

CLIMATE OBJECTIVES

Taking Actions

in our company
with our customers
for the planet

November 30th, 2018

AIR LIQUIDE, A WORLD LEADER IN GASES, TECHNOLOGIES AND SERVICES FOR INDUSTRY AND HEALTH



Agenda

Our climate commitment and objectives

Deployment of initiatives for

Our Assets

Our Customers

New Ecosystems

Contribution to financial performance

Q&A





Air Liquide commitment and objectives

November 30th, 2018

AIR LIQUIDE, A WORLD LEADER IN GASES, TECHNOLOGIES AND SERVICES FOR INDUSTRY AND HEALTH

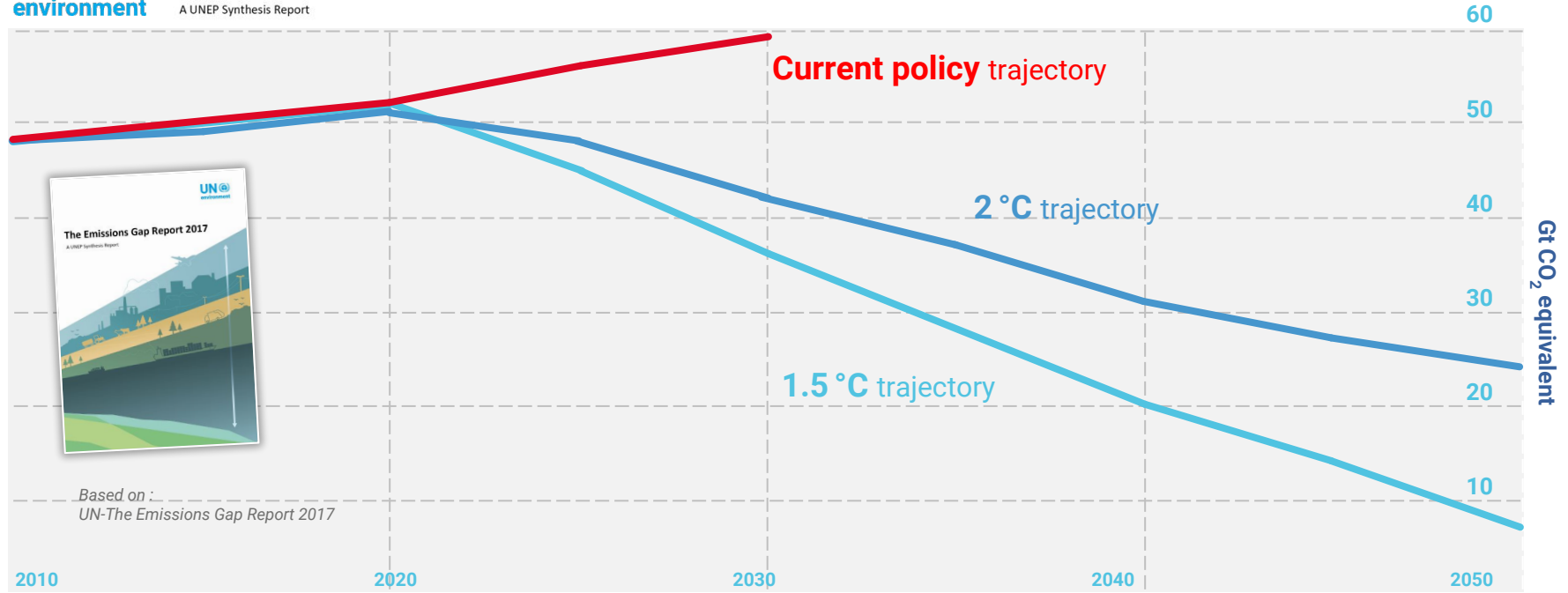
Need for a sharp reduction in greenhouse gas emissions



The Emissions Gap Report 2017

A UNEP Synthesis Report

GHG Emissions Projections



Air Liquide, a committed industrial player

ACTING ...


Long and strong involvement in limiting GHG emissions to reduce Carbon footprint:

- In its operations
- Through its Solutions to customers

... RESPONSIBLY

- Ahead of laws and regulations
- Responsible behavior recognized by **extra-financial**

