



**RÉPUBLIQUE  
FRANÇAISE**

*Liberté  
Égalité  
Fraternité*



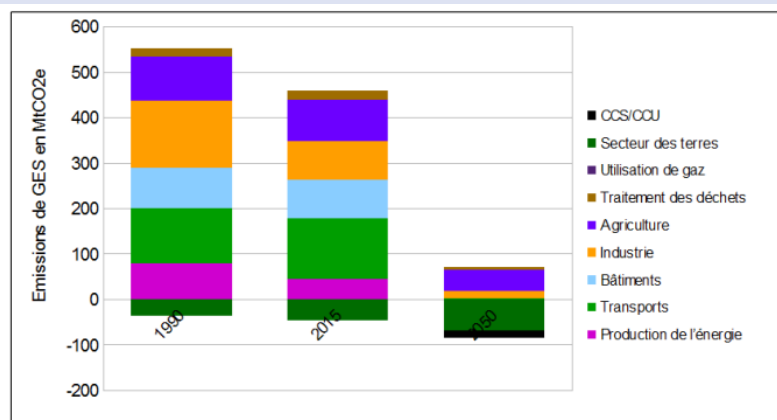
# **Sectoral Transition Plans**

## *Steel and Ammonia*

**ADEME – NEDO Joint Seminar – November 20<sup>th</sup> 2023**

# On the road to carbon neutrality in 2050

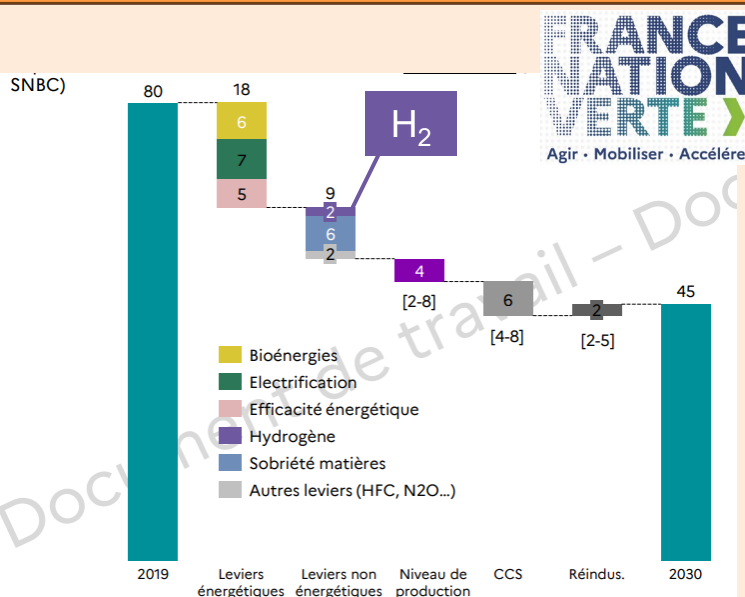
## Low-carbon National Strategy (2020)



- Definition of sectoral carbon budgets
- Industry : From 82 to 16 MtCO<sub>2</sub>e in 2050 vs 2015 (- 81 %)

<https://www.ecologie.gouv.fr/strategie-nationale-bas-carbone-snbc>

## Ecological planning (2023)



- Distribution by decarbonisation levers to 2030
- - 2 MtCO<sub>2</sub>e allowed by H<sub>2</sub>

<https://www.gouvernement.fr/france-nation-verte>

## Hydrogen National Strategy

### 2020 : 7 Mds€, 3 priorities

- Industry decarbonization
  - 6,5 GW in 2030
  - Focus : refineries, ammonia
- Heavy mobility
  - Demonstrators
  - Territorial ecosystems
- R&D, Innovation

### 2023 : + 4 Mds€, support mechanism to produce low-carbon hydrogen

<https://www.entreprises.gouv.fr/fr/strategies-d-acceleration/strategie-nationale-pour-developpement-de-l-hydrogene-decarbone-france>

# ADEME support for industrial transition

## H<sub>2</sub> focus

### Industrial research & innovation

Innovation : AAP Briques techno H2  
(38 / 14 / 19)  
Relance début 2023  
& Concours innovation H2  
(3 / 1 / 1 par BPI)

