  
REFRIGERATED  
TRANSPORTATION

**50** CNG  
LNG  
STATIONS

**H<sub>2</sub>** MOBILITY  
PROJECTS  
EUROPE  
**12**  
INVESTED & OPERATED BY  
AIR LIQUIDE  
— IN 2015 —

**50+** BIOGAS UNITS  
PURIFICATION  
— INCLUDING —  
**6** OPERATED BY  
AIR LIQUIDE

**10+**  $\text{H}_2$   
STATIONS  
////  
**8** FORKLIFT  
PLATFORMS  
— OPERATED BY —  
AIR LIQUIDE

TARGETING  
**70** TAXIS  
BY THE END  
OF 2016  
AND **600**  
WITHIN 3 YEARS

## GERMANY $\text{H}_2$ MOBILITY

**400**  $\text{H}_2$   
STATIONS

**350** M€  
INVESTMENT

MAX. **90** KM  
DISTANCE  
BETWEEN EACH  
STATION ON  
MOTORWAYS

**10** HYDROGEN  
STATIONS  
IN EACH  
METROPOLITAN  
AREA

# Transitioning to New Energies



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# Opening new markets

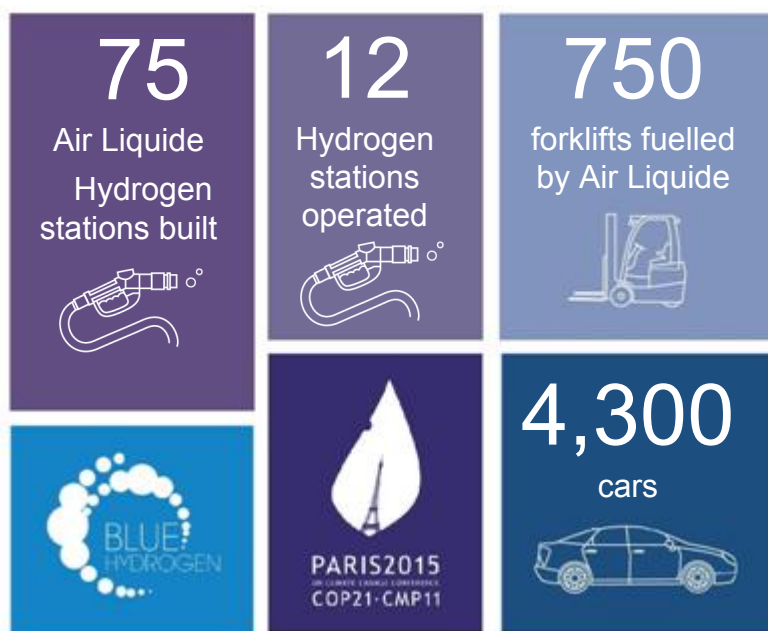
- ❑ Hydrogen energy for clean mobility
- ❑ From Biogas to clean energies
- ❑ Clean transportation: Bio/NGV and liquid nitrogen refrigerated solution



All these markets are linked. Their aim is to deliver a new and clean mobility experience to end users and to the Society

# Hydrogen energy overview

## Progress towards global commercial solutions



*Air Liquide data, end 2015*

### Emerging Hydrogen highways

JAPAN

CALIFORNIA

GERMANY

### Partnerships



DAIMLER

# Delivering a new mobility and logistics experience with Hydrogen

Facilitating access to the hydrogen energy by the roll-out of an hydrogen distribution network to supply vehicles powered by fuel cells (cars, buses, material handling...).

