



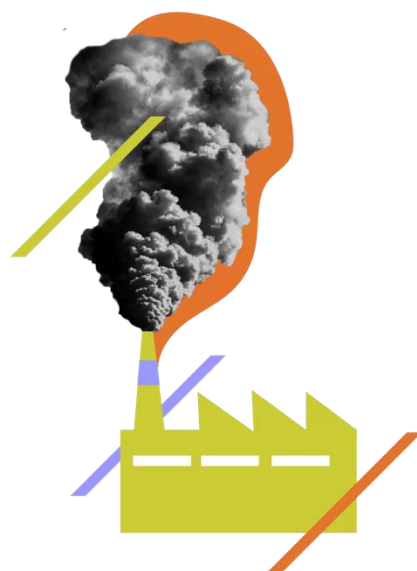
THE ITALIAN CLIMATE CHANGE THINK TANK

# INDUSTRIAL TRANSFORMATION POLICIES

## THE CEMENT INDUSTRY

POLICY PAPER  
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## EXECUTIVE SUMMARY

Due to its importance from an economic standpoint (15% of GDP) as well as in terms of emissions produced (22% of the national total), it's paramount that Italy's manufacturing sector is able to embark on a development path towards decarbonisation and the regulatory and planning framework should facilitate this change.

There currently exists a strategic opportunity for setting the country's future industrial development within the context of reducing greenhouse gas emissions.

An industrial transformation requires policies that are specifically formulated for each sector, including those non-energy intensive as well as SMEs, and which are designed to bring about positive change both in the short term (2030) and in the long term (2050) for the country's entire industrial ecosystem and its particular characteristics.

To this end, this paper takes an in-depth look at Italy's cement production sector and provides a structured analysis of the measures and policies that are currently being employed within the sector. Despite a 60.7% decline in production volumes since 2006, Italy is still the second largest producer of cement in the European Union, after Germany. Italy is also a major consumer of cement and concrete. Italy's imports of cement and clinker have significantly increased in recent years, mainly coming from non-EU Mediterranean countries such as Turkey, Tunisia and Algeria.

Despite the concentration processes that have taken place within the cement industry over the past ten years, the profit margins being generated by the country's primary sector operators remain limited, especially when compared to the level of investments required to decarbonise the industry's cement production processes.

Direct emissions stemming from Italy's cement production account for 3% of national emissions and 15% of all manufacturing related emissions. Two-thirds of these direct emissions, result from the process of calcination. The other third originates from the combustion of mainly fossil fuels, particularly pet coke, during the clinker production phase.

Emissions of CO<sub>2</sub> have decreased significantly in the past 15 years (down 61%), but this is primarily due to a reduction in national cement production, which has fallen by a similar amount. Indeed, over recent years, the industry's emission intensity has remained almost constant, approximately 0.7 tCO<sub>2</sub>/t<sub>cement</sub><sup>1</sup>.

In view of these complexities, it is necessary that any strategy to reduce direct emissions within the cement sector focusses on a variety of solutions that can be implemented over time. It is possible for a number of these to be implemented in the short term, such as using alternatives to pet coke and reducing the clinker-cement ratio, including by incentivising the use of recycled inert materials. The greatest difficulty remains reducing emissions resulting from the chemical process that transforms limestone into clinker, and no technological solutions are currently advanced enough to resolve this issue. Therefore, it is vital that a strategy is devised to finance, research and develop such solutions that are capable of tackling this problem by 2050.

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<sup>1</sup> Federbeton sustainability reports.

Cement production companies will need to invest in the installation of Carbon Capture Usage and Storage (CCUS) facilities, so CapEx support policies are crucial, but so are those that will make it possible for companies to bear the operational management costs of facilities powered by alternative fuels. Furthermore, demand-side support policies need to be geared towards reducing the volumes of cement consumed and creating a market (both European and domestic) for low-emission or 'green' cement products.

Italy is still lagging behind in terms of formulating an industrial decarbonisation strategy for the cement sector, and even the National Energy and Climate Plan doesn't provide for the matter to be addressed organically. Some measures need to be strengthened (such as the GPP criteria), and others could be set in motion.

