Air Liquide
creative oxygen

WATERSTOF INDUSTRIE CLUSTER

HyTrucks

WaterstofNet

Building the European clean heavy-duty transport market

Key figures of the Air Liquide Group 2019

~67,000
EMPLOYEES

PRESENT IN
80 COUNTRIES

MORE THAN
3.7 MILLION
CUSTOMERS &
PATIENTS

REVENUE
€21.9bn

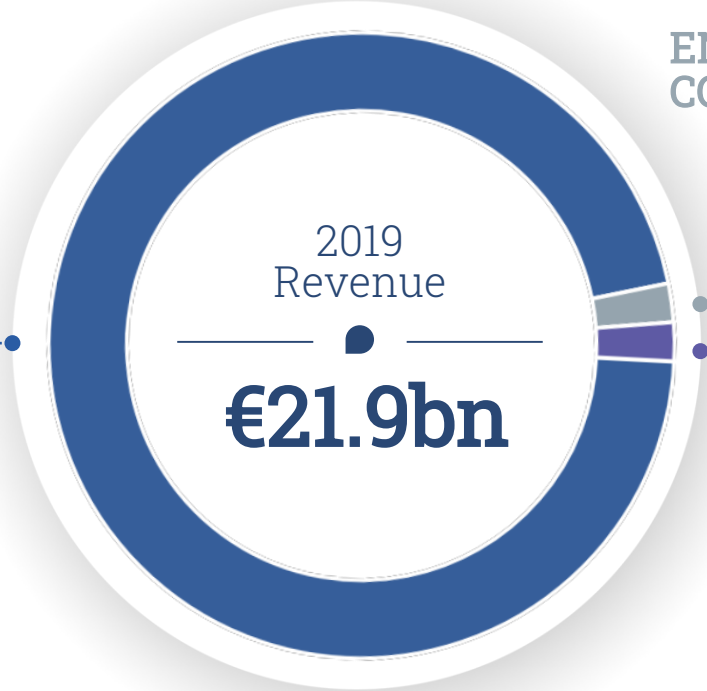
NET PROFIT
(GROUP SHARE)
€2.24bn

INVESTMENT
DECISIONS
€3.7bn

Air Liquide

Group revenue at €21.9bn

2019 figures



96% **GAS & SERVICES**

Industrial Merchant
Large Industries
Healthcare
Electronics
H2 Energy

ENGINEERING & CONSTRUCTION **1%**

Air Separation Units
Hydrogen and CO production units
Technologies

GLOBAL MARKETS & TECHNOLOGIES **3%**

Markets:
Energy transition (H2E, biomethane...)
Deep tech

Significant growth potential for the near future

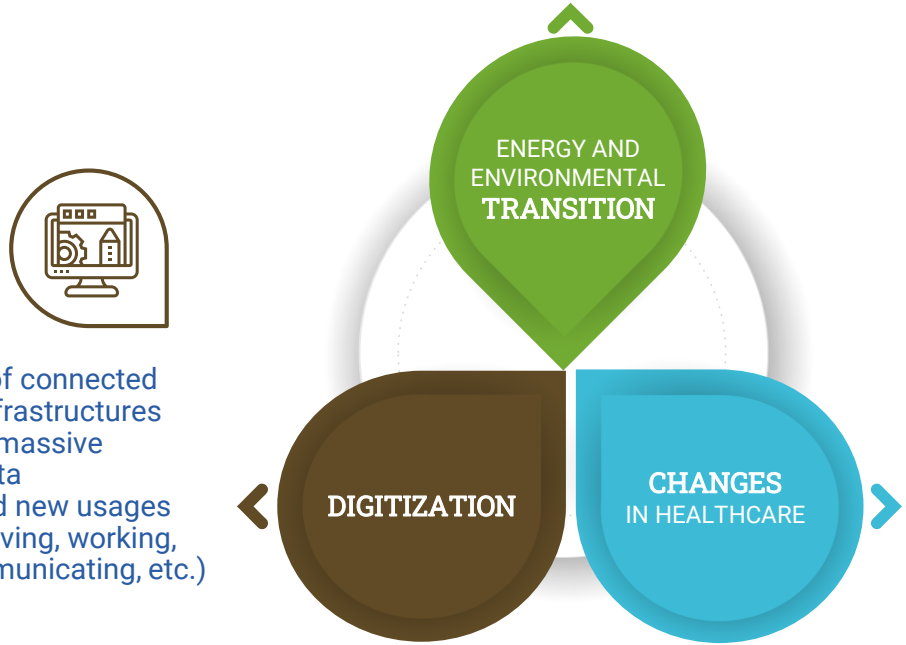
Air Liquide

Our ambition

Air Liquide

Major Trends are Shaping our Markets

- Global warming
- Degradation of air quality
- Natural and energy resource constraints
- Increasing environmental concerns



- Development of connected devices and infrastructures that can store massive amounts of data
- New needs and new usages (new ways of living, working, traveling, communicating, etc.)