### Foresight and planning

TRANSITION(S)  
**2050**  
CHOISIR MAINTENANT  
AGIR POUR LE CLIMAT

Finance  
ClimAct

MINISTÈRE  
DE LA TRANSITION  
ÉCOLOGIQUE  
Liberté  
Égalité  
Fraternité

New French strategy for  
energy and climate

FRANCE

2030

### Decarbonisation solution support

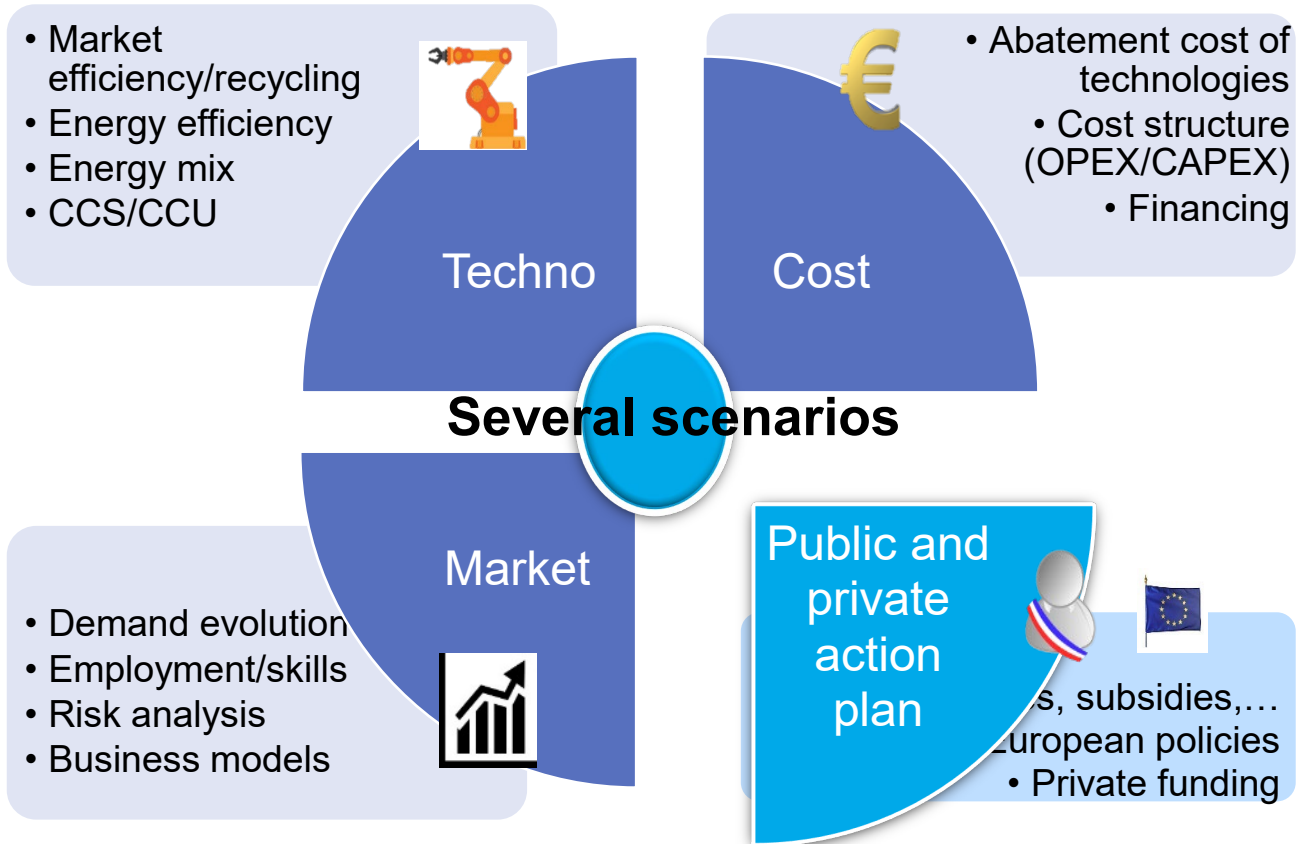
CAPEX : AAP écosystèmes territoriaux H2

OPEX : Mechanism support to produce low-carbon hydrogen

# Sectoral Transition Plans

## Goal

In consultation with the sector's manufacturers, build scenarios and proposals for action to achieve the decarbonisation objectives of the Low-Carbon National Strategy



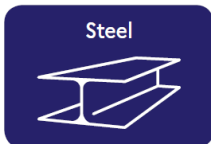
SCOPE:



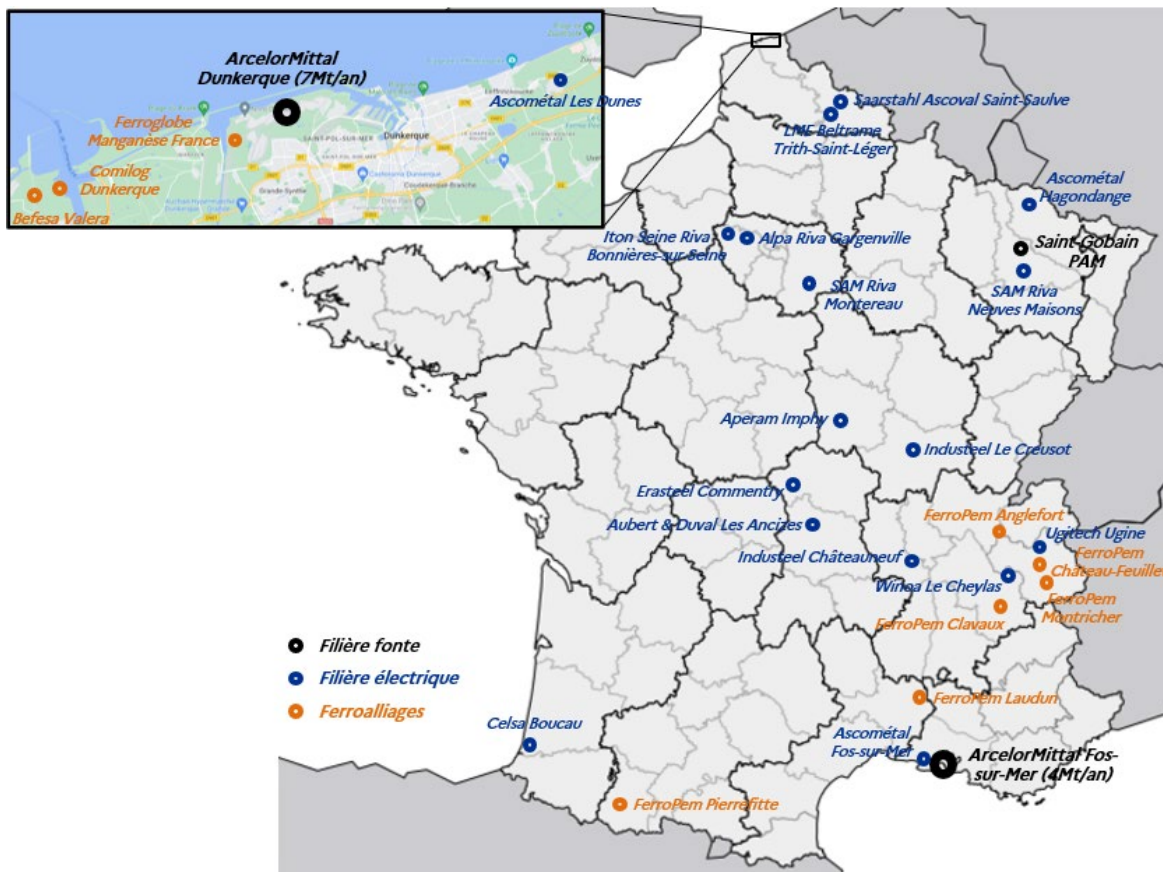
≈ 12 – 18 months

# Step 1 : Current state of play

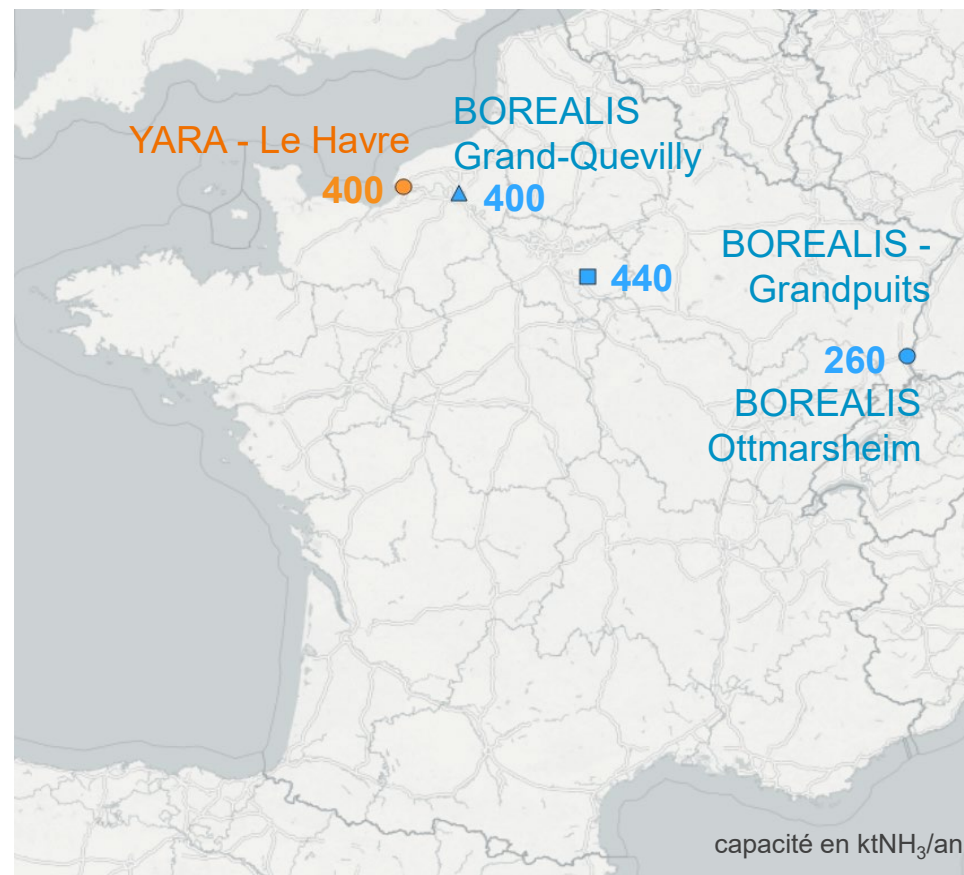
## Steel and ammonia industry in France



6 blast furnace (BF), 20 electric steelworks  
15 Mt/an, 20 MtCO<sub>2</sub>e

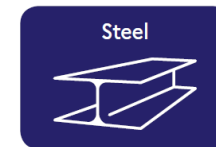


4 steam methane reformer (SMR)  
1,1 Mt/an, 2,5 MtCO<sub>2</sub>e