For this reason, as we have seen for the [steel sector](#), it is necessary to devise a set of coordinated industrial policies that are assigned varying priorities and executed accordingly. Supply-side support policies should tackle issues relating to the need to fund investment as well as the increased energy costs deriving from the use of natural gas (and electricity). Simultaneously, since the production of greener cements is more expensive, regulatory measures, incentive schemes and demand-side policies should be introduced to facilitate the development of a market that can provide a vehicle for its commercialisation.

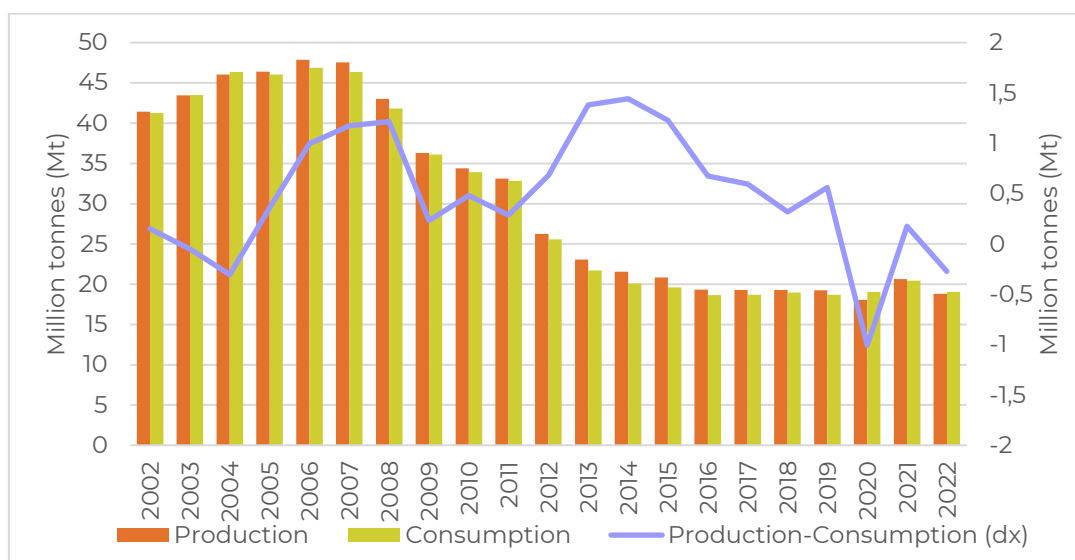
In light of the complex regulatory framework that has been developed around energy and climate objectives, the following analysis proposes a simplified and aggregated policy framework that's consistent with the country's transition towards climate neutrality as well as an outline and assessment of the policies currently in place.

# 1 THE ITALIAN CEMENT INDUSTRY

## 1.1 THE ITALIAN CEMENT INDUSTRY IN NUMBERS

In 2022<sup>2</sup>, Italy produced 18.8 million tonnes (Mt) of cement (0.5% of global production). Aside from a modest rebound in 2021, this figure continues the downward trend that Italy's cement industry has been experiencing since 2006<sup>3</sup>, the year it reached a historical peak (Figure 1). Since then, in volume terms, cement production has fallen by 60.7%, largely driven by a reduction in national consumption, to which production levels are closely correlated. In fact, over the last twenty years, the difference between cement production and consumption in Italy has been consistently moderate, ranging from an overproduction of 1.4 Mt (in 2013-14) to an excess in consumption of 1 Mt (in 2020)<sup>4</sup>.

**Figure 1** – Cement production and consumption in Italy<sup>5</sup>



Per capita consumption has fallen from the historic peak of 813 kg in 2006<sup>6</sup>, when Italy was the fourth highest per capita consumer in Europe (significantly above the average of 530 kg), to 324 kg in 2022, placing it 23rd<sup>7</sup> in Europe (below the average<sup>8</sup> of 381 kg).