**With our Hydrogen stations, we are leading towards full freedom in mobility:**

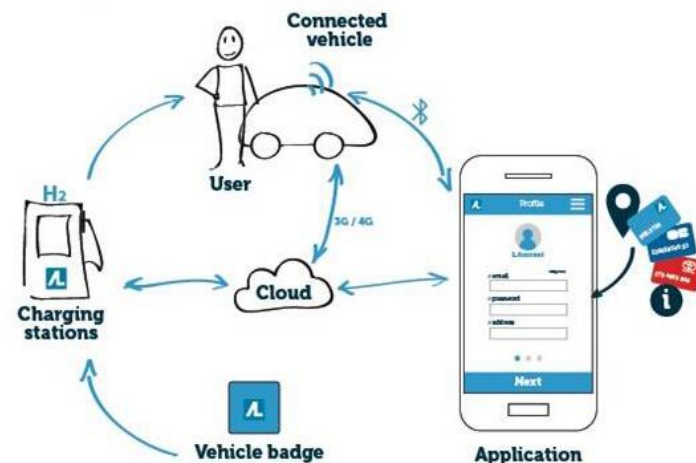
- For electrical fuel cell vehicles
- Buses

**And offering productivity gains and high flexibility on logistics:**

- Material handling

**Critical aspects of the experience we deliver:**

- Accessible and ergonomic stations
- No waiting time, fast charging time
- Convenient payment (vehicles)
- Silent
- A totally connected experience



# Everything we do leads to CO<sub>2</sub>- free H<sub>2</sub> mobility

**50% of H<sub>2</sub> energy  
from carbon-free processes by 2020**

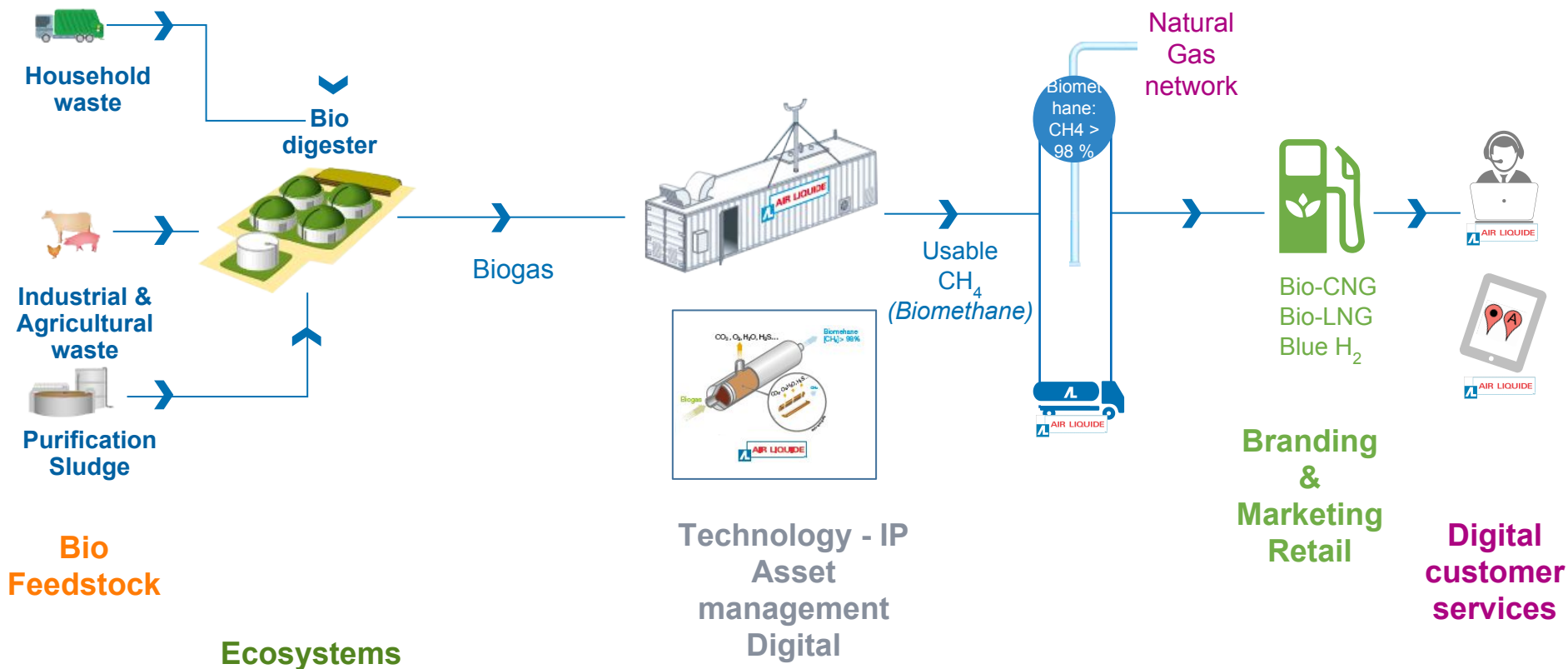
A commitment to meet  
both **environmental requirements**  
and **economic constraints**