# Step 1 : Current state of play

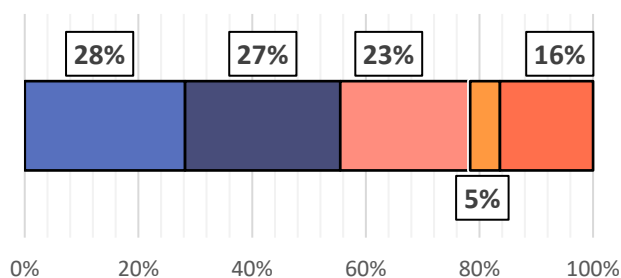
## Steel market in France




### Steel consumption

  
**Flat steel products (FSP)\***

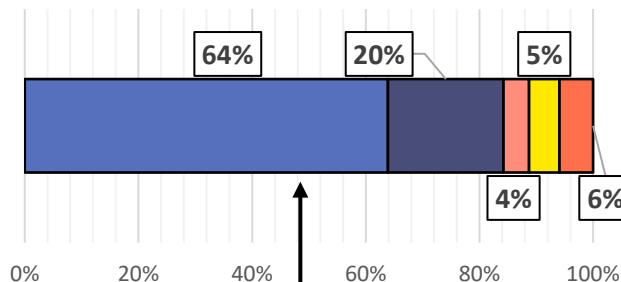
10 Mt/an



A large range of outlets

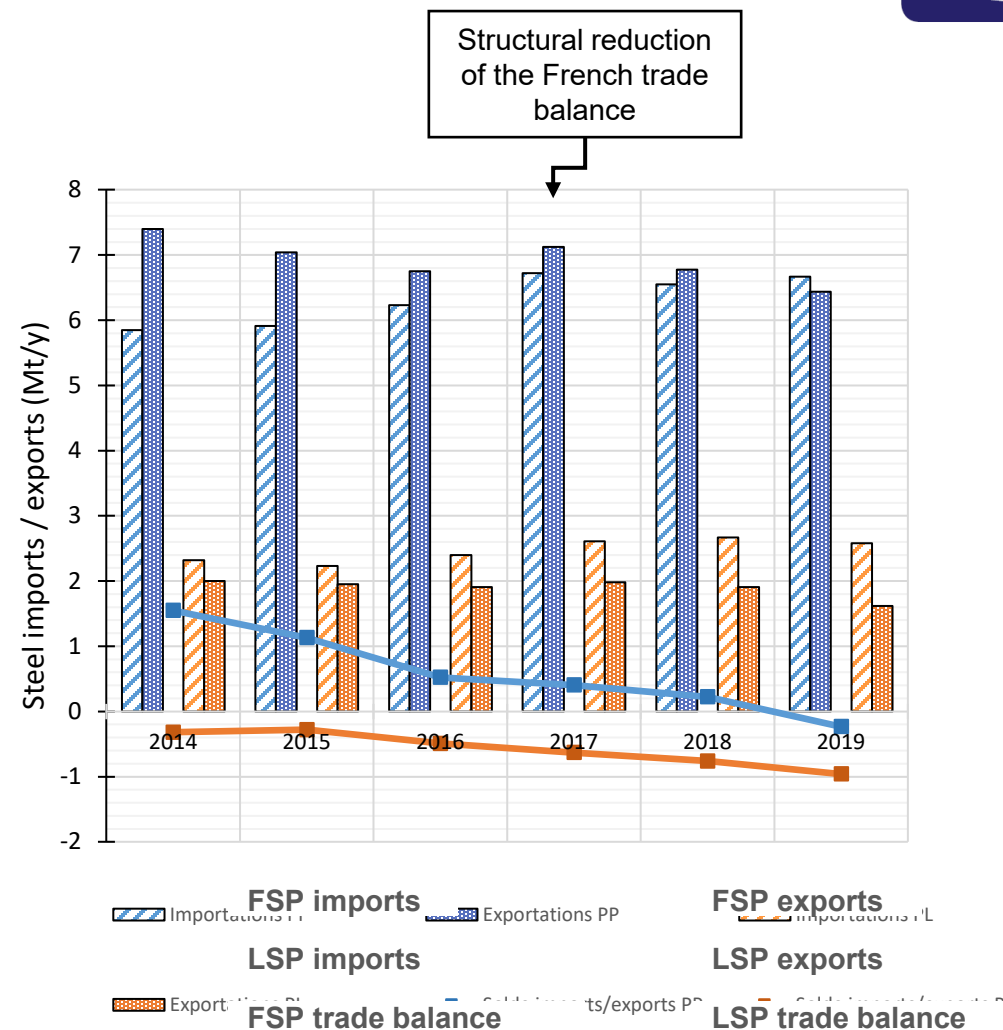
  
**Long steel products (LSP)\***

6 Mt/an



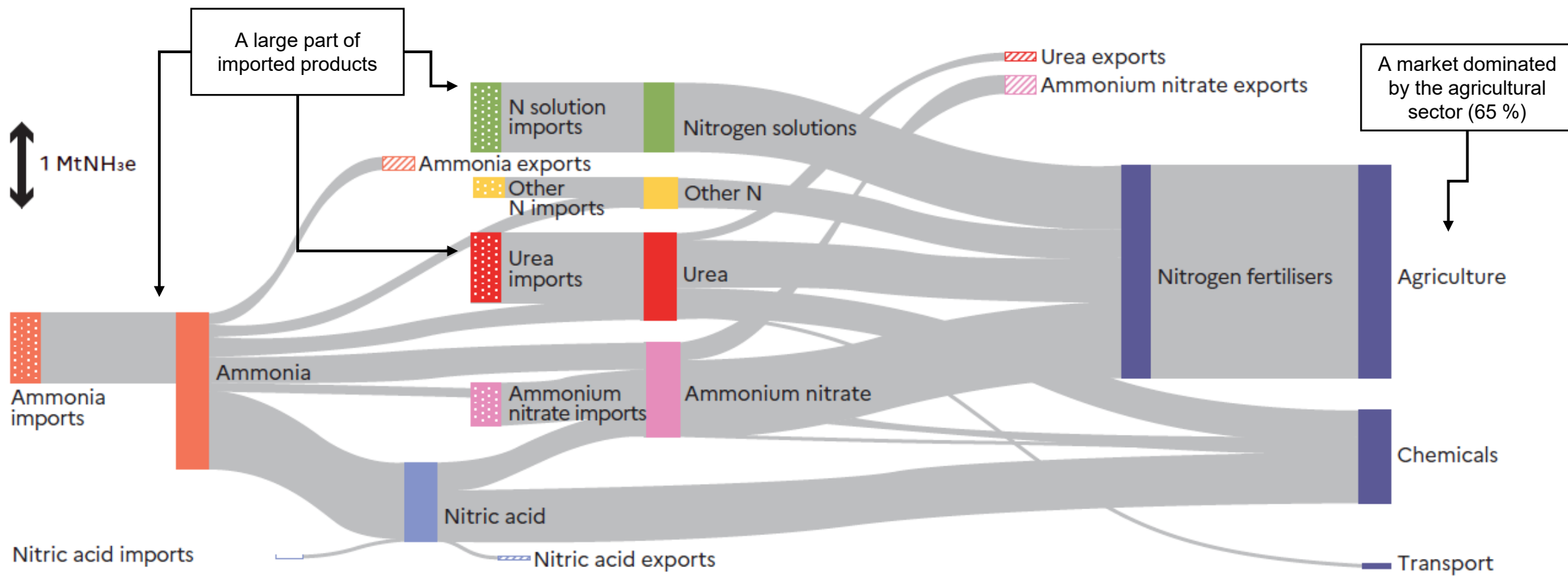
A market dominated by the building sector