There are currently 50 active<sup>9</sup> cement production facilities in Italy, 29 of which are full-cycle facilities and 21 used for grinding only, delivering a total production capacity of 31.4 Mt. These facilities are fairly evenly distributed across the country (Figure 2): 22 in the north, 9 in the centre (including Sardinia), and 19 in the south (including Sicily). However, in volume terms, the majority of cement is produced in the north<sup>10</sup> which, at 9.7 Mt, accounted for more than 51% of national production in 2022. This is

<sup>2</sup> "Rapporto di filiera 2022" (Supply Chain Report 2022), *Federbeton* (2023).

<sup>3</sup> Aitec and Federbeton annual reports (various years).

<sup>4</sup> From ECCO analysis of Aitec and Federbeton annual reports (various years).

<sup>5</sup> From ECCO analysis of Aitec and Federbeton annual reports (various years).

<sup>6</sup> "Relazione Annuale 2007" (Annual Report 2007), *Aitec* (2008).

<sup>7</sup> Data for 2020 from "European cement 2020-2025", *European Cement* (2021).

<sup>8</sup> European Union data for 2021 from "Cembureau Key Facts & Figures", *Cembureau* (2023).

<sup>9</sup> Figures relate to 2022. From "Rapporto di filiera 2022" (Supply Chain Report 2022), *Federbeton* (2023).

<sup>10</sup> "Rapporto di filiera 2022" (Supply Chain Report 2022), *Federbeton* (2023).

due to the fact that the facilities in the north have a higher capacity utilisation (71%), compared to the national average<sup>11</sup> (60%).

**Figure 2** – Geographic distribution of cement production facilities in Italy by type<sup>12</sup>

### Active Italian cement facilities in 2022



With respect to international trade, Italy has returned to being a net importer of cement since 2020. This trade deficit widened further in 2022, reaching 1.4 Mt<sup>13</sup>. This situation arose against the backdrop of a steady increase in imports which, compared to total national consumption, rose from 5.9% in 2014 to 16.3% in 2022<sup>14</sup>, the highest it had reached over the previous twenty years. Indeed, it was only

<sup>11</sup> Value derived from the ratio between national production in 2022 (18.8 Mt) and the Italian cement industry's production capacity (31.4 Mt).

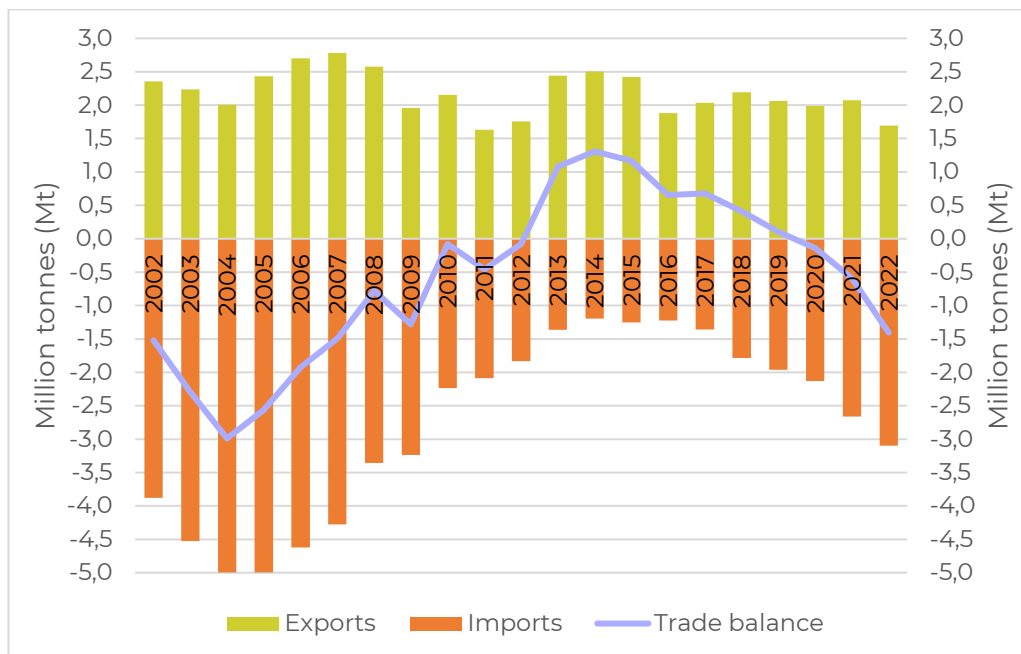
<sup>12</sup> From ECCO analysis of the "Rapporto di filiera 2022" (Supply Chain Report 2022), *Federbeton* (2023).