- Longer life expectancy
- Increase in chronic diseases
- Increasing demand for hygiene products
- Growing demand for medical treatment
- Evolution of healthcare systems
- Increasing importance of health and well-being

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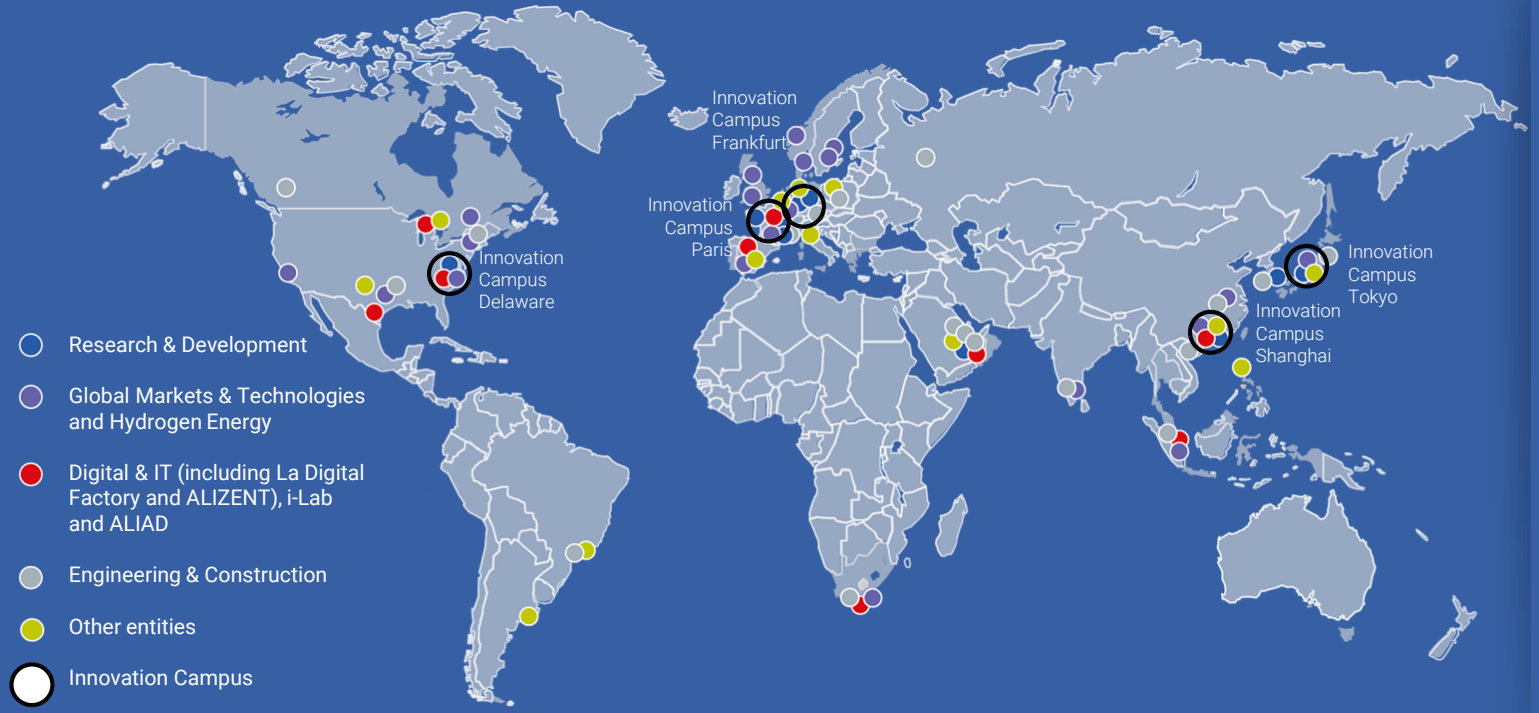
An Innovative Group

Innovation is at the heart of the Group's customer-centric transformation strategy



330
new patents filed in 2019

4,300
employees(1) contribute to innovation

€317m
innovation expenses(1)

(1) 2019 Figures OECD Definition.