- Building
- Goods
- Transports
- Energy
- Packaging
- Others



# Step 1 : Current state of play

## Ammonia market in France

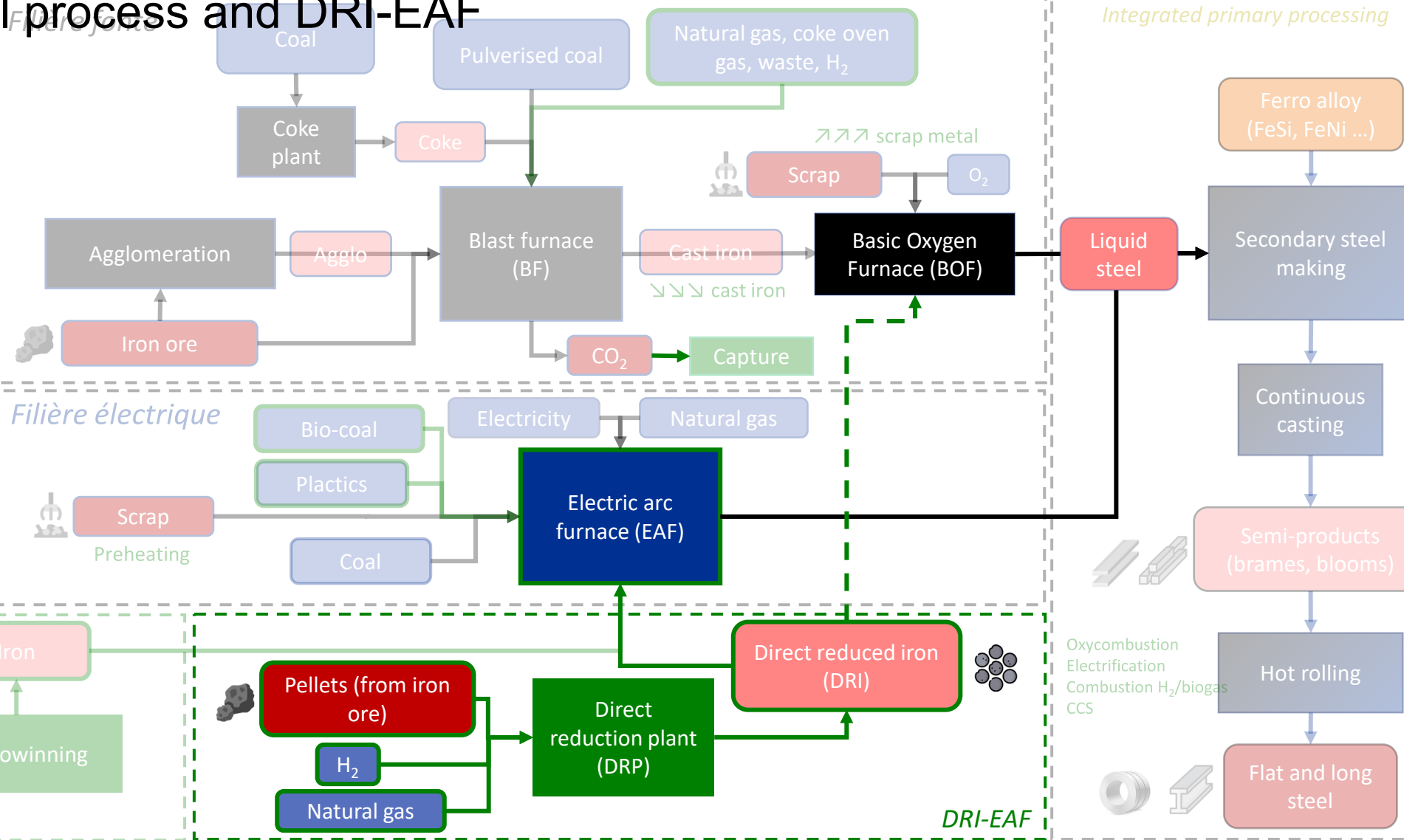
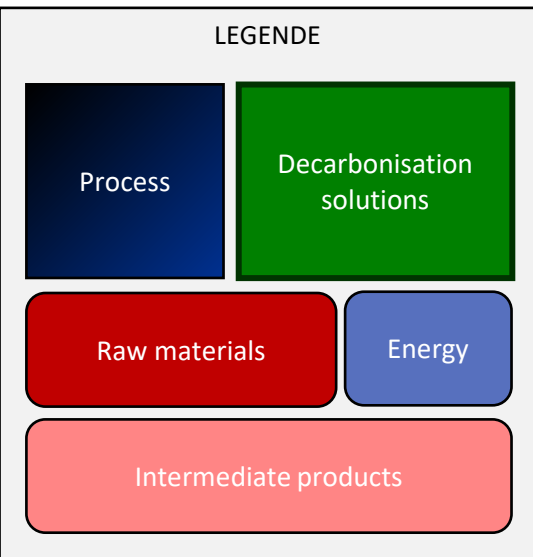


