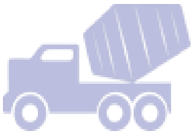
RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

ADEME
AGENCE DE LA TRANSITION ÉCOLOGIQUE

Sectoral Transition Plans

CEMENT



Avec la contribution du programme LIFE de l'Union Européenne

Finance ClimAct

What is a Sectoral Transition Plan?

The "Sectoral Transition Plans", led by ADEME, constitute one of the actions of the LIFE Finance ClimAct project.

Objective:
Promote investment in the transition of the French energy-intensive industry to aim for its decarbonisation by 2050, taking into account the specificities of each sector

The Sector Transition Plan (STP) is a work in progress drawing up tools to support forward-looking dialogue in 9 industrial sectors, in cooperation with sector players (manufacturers and federations). Carried out over a period of 12 to 18 months, an STP builds decarbonisation scenarios aimed at achieving France's energy-climate objectives by 2050 (-81% of emissions compared to 2015 for industry), quantifies the impacts on production costs, assesses climate investment needs and analyses job changes. Finally, the Sectoral Transition Plan offers public and private actions that allow to create the socio-economic conditions necessary for the decarbonisation of the sector.

360° vision to inform the transition of the sector towards carbon neutrality.

This document is the first deliverable of STP Cement. Its objective is to present the key issues of the sector's decarbonisation to a wide audience in order to initiate dialog pertaining to the action plan. It was carried according to a bibliographic research and to the first discussions with industry key players. These results and proposals will be further developed during the next stages of the project.

Key Figures - CEMENT

A sector centred on a few players but spread throughout the country

- **5** main cement groups
- **16.5 Metal** produced in 2018 by **27** clinker production sites (metropolis)
- A very local market because cement is a low economic value product whose transport is profitable below 200 km

Cement, a key component of the building and public works

- **63%** of French cement consumption comes from the building sector and **37%** from public works
- Cement represents **10%** of the total resources consumed for a new building

12% of industry GHG emissions

- **2% of French GHG emissions**
- 4% of industry thermal energy and 2% of electrical energy

Sources: ETS EU, SNBC, SFIC, CEREN, INSEE

An economically aligned sector with the industry

- 2018 turnover of **€2,2 Bn**
- A profitability rate of **6%** (compared to 8% for industry)
- A debt ratio of **53%** (compared to 55% for industry)

INSEE data NAF 23.5, average on 2013-2017

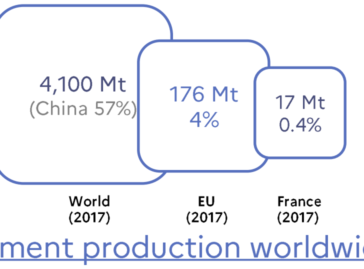
Few direct jobs but many downstream jobs in the CONSTRUCTION SECTOR

- **5,000** direct jobs since 2010 and **25,000** indirect jobs
- **1,146,000** jobs in the CONSTRUCTION SECTOR in 2017
- **- 40 %** of jobs per ton of cement produced in the last 40 years

Source: SFIC, PIPAME report, CONSTRUCTION SECTOR Trades Observatory

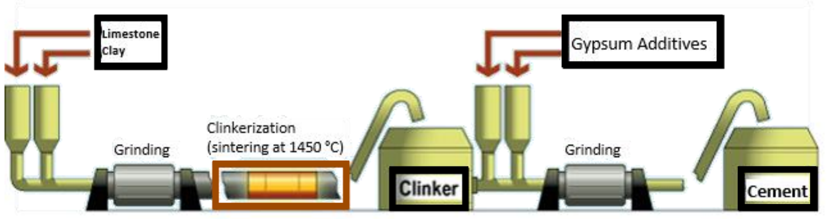
Cement is naturally low, but clinker imports are increasing

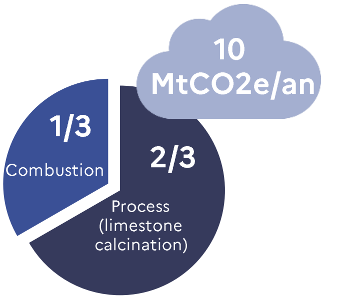
- **France exports 5% of its production and imports 15%**
- Imports of clinker, an intermediate component of cement manufacturing, bearing the entire carbon footprint of cement, have **doubled in 3 years** (origins: Spain, North African and Middle Eastern countries)



Cement production worldwide

Decarbonisation Issues
Cement production





Distribution of greenhouse gas emissions

❖ Concentrated carbon impact on clinker manufacturing and process emissions that are difficult to break down

Two-thirds of the emissions are emitted by decarbonisation of limestone during calcination and cannot be removed by energy efficiency technologies or by changing energy mix.

❖ Mainly thermal energy consumption

85% of the energy consumed is thermal. Cement is made from limestone and clay, cooked at 1500 °C to give the "clinker" that provides the cement with its hydraulic binding properties. This process requires energy between 3,000 and 4,000 MJ/ton of clinker, sometimes more on the least efficient processes.