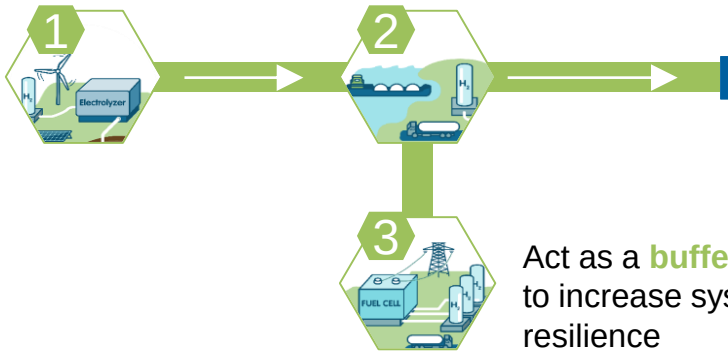
Air Liquide: mastering all seven roles for hydrogen in the energy transition

Enable the renewable energy system

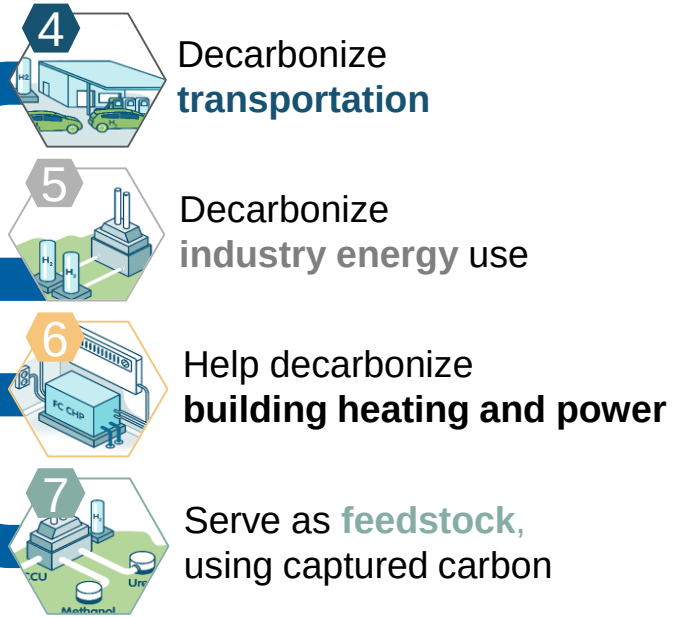
Decarbonize end uses and H2 production

Enable **large-scale renewables integration** and **power generation**

Distribute energy across sectors and regions



Act as a **buffer** to increase system resilience



Decarbonize **transportation**

Decarbonize **industry energy** use

Help decarbonize **building heating and power**

Serve as **feedstock**, using captured carbon

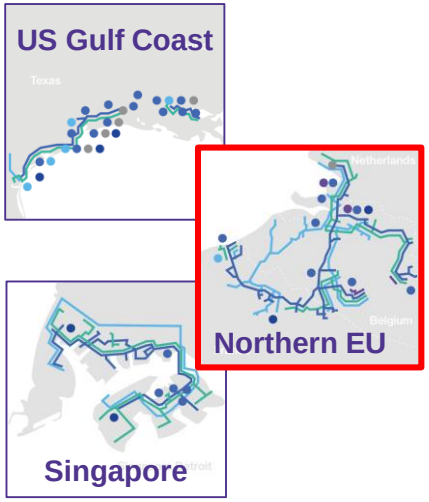
40+ years of development in Hydrogen for our customers

Production & Supply chain

Production

Supply-chain

Distribution Networks



Markets Segments

Process industries

Oil & Gas

Steel, Glass

Electronics

Mobility

Space

Key Figures

- > 14 bn m^3/yr
- > 1,850 km H_2 pipeline
- > 46 large H_2/CO plants
- > 40 electrolysers in operation
- > 2 bn € sales

HyTruck

The European Zero Emission truck market failure

- **European heavy-duty market:** 300k new registrations per year, 20% of EU transport-related GHG emissions

- **Strong pressure for CO2 emissions reduction:**
  - EU regulation reduction targets: -15% CO2 in 2025, -30% CO2 in 2030
  - 2030 target impossible to meet without ZE trucks (Daimler estimate: 10k FC trucks, Iveco estimate: 30k ZE trucks), but the high fines could be fatal to OEMs
  - Low emissions zones enforced all over Europe, clear national ambitions
  - Societal pressure on transport pollution