## Achieving “Blue H<sub>2</sub>”

1. Natural gas reforming + CCS
2. Water electrolysis (renewable, nuclear)
3. Biomass gasification
4. Biogas reforming



# From biogas purification to clean energies



# From biogas to biomethane end-users

A presence on the whole value chain  
of biomethane

## An example of use:

Can provide

1,000 tons  
of waste



45 tons  
vehicle's clean fuel

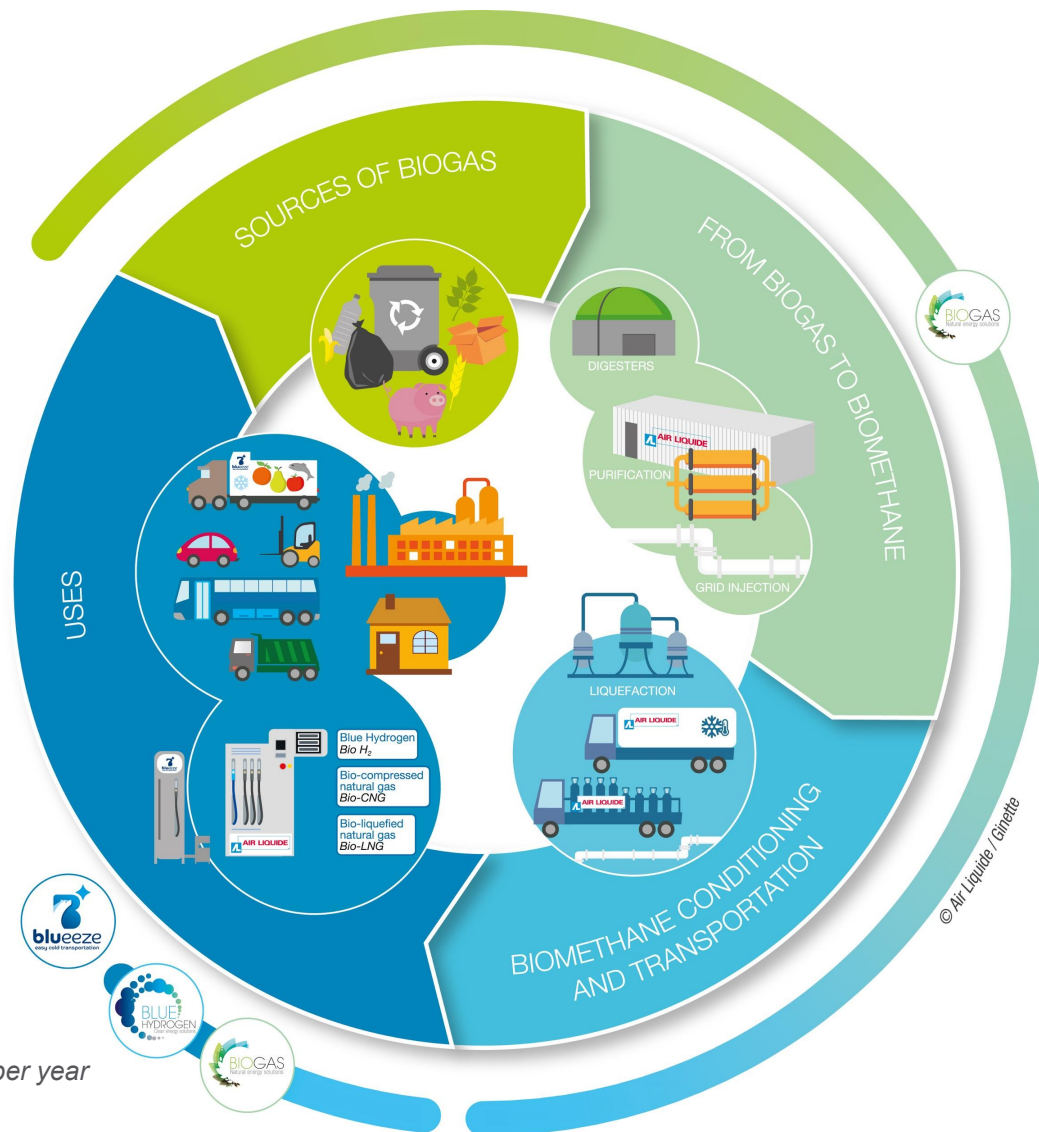
For one truck



Or two buses



Or 45 cars

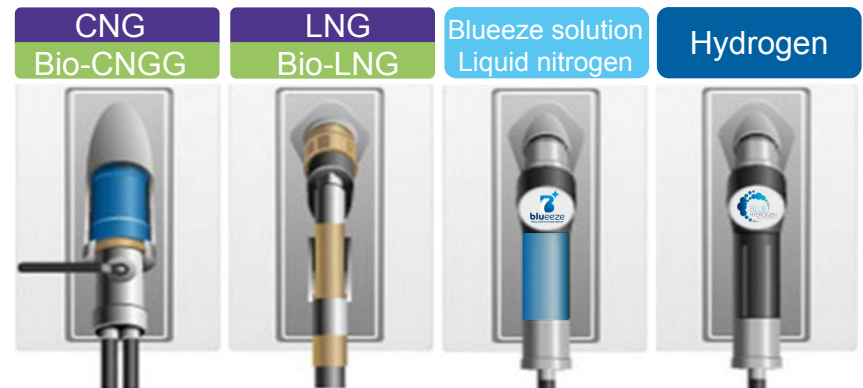


National average for the circulation of the category given by vehicle per year

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# A multi-energy offer for clean transportation

- A packaged offer for road freight **clean mobility**, aimed at supermarket chains and their transport and logistics companies
- Many benefits:
  - **Clean energies**, allowing to cut fine particles and CO<sub>2</sub> emissions
  - A **quiet** transportation solution for urban and peri-urban deliveries
  - An **economical** solution, with a lower cost price per mile than diesel