Ratings

MSCI  A

 CDP A-
DISCLOSURE INSIGHT ACTION

 SUSTAINALYTICS 69/100

 ecoVadis Gold
SUPPLIER SUSTAINABILITY RATINGS

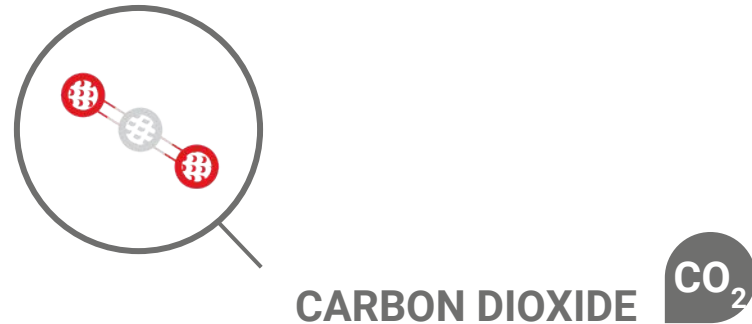
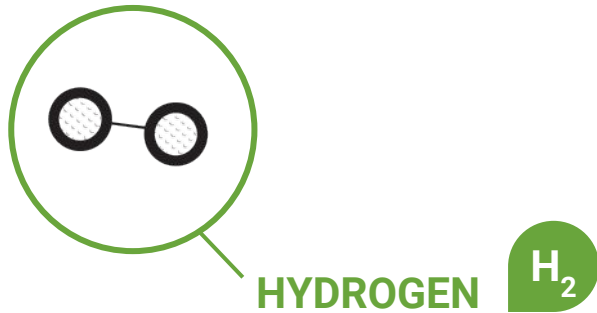
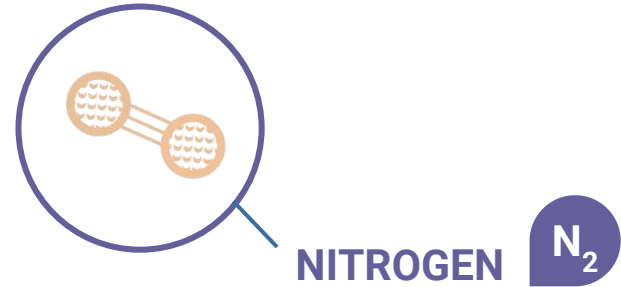
Indexes

 FTSE4Good

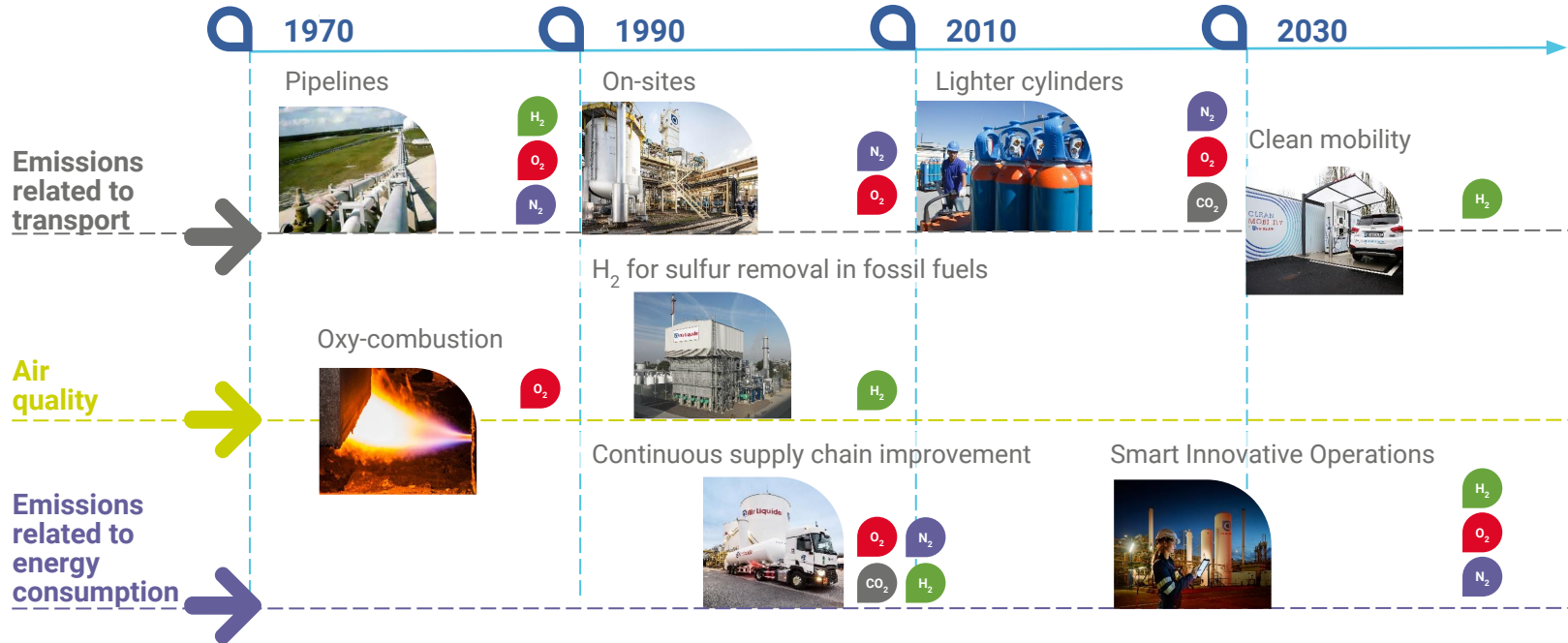
 EURONEXT
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INDICES EUROZONE 120

