Glass recycling and decarbonization of glass industry

Example of French glass industry roadmap

fédération des industries du verre

Sept 2023

Agenda

- French glass industry
- Glass recycling in France
- Decarbonization roadmap

France, a key player in Europe

- **About 25 000 workers on 48 industrial sites – 90 furnaces**
- **Global turnover above 4,5 milliards d'€**
- **French glass production*** : 5 millions tonns – 3rd European producer

Glass sector	2019 production (% among french production)	France vs Europe (%, per sector)
Flat glass (building and automotive industry)	1 000 Ktonns (20%)	About 10%
Hollow glass (food packaging (bottles and jars), pharmaceutical and perfumery, tableware)	3 500 Ktonns (71%)	14%
Fiber, wool and special glasses	420 Ktonns (9%)	n.d.

- **All glass sectors are present in France**
- **Industrial cycles could be very variable : from 2 to 15/20 years!**

* *Sources : FCSIV*

An industry presents throughout the whole territory

- Proximity with our customers
- Cullet treatment plant near food packaging producer!

French glass sector : a great diversity

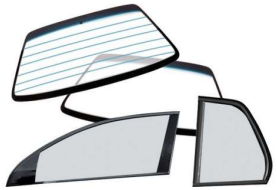
- Among articles produce : bottles, jars, flocaonnage, flat glass, glass fiber, glass wool, tableware, special glasses….
- Regarding glass produce : sodalimeglass, borosilicate….reduced or oxydised glass….
- Based on capacity production : form 20 t/day to 600 t/day

Average figures are not representative of a specific furnace!

Some glass products are useful for the ecologic transition

- Return on Invest time could be very short for some of our products
  - Through building insulation – 6 to 20 month for dooble glazing (GfE)

  - Through lightweighting for automotive



  - Through renewable energy production

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Cullet is already our first raw material in packaging sector

- **Glass is 100% recyclable without limitation**
- **Recycled glass is already our first raw material for packaging – about 65% in France**
- Glass is inert and neutral
- Glass is a monomaterial packaging
- Used for drink, food, perfume, medicine…

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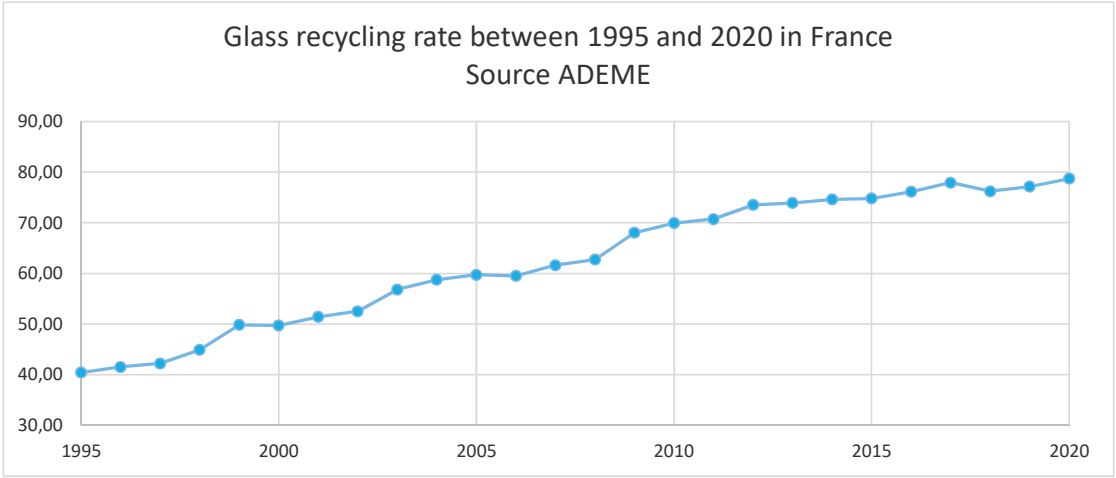
Recycling rate is increasing since decades

- **Glass collection started in 1974! Collection made mostly via bottle banks**
- **Increase of glass recycling rate since decades in France**