# Step 1 : Current state of play

## Steel process and DRI-EAF



Integrated primary processing





# Step 1 : Current state of play

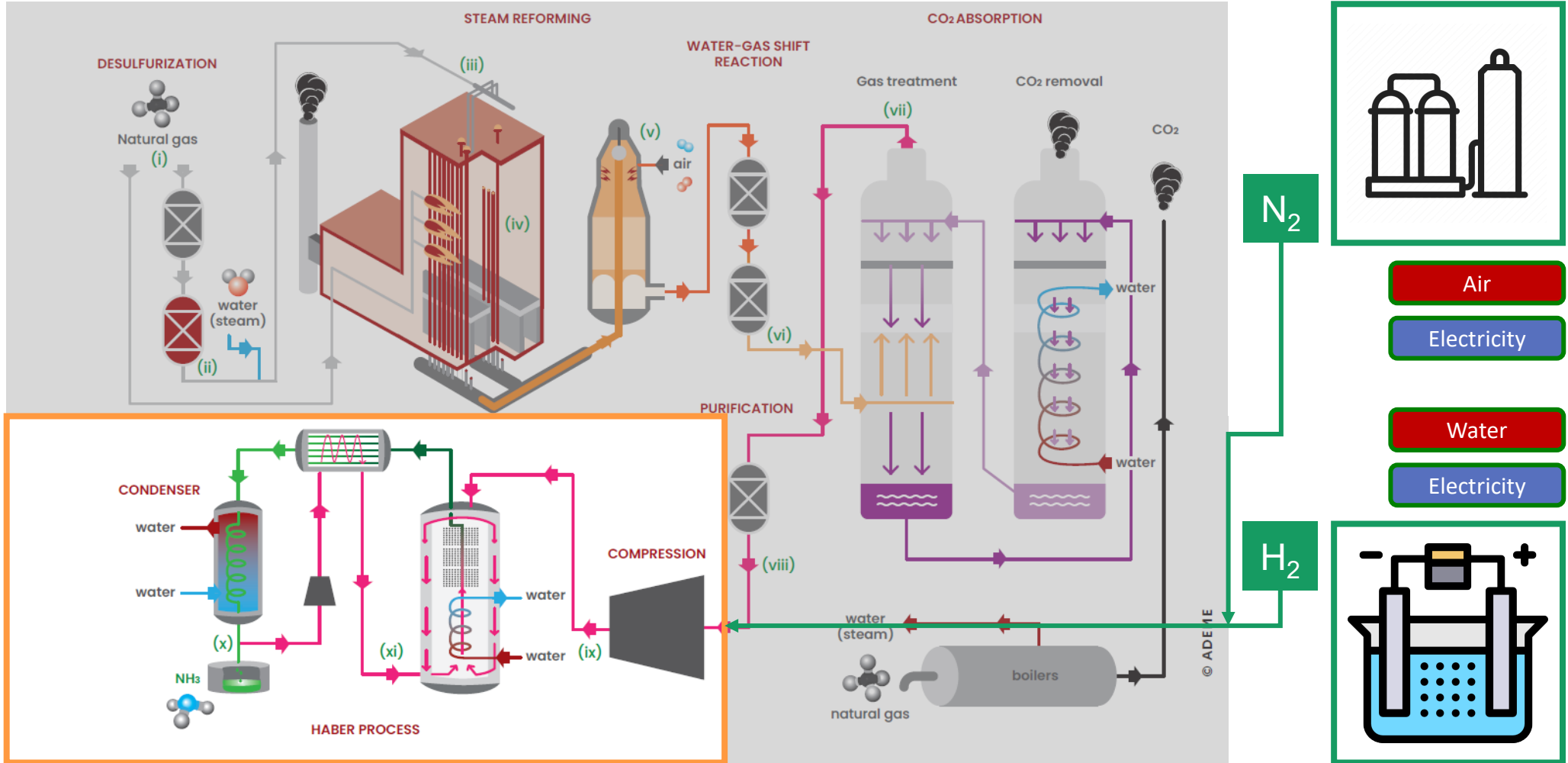
## Ammonia process and electrolytic H<sub>2</sub>

Decarbonisation of a SMR using electrolytic H<sub>2</sub> coupled with the Haber process

Removal of the steam reforming and CO<sub>2</sub> absorption processes

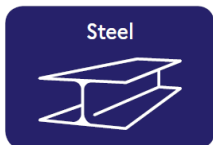
Haber process maintained

Addition of an electrolyser and an air separation unit

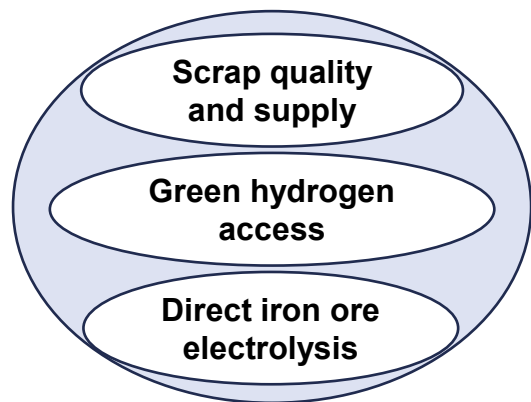


# Step 2 : Forward-looking scenarios

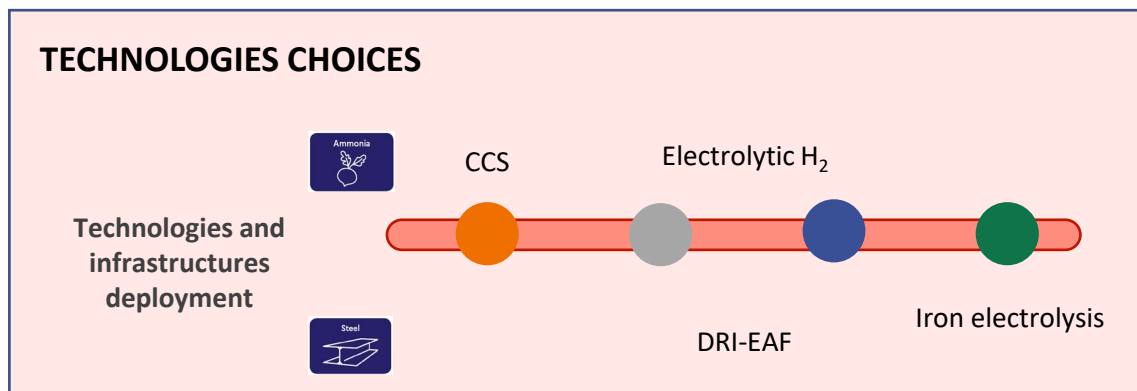
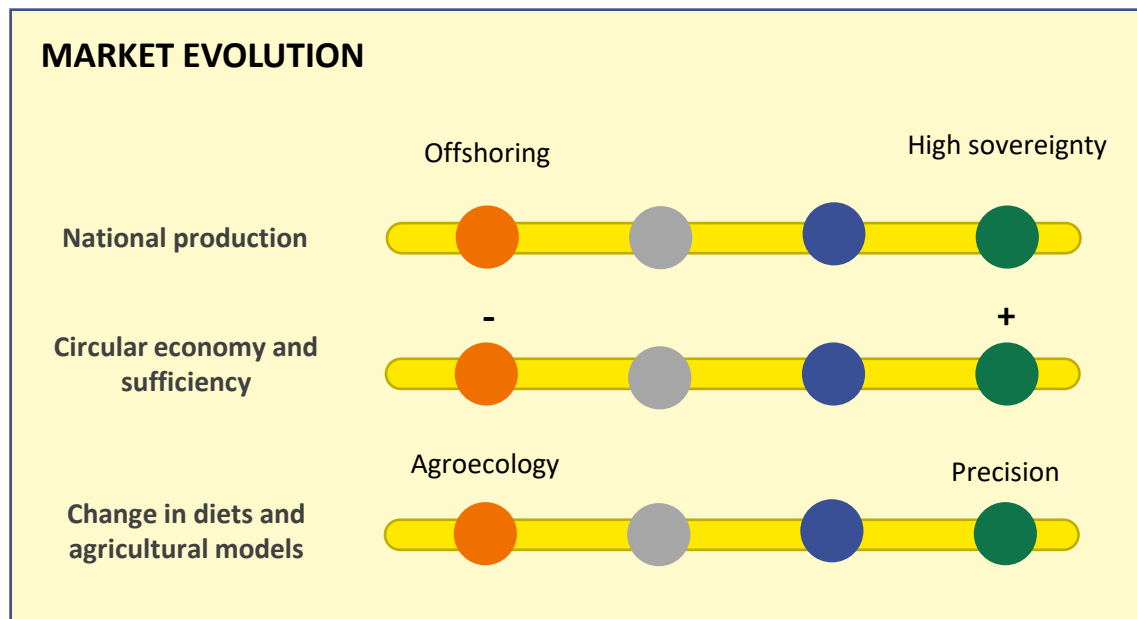
## Exploring plausible futures