*Inauguration of Transalliance station (Nancy, France)*

# A multi-energy offer for clean transportation

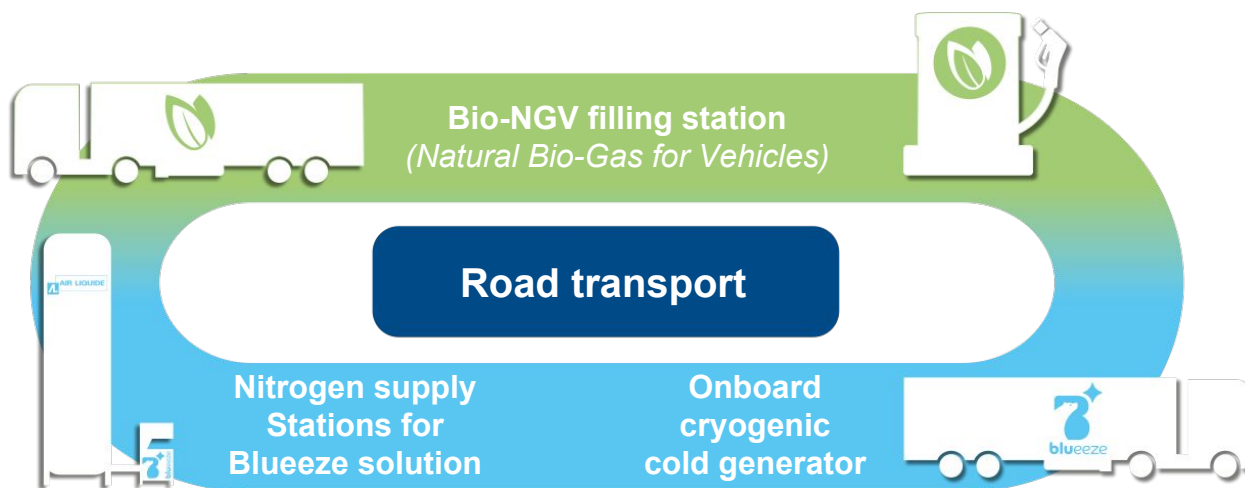
Committed to clean transportation, Air Liquide proposes a Bio-NGV offer that is being implemented thanks to the rollout of multi-energy stations.

## Running on natural gas reduces:

- Noise by 50%
- NOx emissions by 80%
- Particulate matter emissions by 90%
- CO<sub>2</sub> emissions by up to 90%

## Extended range capability:

- More than 800km for a truck running on LNG
- Up to 400km for a truck running on CNG



# Blueeze, a global solution for refrigerated transport

## Cryogenic nitrogen solution for heavy vehicles refrigerated transport

### Sustainable and clean

- Zero particulate, NO<sub>x</sub> & NO<sub>2</sub> emissions  
Zero HFC
- Only releases nitrogen: a natural air component, inexhaustible and produced locally
- Perfect match with NGV vehicles

### Silent

- Even when running at maximum power
- Ideal for night-time deliveries

### Easy and safe

- Technology without a thermal engine with reduced maintenance
- Adopted by drivers
- Automatic filling
- Simultaneous NGV / Nitrogen filling are possible
- No contact with nitrogen, indirect solution

### Filling station

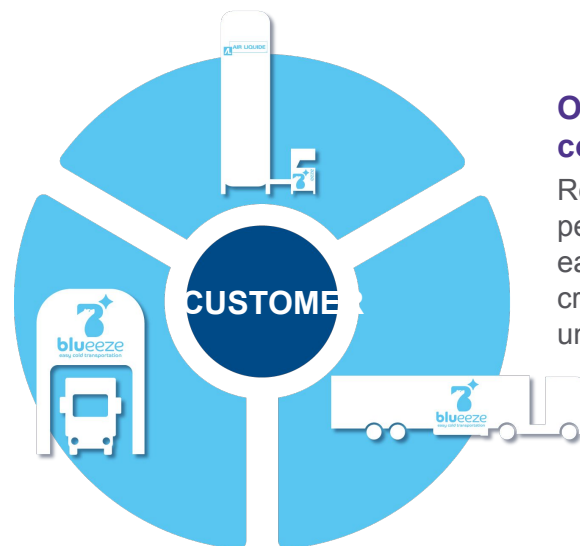
Safe and performant.  
**24h 7days monitoring by  
Air Liquide for a secured supply**