~1/3 of the cement plants and **~50% of clinker production** are **already** operating **on the most efficient process** to date (dry process manufacturing with precalciner).

60%
thermal energy is produced by burning coal or petroleum coke

❖ A potential circular economy that remains to be explored

The industry recovers 3.5 million tons of waste each year, either as a substitute for fossil fuel (40% of its supplies in 2015 are CSR, wood waste, ...) or by incorporating them into its cement recipe (up to 15-25%, like blast furnace slag).

80% of the concrete produced from deconstruction is recovered, mainly for road applications. Today, recycled material loses its function as a hydraulic binder and there is no re-incorporation of recycled and processed concrete in the cement production.

❖ More or less carbon cement depending on clinker ratio

High clinker cement (CEM I and CEM II) represents about **¾ of the French production**. The use of new types of cement would lower the clinker rate, but the standardisation process is long and access to raw materials is a barrier.

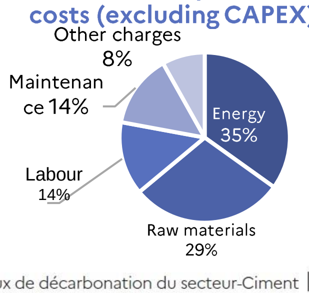
SFIC Objective:
reduce clinker rate from 78% to 66% in 2050

❖ An energy-intensive capital-intensive industry whose economic conditions are not conducive to investment in decarbonisation

The cement sector is old (+80 years) and requires major investments over long cycles (average lifespan of a 40-year furnace).

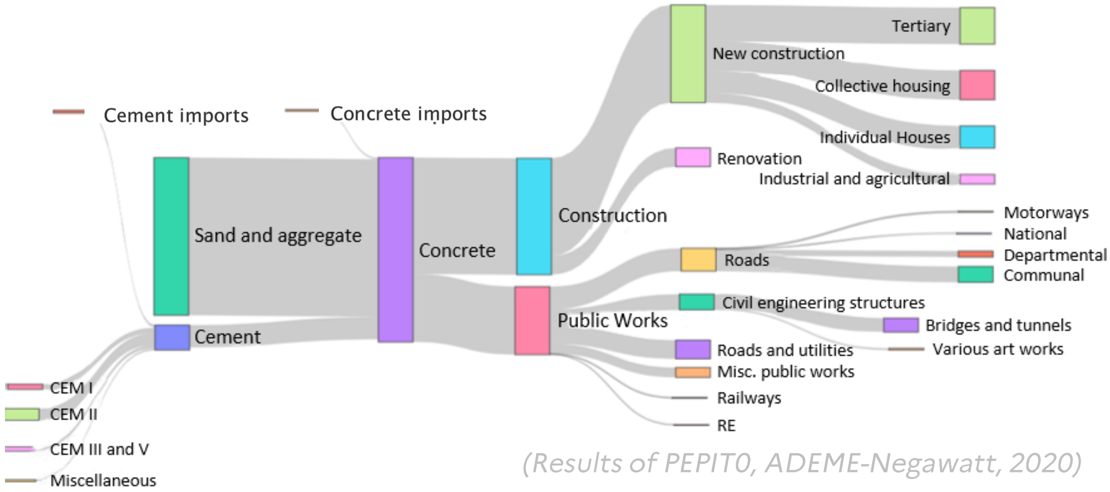
Energy consumption represents **35% of the cost of production.** But this cost does not automatically justify the renovation of a plant with *Best Available Techniques* which costs about 100 MEUR for an average energy saving of 15-20% on the French sites.

Distribution of production costs (excluding CAPEX)



Decarbonisation Issues

Market visibility: a barrier to investment



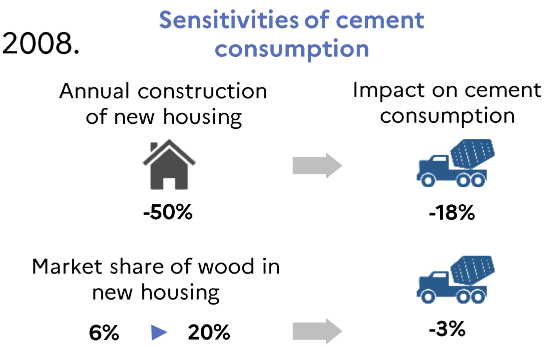
(Results of PEPITO, ADEME-Negawatt, 2020)

❖ Demand from new housing construction, which is highly exposed to environmental regulations

The number of new buildings has been decreasing since 2008.

At both national and local level, demand for cement can be strongly impacted by changes in building regulations.

(e.g. environmental thermal regulation of the building, investment programmes, public procurement, local urban planning policy, limitation of the artificial soil, etc.).