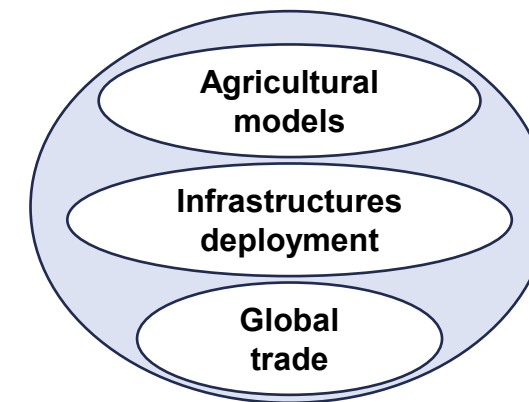
Major uncertainties for the French steel industry transition



Risks of offshoring and technological opportunities to be weighed up in the light of material and energy supply issues and market prospects



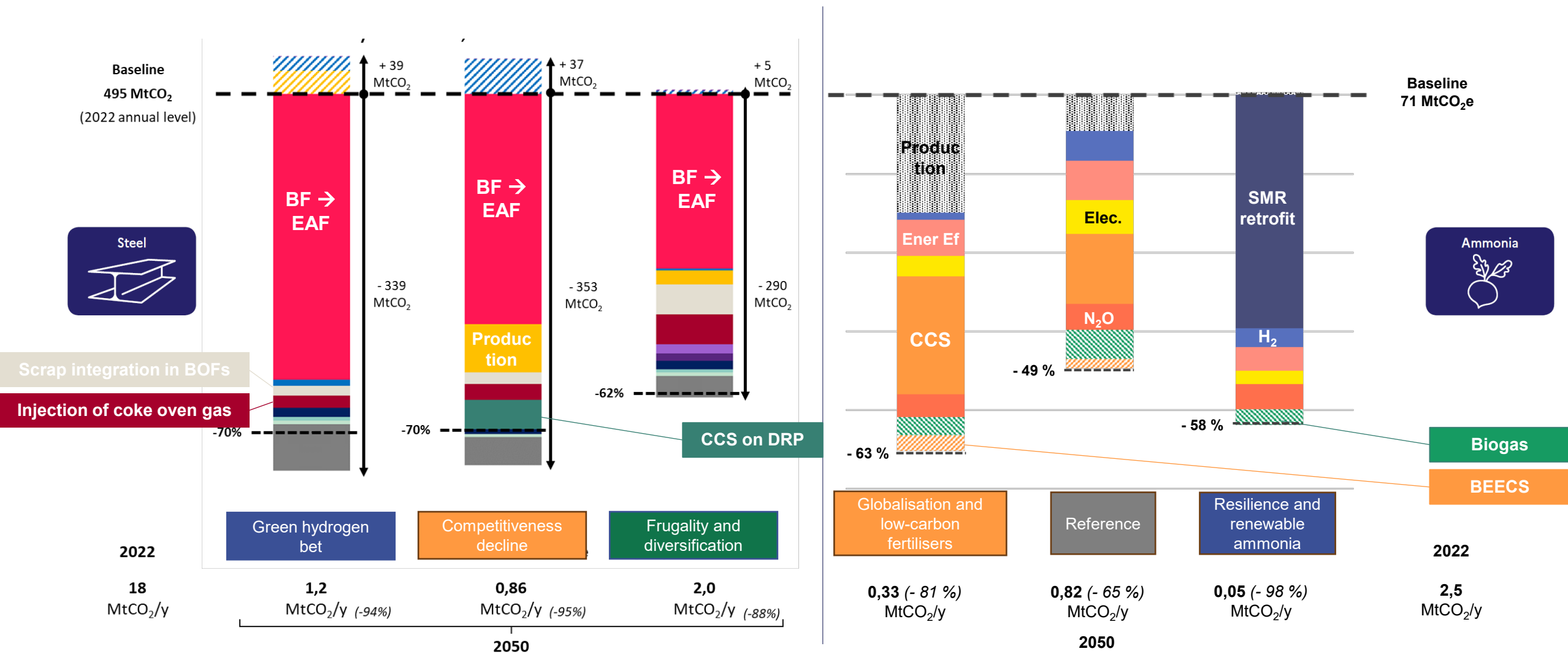
Major uncertainties for the French NH3 industry transition



An uncertain future depending on the French infrastructure's deployment (CO<sub>2</sub> / H<sub>2</sub>) and the place of ammonia in our future society