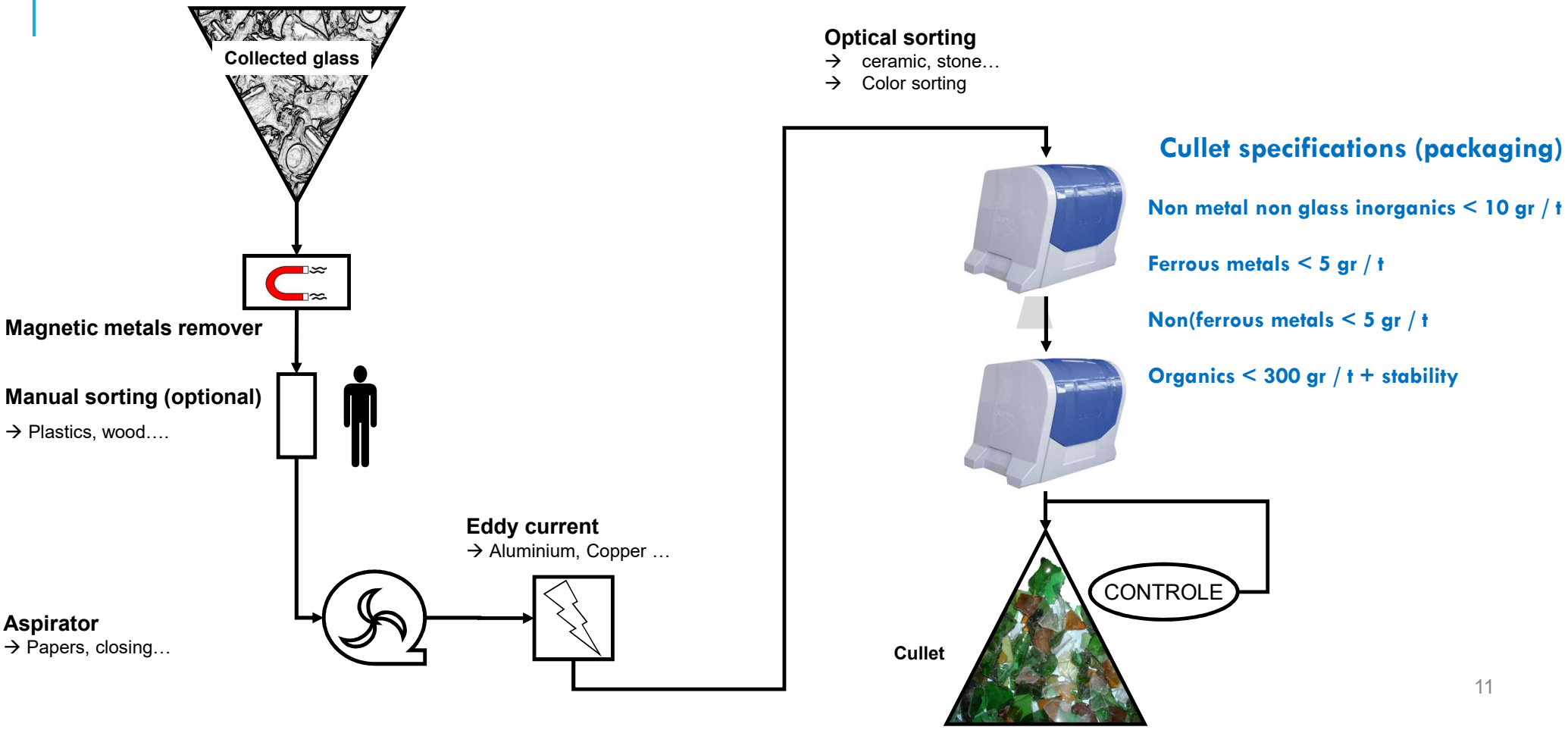


- **Our objective (2030 / 2015) : + 480 kt of collected glass per year**

Why are we recycling glass?