### Maintenance & Services

Experts and  
partners  
network for  
training &  
maintenance

### On-Board cooling unit

Reliable,  
performant and  
easy to use  
cryogenic cooling  
unit



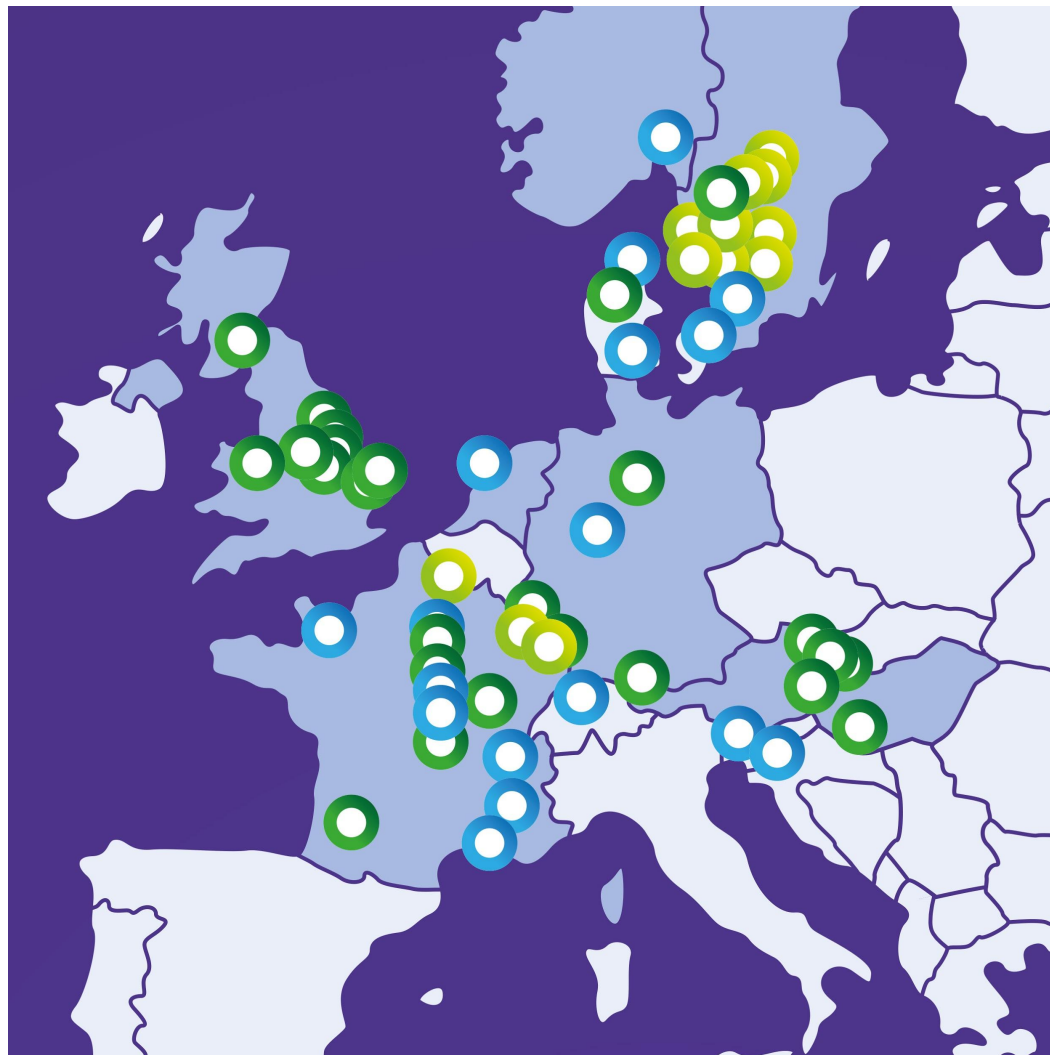
# Our new energies references in Europe

● Biogas upgrading units:  
30+ references  
(incl. 6 operated by Air Liquide)

● NGV stations

● Hydrogen stations

Austria  
Denmark  
France  
Germany  
Hungary  
Netherlands  
Norway  
Sweden  
Switzerland  
United-Kingdom



Thank you

[www.energies.airliquide.com](http://www.energies.airliquide.com)  
[@airliquidegroup](https://twitter.com/airliquidegroup) 