<sup>13</sup> "Rapporto di filiera 2022" (Supply Chain Report 2022), *Federbeton* (2023).

<sup>14</sup> From ECCO analysis of the "Rapporto di filiera 2022" (Supply Chain Report 2022), *Federbeton* (2023) and Aitec annual reports (various years).

during the 2013-2019 period that Italy recorded a trade surplus for cement, this was due to a significant drop in national consumption which drastically reduced the need for imports (Figure 3).

**Figure 3** – Imports and exports of cement in Italy<sup>15</sup>



The primary countries that export cement and clinker to Italy<sup>16</sup> are Turkey (25% of the total), Greece (17%), Slovenia (17%), Tunisia (12%) and Algeria (10%). Therefore, the majority of Italy’s cement imports come from non-EU countries, which are currently subjected to less stringent environmental regulations governing their production processes. With respect to Italy, some of these countries have an excess of production capacity and enjoy a more competitive cost environment. The combination of these factors allows non-EU cement producers in the Mediterranean area to offer a lower price per tonne of cement sold<sup>17</sup>.

Furthermore, it should also be noted that cement clinker producers fall under the scope of the EU ETS Directive. In particular, facilities established to produce clinker in rotary kilns with a production capacity in excess of 500 tonnes per day are subject to the system. Given the industry’s already limited profit margins, the impact of the cost of CO<sub>2</sub>, currently between €60 and €70 per tonne, is highly significant and further reduces the scope for investment. For a national industry that needs to bear the cost of decarbonisation, this question of price competitiveness is potentially critical. The option of replacing domestic production with cement imports from neighbouring countries that enjoy more relaxed emission regulations is undesirable, because it “transfers” the climate issue to another geographical area whilst negatively impacting on the domestic economy and unemployment figures (so-called carbon leakage).

<sup>15</sup> From ECCO analysis of Aitec and Federbeton annual reports (various years).

<sup>16</sup> “Rapporto di filiera 2022” (Supply Chain Report 2022), Federbeton (2023).

<sup>17</sup> “Strategia di decarbonizzazione del settore cemento” (Decarbonisation strategy for the cement industry), Federbeton and Aitec (various years).

## 1.2 THE COMPETITIVENESS OF THE ITALIAN CEMENT INDUSTRY

In volume terms, Italy is the second largest producer of cement in the European Union, after Germany<sup>18</sup> (Table 1). From an economic standpoint in relation to the quantity of cement produced (NACE code 23.51), Italy fares quite poorly compared to the other top five producers in the EU.

**Table 1 – Comparison between Italy and other major European cement producers (2021)<sup>19</sup>**

	Germany	Italy	Poland	France	Spain
<b>Production</b> [millions of tonnes]	35	20.6	19.6	17.5	17
<b>Number of companies</b>	21	41	32	19	59
<b>Employees</b> [Full-time equivalent]	13093	4197	8424	7246	5303
<b>Net revenue</b> [millions of Euros]	5655	2115	2431	3357	1992
<b>Value added</b> [millions of Euros]	1740	533	814	956	1162
<b>Share of value added</b> [% for the manufacturing sector]	0.24	0.19	0.84	0.38	0.87
<b>Gross operating margin</b> [% of revenue]	12.6	10.7	24.2	9.7	40.7
<b>Workforce productivity</b> [thousands of Euros]	132.9	127.2	96.7	131.9	219.2

The number of employees working in the Italian cement sector is lower than in Germany, Poland, France and Spain, it also, in relation to these countries, offers lower value added, both in absolute terms as well as in terms of its share for the manufacturing sector. However, Italy's workforce productivity, measured in terms of value added per employee, is in line with Germany and France and higher than in Poland. The gross operating margin - at 10.7% of revenue - is also quite low, but is not significantly different from France and Germany.