- **Strong demand from customers for greener road transport**
  - Need of transport companies for a ZE solution meeting their operational requirements
  - Shippers and end-users are eager to lower the carbon footprint of their operations

- However, there is currently **no offer from European OEMs for ZE heavy-duty trucks** (high market entry cost, large technical and value chain challenges)
- **No consensus** on refueling technical solution (350/500/700b, LH2, refueling protocol)

HyTrucks in one view - first phase

- **Purpose:**
  - Lower CO2 emissions in heavy duty transport sector
  - Help to reach GHG objectives in 2030
  - Shift from diesel to hydrogen
  - Make hydrogen tractors commercially viable for transport companies asap
  - **In and between Ports of Rotterdam, Port of Antwerp, Port of Duisburg**
- **Benefits**
  - Construction of renewable power generation
  - Production of blue or green hydrogen for the transport sector
  - Roll-out large scale modern hydrogen tractors
  - Build HRS infrastructure for HDV, but also for buses, rigid trucks, LCV and harbor handling equipment
  - Scalable to all other major logistics hubs
- **Countries first phase: Netherlands, Belgium, Germany**

1000

Blue and green

Heavy Duty HRS

>50 companies

CCS
Wind / Solar

-117 KT/a

Why the HyTrucks project?

- **The market failure for ZE heavy-duty trucks will be addressed with H2**
  - BEV is not an option for heavy-duty applications (range limited to ~200km, limited payload, poor operational flexibility)
  - FC trucks are widely recognised as the solution to ZE trucks
- **Location: North-Western Europe ports are ideal (start and incubators)**
  - The first FC truck fleets will very probably be deployed in the Netherlands (ambitious emissions reduction targets, strong political and societal push for H2 with associated subsidies)
  - In the Netherlands, the first FC trucks should come in the Port of Rotterdam: clear local plan to reduce emissions (windmills to come), large semi-captive fleets with intensive usage, H2-favourable (plans for their own H2 pipeline network)
  - There is already a strong hydrogen infrastructure between Port of Rotterdam and Antwerp
- **The proposed scheme is suited to all major EU ports -> replication & scale-up**
  - Rotterdam: major hub and in close connection with Antwerp
  - Rhine river ports: very favourable political context, major hubs, close connection with Rotterdam
- **The timing is favourable**
  - 2025 target achievable, IPCEI scheme scale-up opportunity, **The project touches R&D and Innovation, First Industrial Deployment of H2 tractors and contributes strongly to Energy, Environment and Transport.**
    German subsidies for FC trucks, first small demos already running

HyTrucks: a large consortium to align interests and de-risk the project.

A full system approach

OEMs & component suppliers:

Truck R&D and First Industrial Deployment (large scale)

Transport companies: from Demo to large scale utilisation

Customers for the trucks and H2

Industrial gas companies, Technology companies, Stations operators & Fuel retailers:

Scale-up Blue / Green hydrogen production, HRS R&D, Innovation, dvt, construction, operation and land provision

HyTrucks (B) Core Partners and Supporting Companies

not all companies mentioned due to NDAs

Other sponsors

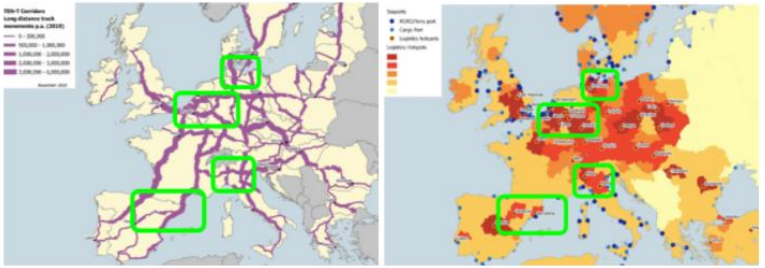
Shippers:
Engagement to green their operations via contract with transport companies

Financers (public and private)