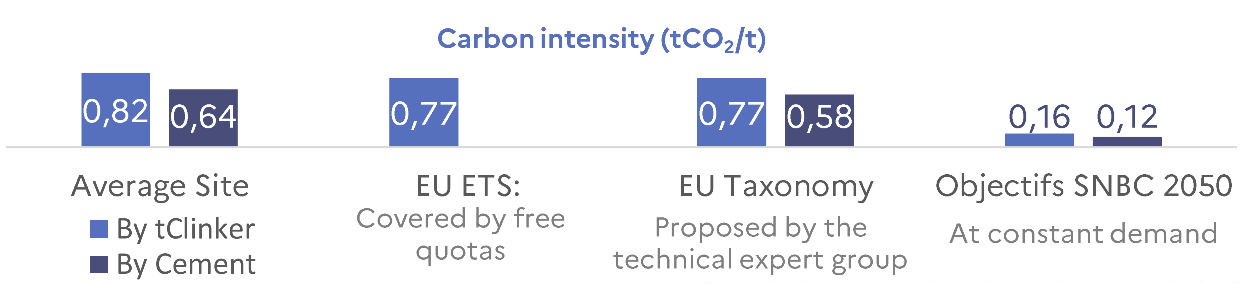


❖ No market for low-carbon cement

Low-carbon cement is not yet the main focus of manufacturers or their customers (private, state, local authorities).

❖ Incentives to invest in decarbonisation are currently weak contractive and with low long-term visibility

Even though cement is barely traded, the cement industry benefits from the classification of "carbon leakage sector" under EU ETS regulations, due to increasing clinker imports from countries with less stringent emission control rules. In 2020, manufacturers receive free allowances of 0.766 tCO_2/tclinker, close to the carbon intensity of the sites. **Without this support, the cost of production would be 30% higher.**

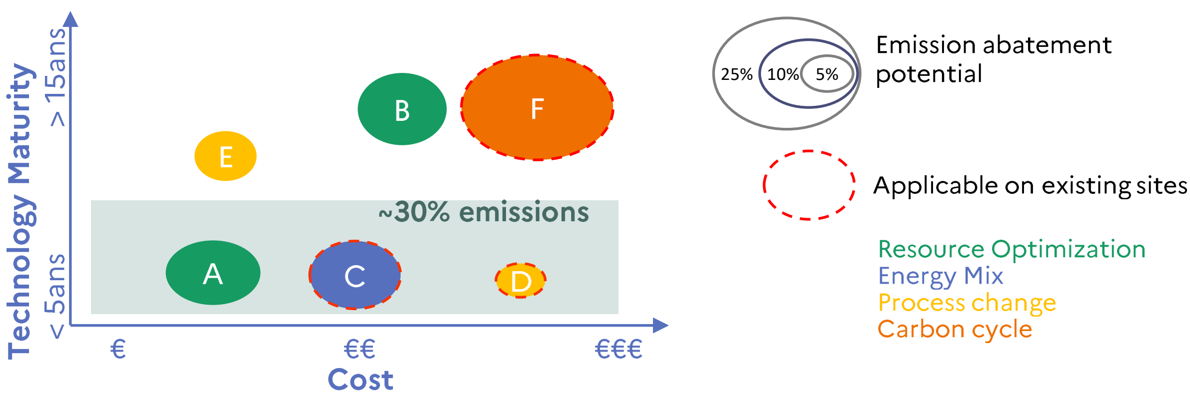


Decarbonisation levers

All the technologies available in the short term can only **reduce emissions by one third**.
A combination of actions on the downstream market, investments in the current fleet and innovations is necessary to achieve the decarbonisation objective of the SNBC, namely -81%.

Key technological levers and their technological and economic trends

		Identified barriers
A	**Decrease in clinker rate by cement recipes**	*Availability of alternative resources, standardisation, physical characteristics*
B	**More in-depth recycling**	*Low-level collection and sorting, R&D integration technologies*
C	**Fossil fuel substitution**	*Availability of alternative resources*
D	**Modernization of cement plants at the "Best Available Techniques" level**	*Significant Investment Needs (CAPEX)*
E	**Development of alternative low-carbon clinkers (e.g. high belite content)**	*Availability of alternative resources, lack of market*
F	**Capture carbon and storage (CCS)**	*CAPEX, accessibility to technology depending on location relative to potential geological storage sites*



Examples of actions to create a favorable environment for low-carbon investment

Best practices

Establishment of a market for low-carbon cement thanks to strong traceability of materials

Transparency in the carbon content of products and incentives for optimal use of concrete in construction

Regulation

Evolution of cement composition standards to validate the use of new low-carbon cement

Evolution of constraints on the composition of concrete in building regulations and in public procurement

Evolution of constraints on the recycling of deconstructive waste

Evolution of public policies favoring the renovation of buildings to the construction of new housing

Financial Support

Visibility mechanism on carbon price (e.g. Carbon Contract for Difference (ETS) to trigger the investment

Innovative support devices to improve recycling, create new low-carbon cement and develop CCS

Ref. ADEME 011517