- **Save “virgin” raw material**
- **Save energy**
- **Decrease CO2 emission**
- **Avoid landfilling….**
- **….and save money for local communities – 130 €/tonn**

Glass treatment process



Close the Glass Loop

- European initiative to increase glass collection rate to 90% in 2030.
- Implemented through « Charte verre 100% » solution in France
- Gathering all the value chain : local autorithies, eco-organism, bottlers, distributors, glass makers….
- Actions (example) :
  - increase bottle bank number (about 200 000!)
  - colour sorting on cullet treatment plants

Color sorting

Allow an increase of cullet rate used to produce white glass

Keep the existing collect system in place

Ex : Germany

Keep the habits of citizens

Most of the cullet treatment plants are equipped

Other sectors launched also initiatives

- **Extended Producer Responsability system to be implemented for building materials including glass product – about 200 000t of flat glass/year concerned!**

- **Current situation**
  - **Flat glass : drop in production are recycled – post consumer glass are scarcely recycled….**
  - **Glass wool : first recycled furnace are build….collection should be improved**

Isover recycling

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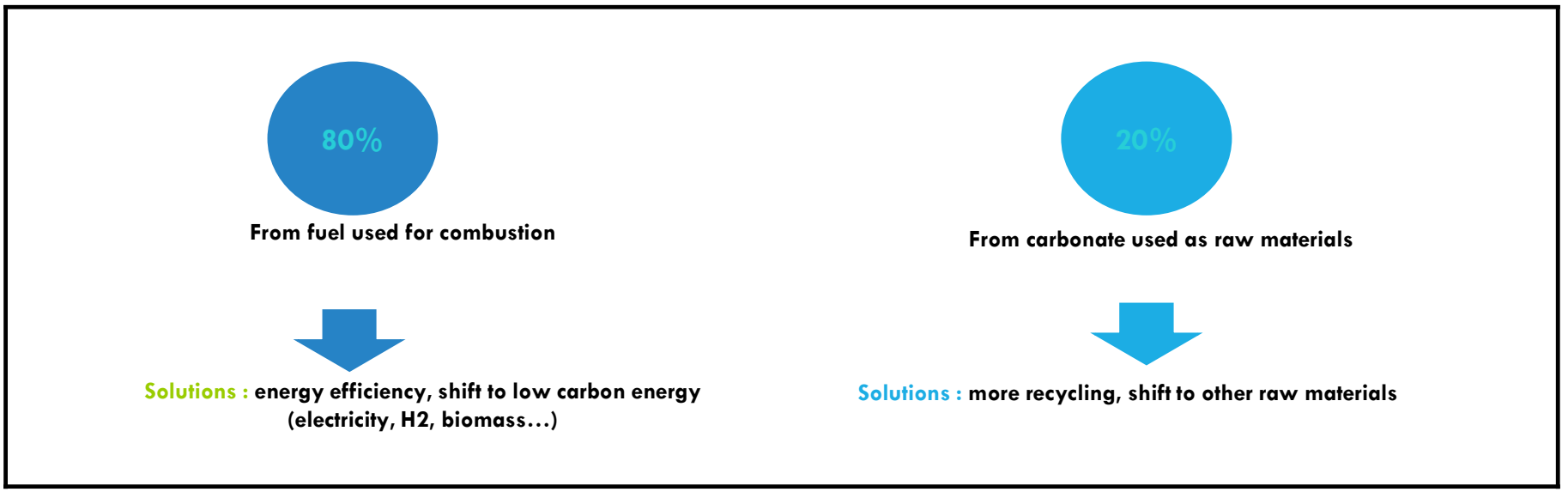
Our CO2 releases…

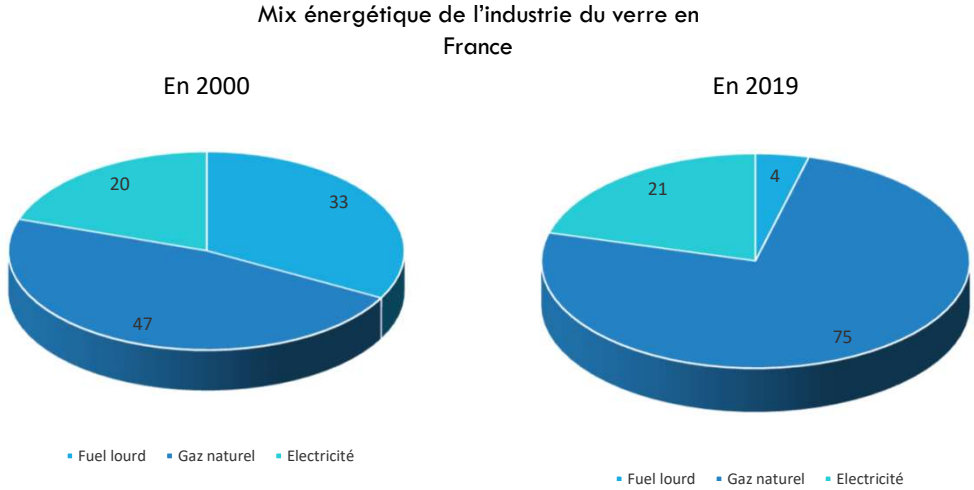


- French glass sector releases : 2,7 $MtCO_2e$ (CITEPA) – mainly as CO_2
  - 0,6% of national releases
  - 3,3% of industrial releases