NEW STEP
CLIMATE
OBJECTIVES

Small essential molecules are core to our business model to drive customers solutions

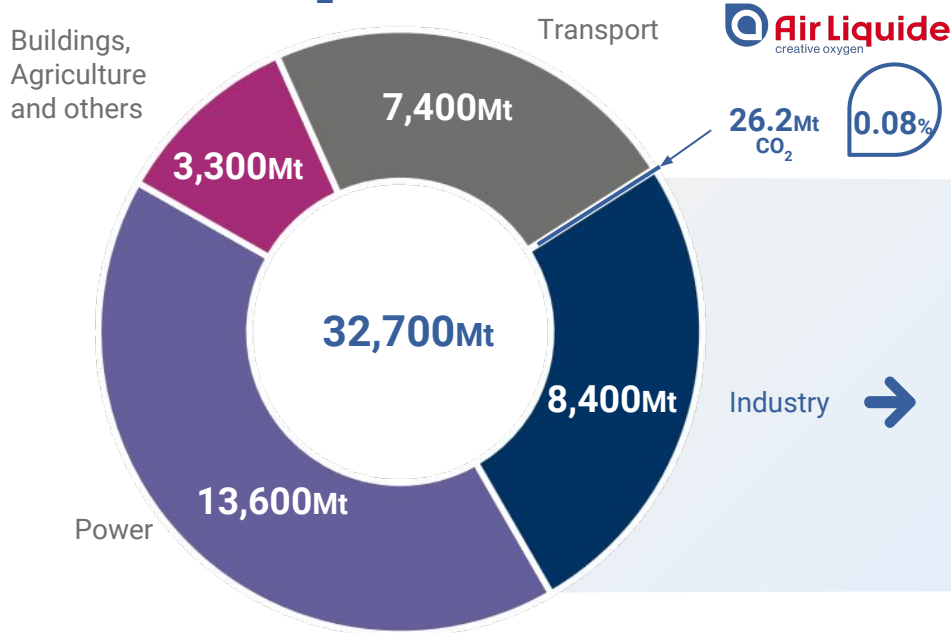


Our solutions addressing carbon emissions and air quality



Industry response to sharp CO₂ reduction requirement

Global CO₂ emissions



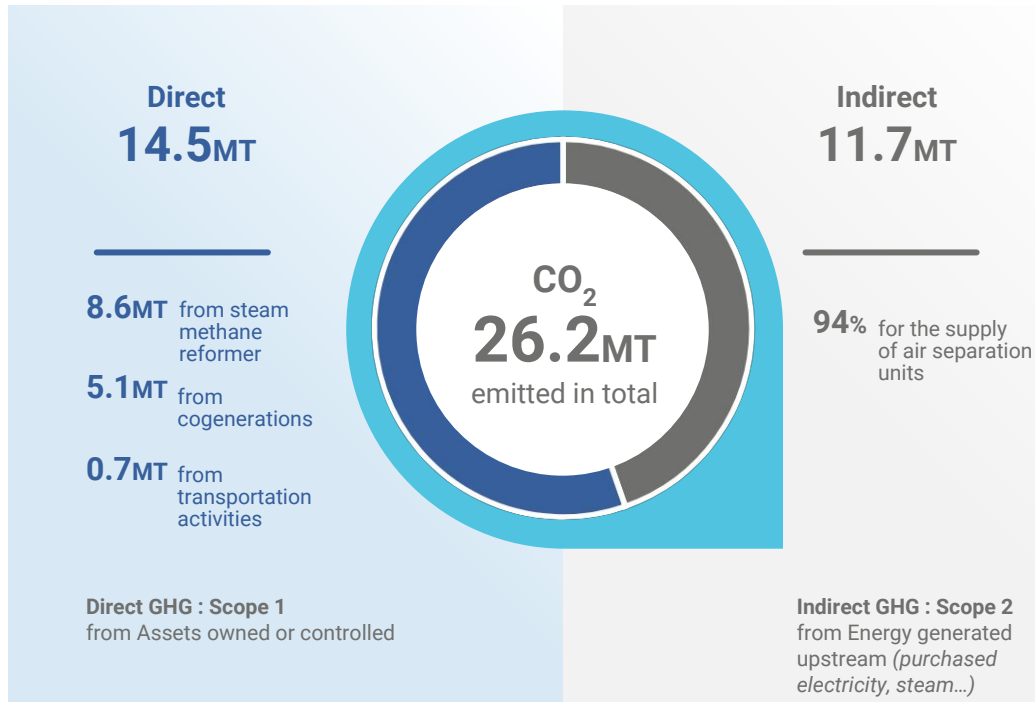
Industry response

- Reduction of its own emissions
- Innovation and development of cleaner solutions to other emitting sectors