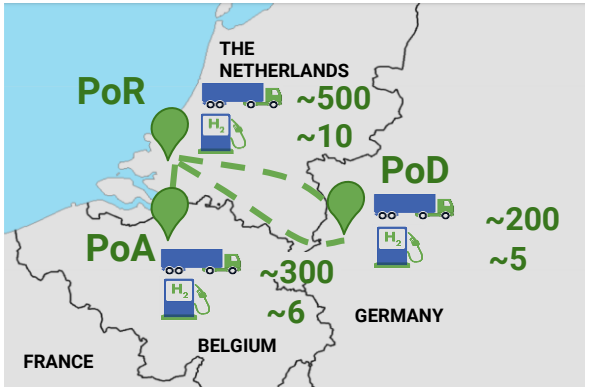
Local, national and EU authorities
Including the port authorities; local planning, permitting, funding, political support

Planning & realisation → Clean H2 production, Storage & distribution → Component suppliers → HRS construction → Retailers → HRS / operation → OEM → Transport companies → End user/ shipper → Financing / subsidy

HyTrucks deployment phasing
From PoR/PoA/PoD to Europe



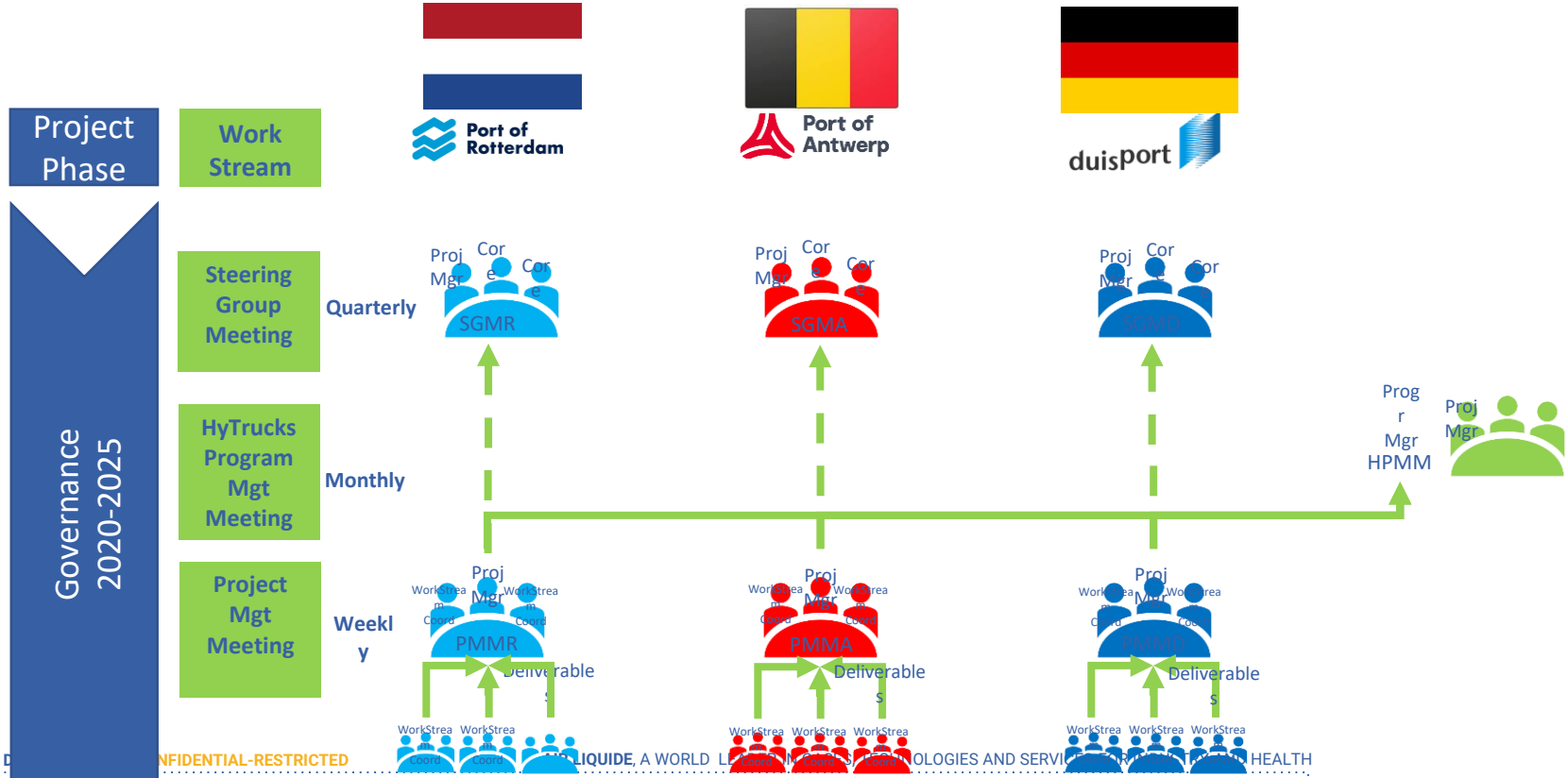
2022 → 2023 → 2025



PoR = Port of Rotterdam
PoA = Port of Antwerp
PoD = Port of Duisburg

+ complementary refueling infrastructure at key locations on main corridors

3 countries, 3 consortia, 1 project!