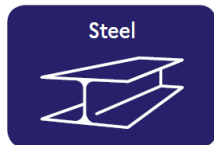
# Step 2 : Forward-looking scenarios

## GHG cumulative emissions reduction 2023 - 2050

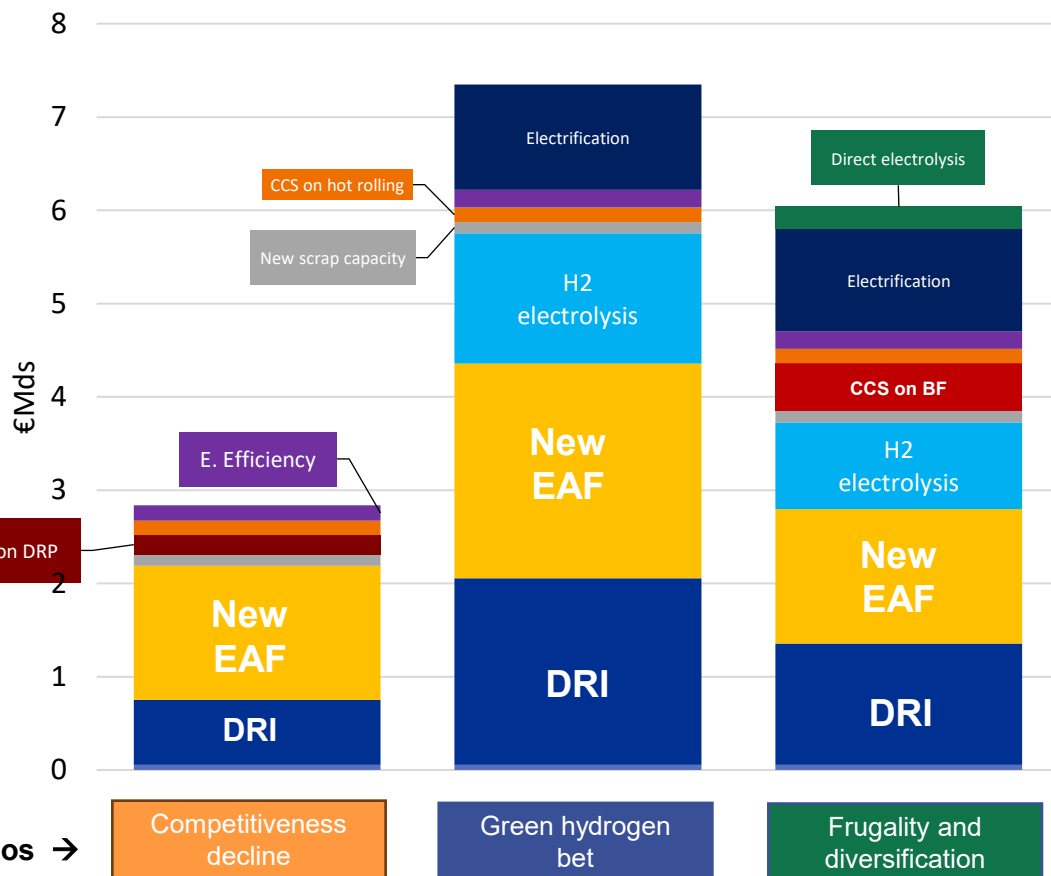


# Step 2 : Forward-looking scenarios

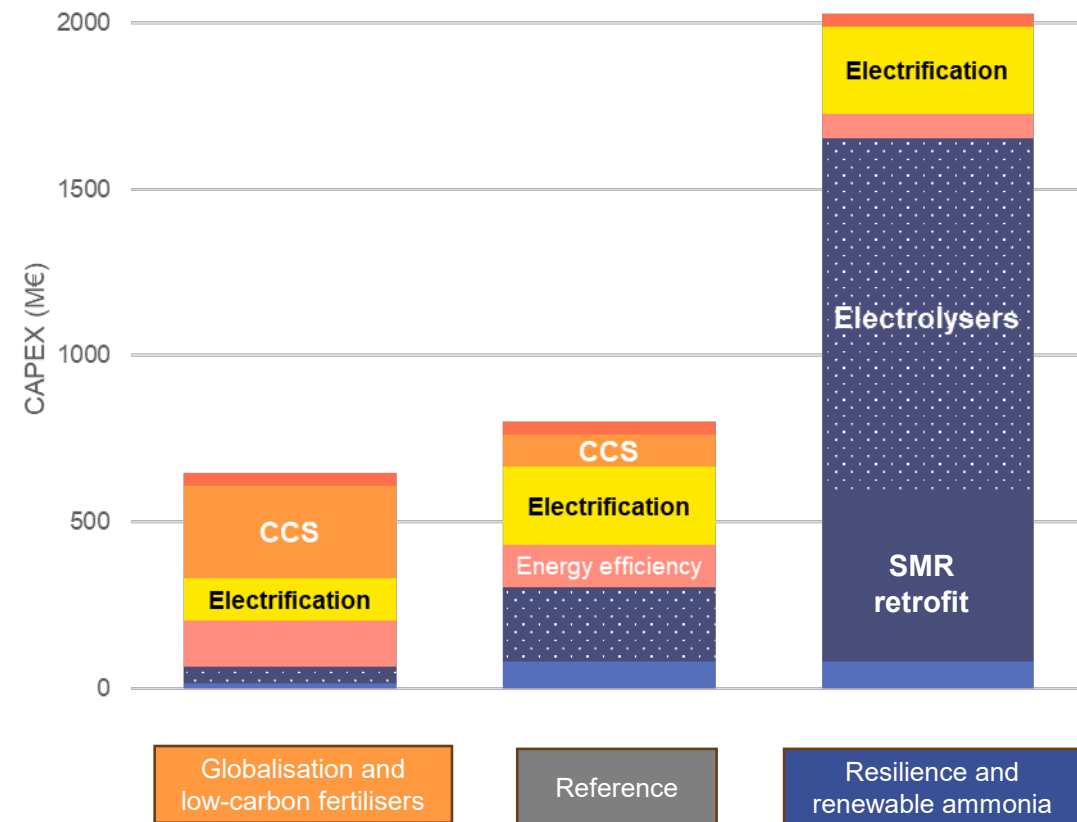
## Direct investments



H2 : a small part of the investments needed  
From 0 to 1,5 Mds€



H2 : a capital-intensive solution  
Retrofit → 1,3 GW, 1,6 Mds€





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Thanks for your attention

[antoine.deswaziere@ademe.fr](mailto:antoine.deswaziere@ademe.fr)