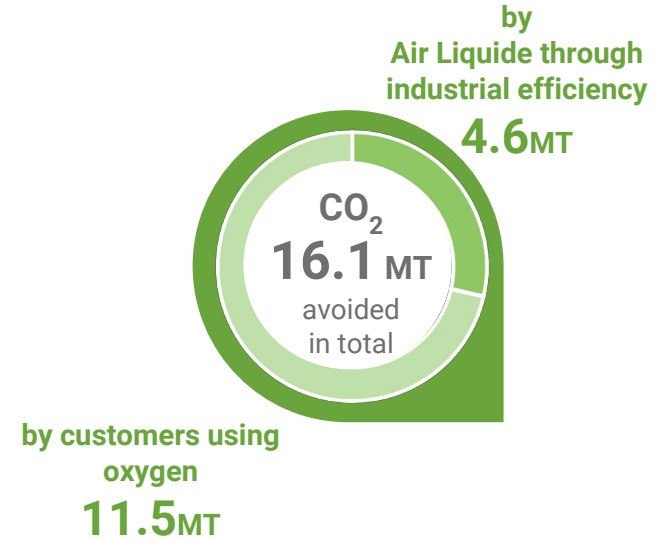
Source: Energy Technology Perspective 2017, IEA, Direct CO₂ emissions in 2014

Greenhouse gas emissions within Air Liquide

Air Liquide GHG emissions in 2017



Avoided GHG Emissions



CLIMATE OBJECTIVES

A global approach



ASSETS

Reduce our carbon intensity in 2025 vs. 2015 by **-30%**



CUSTOMERS

Act for clean industry by developing low-carbon solutions



ECOSYSTEMS

Contribute to a new low-carbon society

Embed Climate in our decision process



Carbon impact in the review of new investments

- to perform **customer site assessment**
- to evaluate **risk of obsolescence** of our assets
- to measure the **impact on CO₂ intensity**