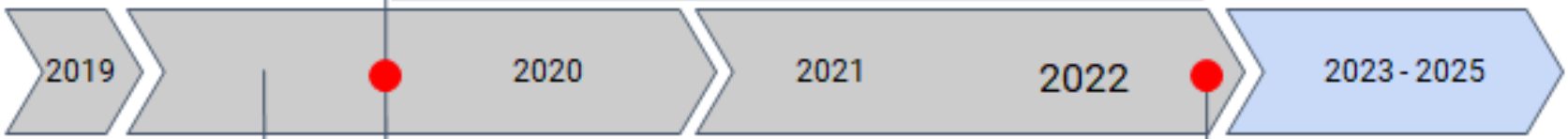
Timeline

HyTrucks

Mid 2020
IPCEI submission
PDA signature
Appointment of project manager

Mid 2020 - End 2022
Project development phase:
elaboration of business model and financial structure, elaboration of technical solution, prototyping and testing planning, permitting & certification pre-assessment contracts

2023 - 2025
Manufacturing, Construction and Deployment phase



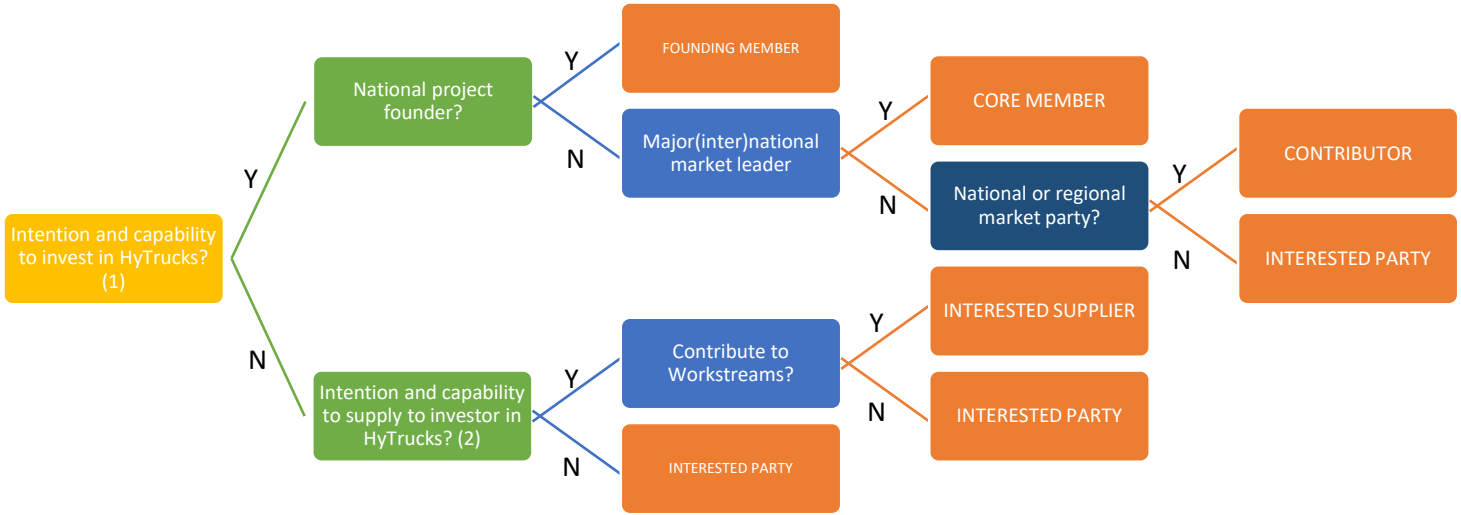
Q1 2020
MoU
Early discussion
Business scoping event (April)

Mid 2020
Kickoff

End 2022
Go - No Go
Final Investment Decision

Become also a HyTrucks member!

Looking for Shippers and Transport companies…..



For more information

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Thank you

"Hydrogen is really at the heart of the energy transition.

We have created a momentum and now it's all about scaling up and acting smart and fast !"