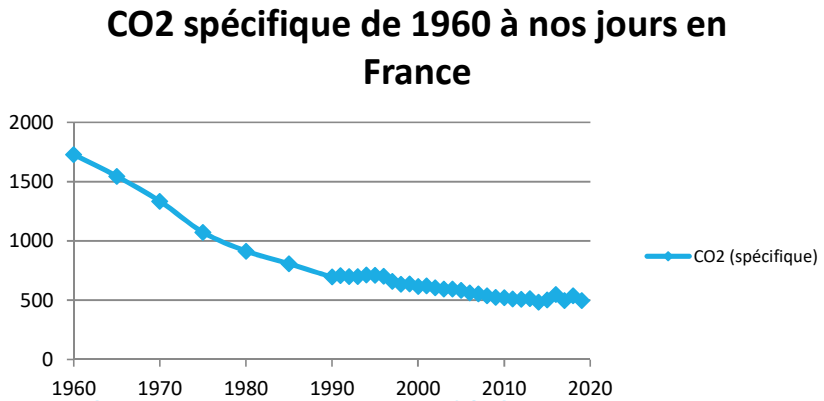
Improvement since years

- Shift to energy with lower carbon content

Mix énergétique de l'industrie du verre en France



- Decrease of energy required to produce glass driving to a decrease of CO2 release : -50% on 50 years, -5% since 2008



- Decrease of the weigh of our packaging : -30% for bottles on 20 years

Cullet

- **10% of cullet decrease energy need of 2,5-3% and CO2 emission up to 5%**
- **Cullet also decrease release due to carbonate used as raw material**
- **New EPR for restauration**

- **2015-2021 : + 280 kt of collected glass/year**

Energy efficiency

- **Decrease the energy need…through increasing cullet content, using oxycombustion, AI….but caped by the chemistry…**

- **Valorised the heat of the exhaust gases for non electric melter on site or for building heating.**

Electricity

- **Decarbonation through electrification depends on the way of electricity production…**
- **Electricity share increase is a major way to decarbonize until 100% of electricity in certain case**
- **First hybrid and 100% electric furnaces are planned for 2024….**

GROUPE POCHET

LE GROUPE NOS ENGAGEMENTS NOS SAVOIR-FAIRE NOTRE OFFRE TALENTS ACTUALITÉS FR

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Le Groupe Pochet annonce l'électrification d'un four dédié au flaconnage de Luxe pour 2024.

13/05/22

Back to articles

Verallia's first hybrid furnace, to be built in
en declared an investment of regiona
Government of Aragon

Environnement

Verescence électrifie ses fours à Mers-les-Bains-Le Tréport

Le **leader du flaconnage en verre** veut décarboner sa production. Il annonce **l'électrification de ses fours**. Le four 1 de l'usine de **Mers-les-Bains** sera le premier à l'horizon 2025.

PAR BENOIT DELABRE - 23 FÉVRIER 2022

AGC
Your Dreams, Our Challenge

SAINT-GOBAIN

February 6, 2023

AGC and Saint-Gobain Partner for the Decarbonization of Flat Glass Manufacturing

AGC and Saint-Gobain, worldwide flat glass manufacturers leading in sustainability, announce that they are collaborating on the design of a **pilot breakthrough flat glass line** that is expected to reduce very significantly its direct CO_2 emissions.

As part of this R&D project, AGC's patterned glass production line in Barevka, Czech Republic, will be entirely refurbished into a high performing & state-of-the-art line that targets to be 50% electrified and 50% fired by a combination of oxygen and gas. This is a technical breakthrough compared to current technology used in flat glass furnaces fired by natural gas. It will be **the most sustainable flat glass line design** contributing to both companies' paths towards carbon neutrality and to the necessary acceleration of the flat glass industry decarbonization.