Climate initiatives part of 2019 budget commitment

- climate objectives in managers' compensation

Act & advocate: Engage with all stakeholders



Employees

Hydrogen Council 54 world-class companies

Authorities & General public



Customers, Suppliers

Shareholders, Investors, NGOs

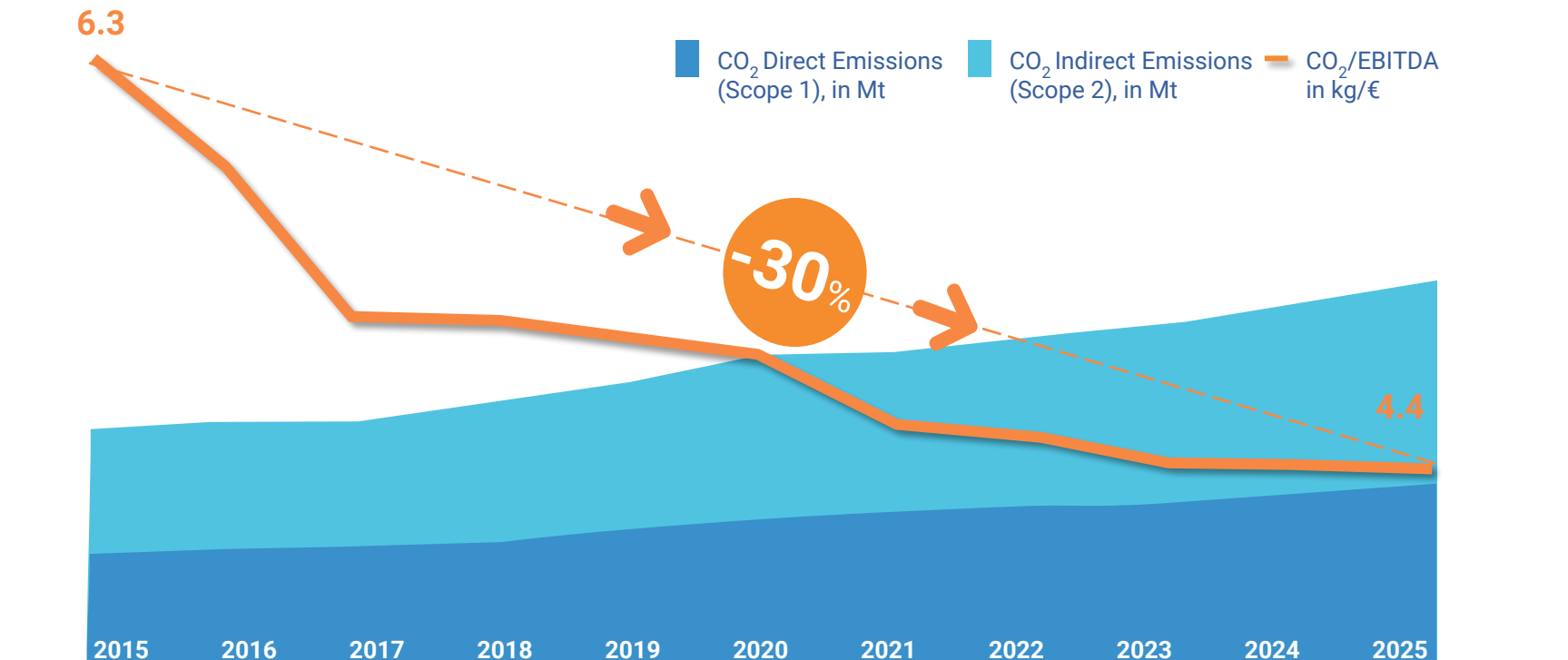
SCIENCE BASED TARGETS



Climate-driven initiatives for our Assets

Reduce Air Liquide carbon intensity in 2025 vs. 2015

Carbon intensity (kg CO₂/€ EBITDA) and Group Emissions



Assets: 3 main levers

1

INCREASE

renewable
electricity
purchase

2

REDUCE

energy consumption
per volume
of production

3

REDUCE

carbon footprint
of bulk & packaged
gases

Lever 1: Increase renewable electricity purchase by **+67%** (from 6 to 10 TWh)



Voluntary action to **buy renewable** energy - Power Purchase Agreement



Supplier arbitration taking into account their energy mix



Improvement of energy mix in countries where Air Liquide operates



Lever 2: Further reduce energy consumption per volume of production by -5%

➔ New plants with **higher** energy efficiency

- Enabled by Innovation
- Continuous technology improvement between 2007 and 2015
 - -3.0% for ASU
 - -1.0% for SMR ➤ to be accelerated

➔ Step change performance on **existing** plants

- Leveraging data - Smart Innovative Operations for:
 - Best Economical Point
 - Production & Supply Chain **integrated Optimization**
 - Predictive maintenance

➔ **Modernization/renewal** of our assets base

- Retire **obsolete** assets and **replace by best available technology**
- Adapt equipment to evolving industrial basins



Lever 3: Reduce carbon footprint of bulk and packaged gases by **-10%**



Optimize plant operations

- Better energy efficiency



Optimize distribution routes

- Past improvement: bulk transportation **-7.8%** between 2008 and 2015
- New **Integrated Bulk Operations** program: thanks to Big data



Convert **20%** of truck fleet to **alternative fuels**

- Industrial Merchant European project of fleet conversion from diesel to alternative fuels*
- Duplication of the European program to other Hubs



(*) including 3rd-party trucks



C

Climate-driven
initiatives for
our Customers



Act for clean industry



1

Low-carbon
solutions & offers



2

Breakthrough
manufacturing routes

Lever 1: Low-carbon solutions & offers

O₂



Promote **outsourcing**

- -15 to 20% energy by mutualization of assets

N₂

H₂

O₂



Develop offers **limiting transport related emissions**

- >700 Industrial Merchant **on-sites** currently in operation
- 40% **lighter** cylinders versus steel cylinders

N₂

O₂



Deploy **Oxy-combustion**

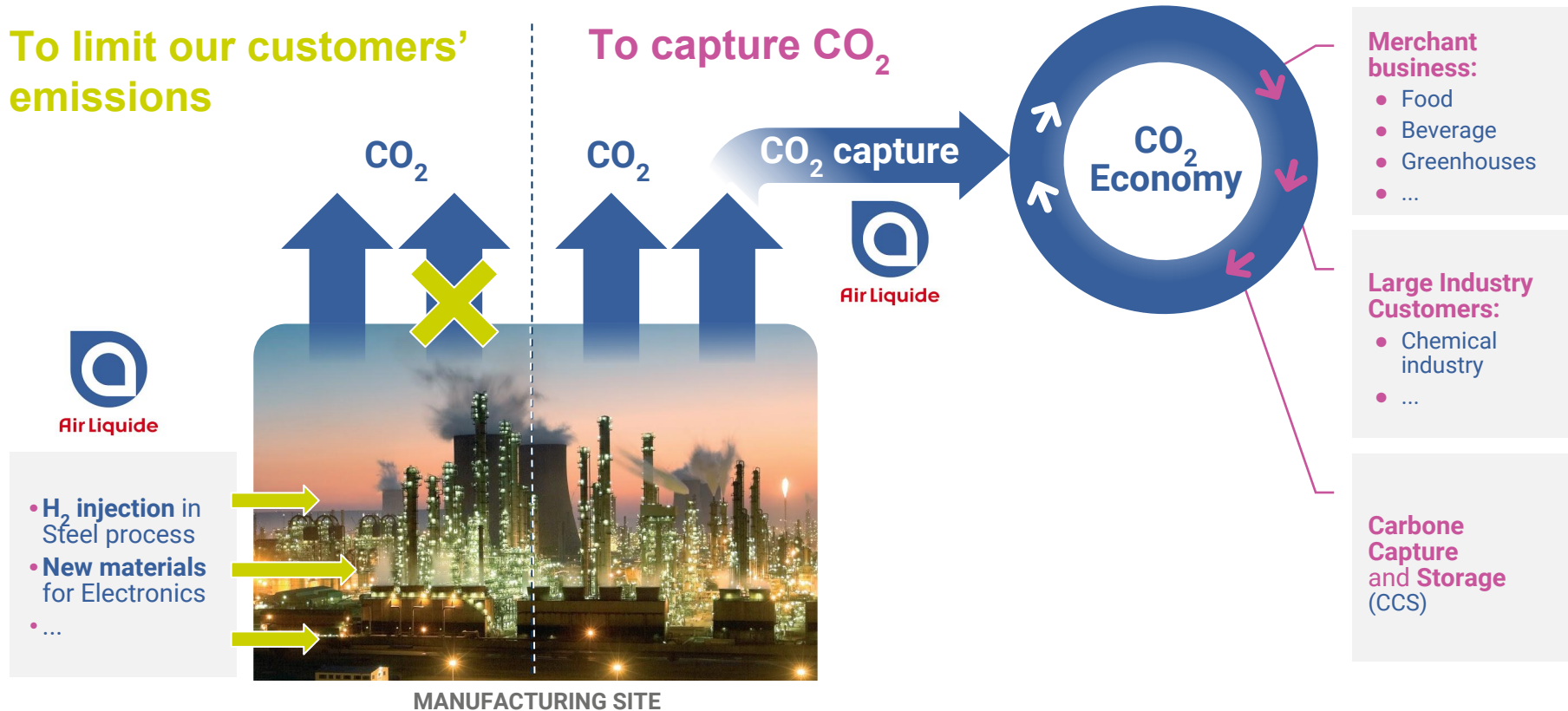
- >11 mT CO₂ avoided by customers (2017)
- **New HeatOx** solution



Lever 2: Breakthrough manufacturing routes

To limit our customers' emissions

To capture CO₂



- H₂ injection in Steel process
- New materials for Electronics
- ...