Biomethane

- **The easiest way as no change required on site!**

- **Depend on the amount of biomethane produce**
  - **714 GWh of biomethane in the gas network in 2018**
  - **39 to 42 TWh in 2030 (Le verdissement du Gaz, CRE, 2019).**
  - **140 TWh in 2050 (ENGIE, 2019)?**

Hydrogen

- **As for electricity, carbon content depends on the way H2 is produce!**

- **More and more trials : increasing H2 content within natural gaz until 100% H2, from hours to days, weeks, months…**

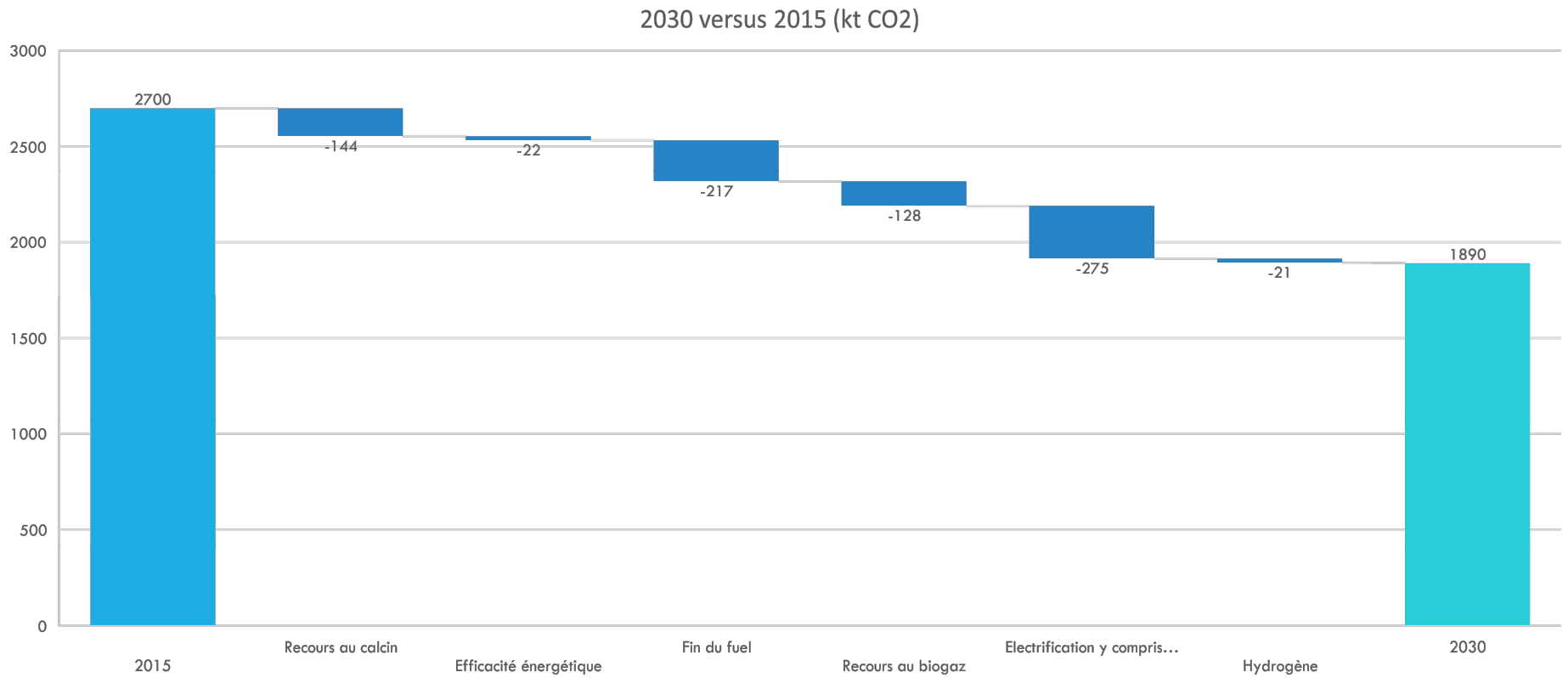
- **Still some concerned about the economic model**