Climate-driven initiatives for New Ecosystems

1

**Circular
economy**

2

**Clean
cold
logistics**

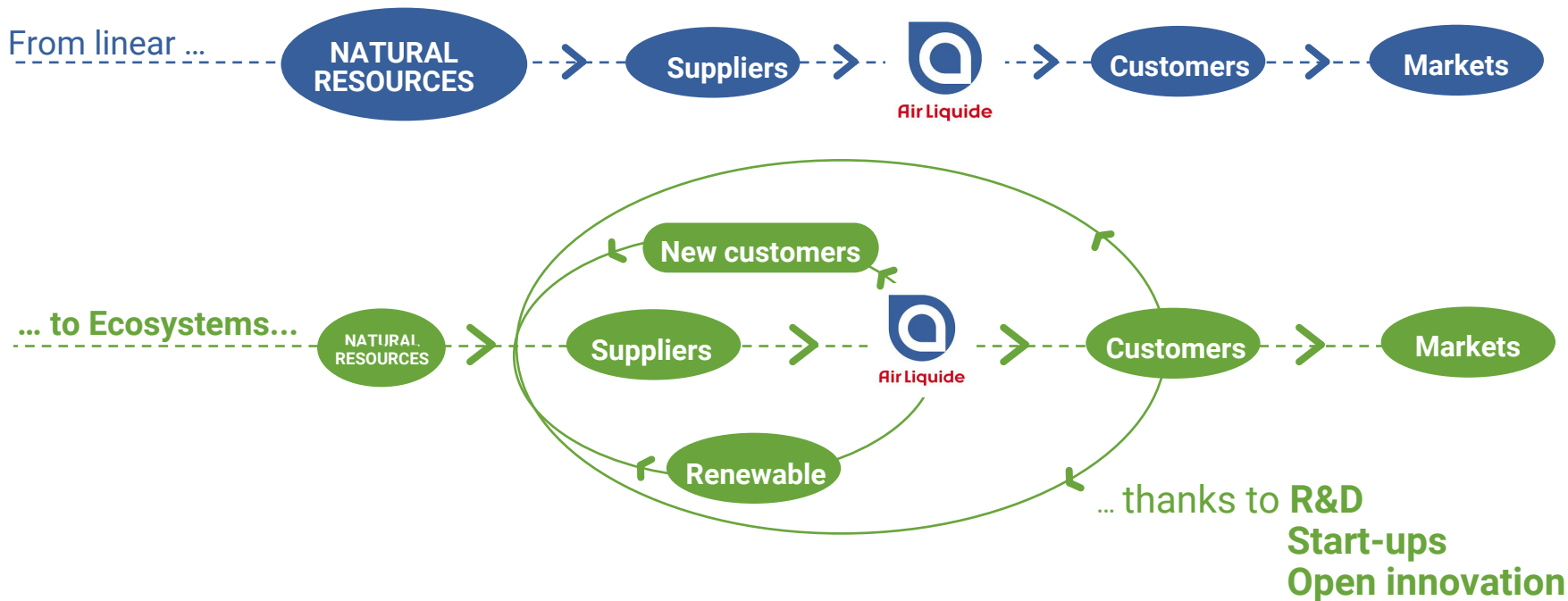
3

**Hydrogen
clean
mobility**

4

**Hydrogen
global
economy**

Lever 1: Develop circular economy



OBJECTIVE : Reduce the use of Natural Resources

➔ Upstream/downstream integration leveraging technologies and new business models

Lever 1: Develop circular economy through biomethane production and usages



Build new biomethane plants

- Air Liquide value in the **biogas purification** with proprietary membrane technology
- 2 main regions:
 - Europe
 - USA
- Capacity: **0.8 TWh/year** today to **5 TWh/year** in 2025

x6



Extended usages

- **End-users:** Industry and Transport
- **Injection into existing natural gas network**

> 60
Retail
stations

> 10
Production
units

Lever 2: Clean cold logistics



Promote use of
cryogenic molecules
for **cold transportation**

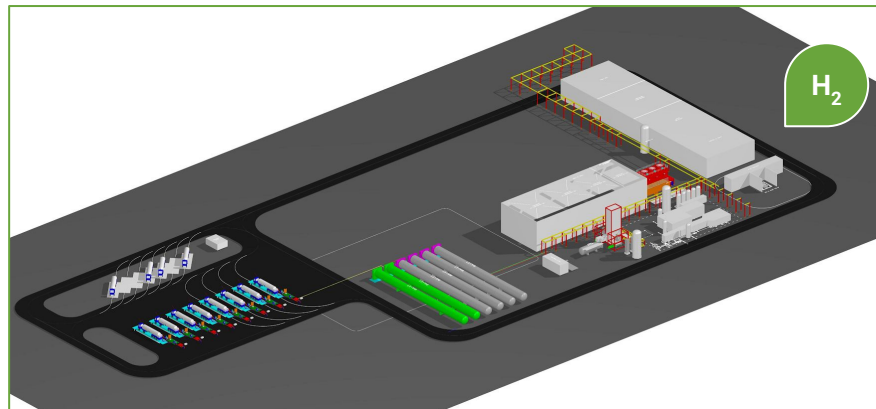


Lever 3: Hydrogen clean mobility



Invest in low carbon
H₂ production assets

1st world scale liquid H₂ production
plant dedicated to the H₂ energy market



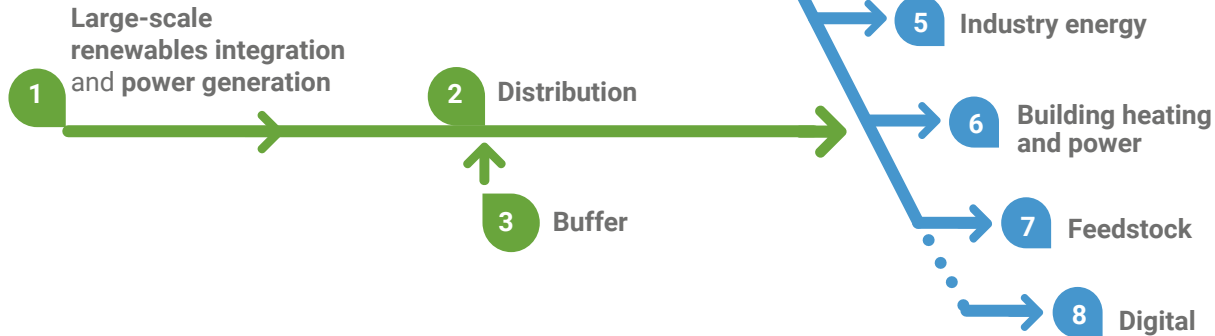
Build and operate
new H₂ stations
(120 stations worldwide)



Lever 4: Hydrogen global economy

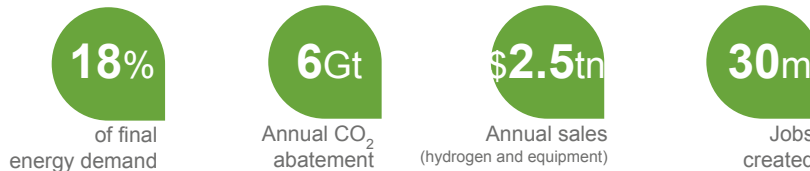
➔ H₂ is a **clean, safe** and **versatile energy carrier**

Enable the renewable energy system



➔ **2050 vision** ⁽¹⁾

(1) Source: Hydrogen Council





Contribution to financial performance

Investments to reduce carbon footprint...

Yearly
innovation Opex



to reduce
carbon footprint

Cumulated Capex
since 2014

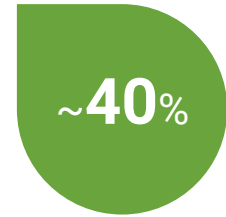


in biomethane



in hydrogen
mobility

2018 investment
decisions⁽¹⁾



embedding
environment and
climate objectives

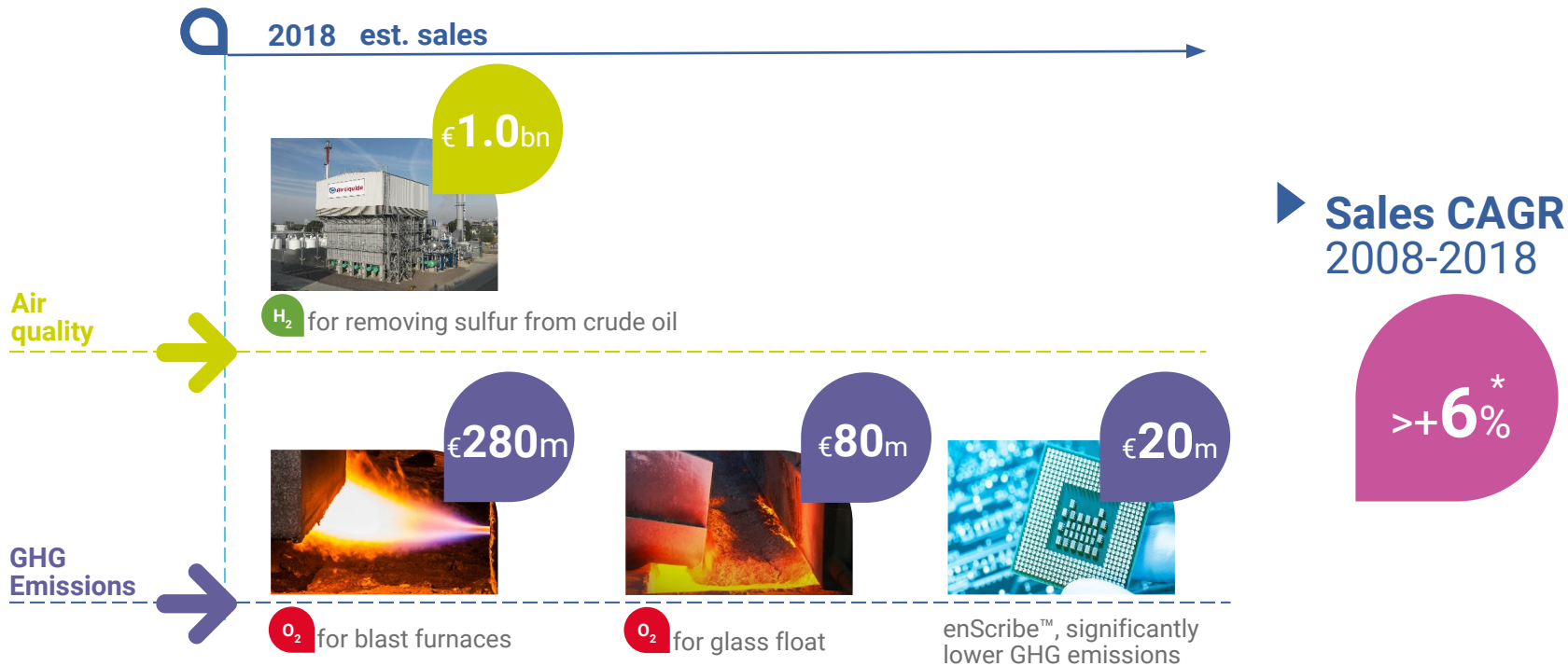
(1) Investment decisions >€5m

... contribute to boost NEOS efficiencies...

Yearly efficiencies
>€300m



... and to expand our core business...



(*) Based on H₂ for removing sulfur from crude oil and O₂ for blast furnaces

Biomethane

Market *
\$6 to \$7 bn
2025

AL Sales
~+40%
CAGR 2016-2018



* Air Liquide estimates

H₂ energy

Market **
\$0.5tn
2030
\$2.5tn
2050

AL Sales
~+105%
CAGR 2016-2018



**Hydrogen Council

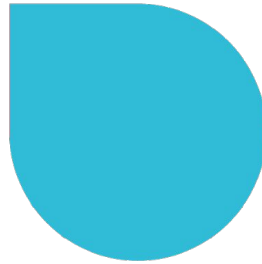
Air Liquide confirms its ambition

neos

- Lead our industry
- Deliver long-term **performance**
- Contribute to **sustainability**

CLIMATE OBJECTIVES

Taking Actions



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