CCS

- **Require an oxy-combustion**

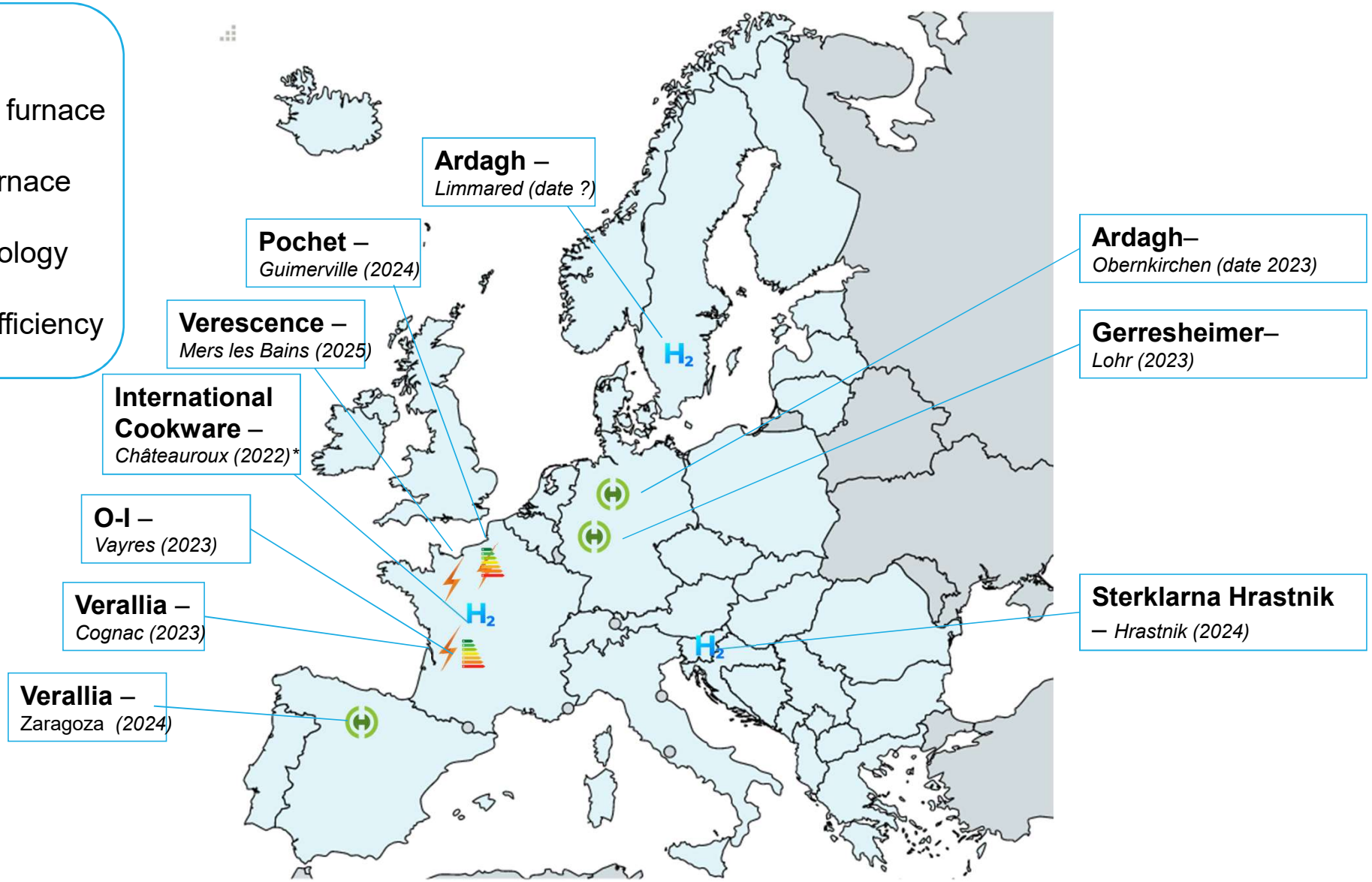
- **Depend on the proximity of CO2 network…**

Impact of the different means to decarbonise



Legend :

- Electrical furnace
- Hybrid furnace
- H_2 H2 technology
- Energy efficiency



Conclusion

Recycling is key to ensure decarbonisation of our sector, decarbonisation is on track and many initiatives are being implemented!