Over the last ten years, the Italian cement industry has seen a number of concentration and acquisition processes that have radically transformed the production shares of the sector's major players.

In 2016, Italcementi, a sector leader in Italy since its establishment in 1864, was acquired by the German multinational corporation HeidelbergCement. Two years later, Cementir Italia, having previously acquired Sacci (in 2016), another important Italian producer, was incorporated into Italcementi (already controlled by HeidelbergCement). In November 2023, HeidelbergCement's subsidiaries were integrated into the new group "Heidelberg Materials" which, in terms of installed production capacity, is the world's 4th largest cement producer<sup>20</sup> with 182.6 Mt, 9.9 Mt of which is in Italy.

<sup>18</sup> If Turkey was included within the European total, both Germany and Italy would rank behind it. In certain years, between 2008 and 2011 and before 2001, Italy ranked first among EU countries.

<sup>19</sup> Economic data for the "Manufacture of cement (23.51)" sector from Eurostat (*Structural Business Statistics*). Production volume data from "Activity Report 2022", Cembureau (2023) and "World Mineral Production 2017-2021", British Geological Survey (2023).

<sup>20</sup> "Annual and Sustainability Report 2022", Heidelberg Materials (2023).



In 2022, the three largest producers in Italy - Heidelberg Materials (formerly Italcementi), Buzzi Unicem and Colacem - accounted for approximately three quarters<sup>21</sup> of national cement production (Table 2). Although investments in decarbonisation are made at the facility level, any public policies whose objective is to facilitate such investments can be applied through direct interaction with the industrial players whose role it is to implement and oversee them.

**Table 2** – Principal cement producers in Italy (2022)<sup>22</sup>

	Revenue [millions of €]	Employees
<b>Heidelberg Materials (Ex Italcementi)</b>	711	1,091
<b>Buzzi Unicem</b>	726	1,538
<b>Colacem</b>	402	757

Whilst concentration is advantageous because it improves the limited investment capacity of companies and simplifies discussions and negotiations between the private sector and public authorities, it may also be problematic since the increased internationalisation of those companies may reduce the effectiveness of any measures that are implemented domestically. More specifically, Colacem is the only major producer whose activities are predominantly domestic; Buzzi Unicem is the only major group to have maintained its headquarters in Italy, but it is also highly internationalised (26.9% of its total production capacity is in Italy,<sup>23</sup> and this accounts for just 9.3% of the group’s gross operating margin<sup>24</sup>); while what used to be Italcementi is now controlled by a multinational corporation that makes its decisions in Germany and for whom Italy accounts for just 5% of its overall production capacity<sup>25</sup>.

<sup>21</sup> Estimated figure given a 60% capacity utilisation rate (national average) of the production capacity of former Italcementi facilities in Italy.

<sup>22</sup> From ECCO analysis of corporate sustainability reports.

<sup>23</sup> “Sustainability Report 2022”, *Buzzi Unicem* (2023).

<sup>24</sup> “Consolidated Report 2022”, *Buzzi Unicem* (2023).

<sup>25</sup> “Annual and Sustainability Report 2022”, *Heidelberg Materials* (2023).

## 2 THE CEMENT PRODUCTION PROCESS AND ITS EMISSIONS

### 2.1 THE CEMENT PRODUCTION PROCESS AND HOW IT PRODUCES GREENHOUSE GAS EMISSIONS

In order to consider how the cement supply chain might be decarbonised, it's important to outline its various production process stages so as to be able to identify the origins of the greenhouse gas emissions it produces.

The cement production process starts in quarries and mines, where raw materials (primarily limestone and clay) are extracted and fragmented. These are then dried, ground and mixed to obtain raw meal, which consists of 80% limestone (mainly calcium carbonate,  $\text{CaCO}_3$ ) and 20% clay.

This is then pre-heated (to a temperature of approximately  $900^\circ\text{C}$ ) during the calcination process, i.e. the decomposition of calcium carbonate, from which calcium oxide ( $\text{CaO}$ , commonly known as lime) and carbon dioxide ( $\text{CO}_2$ ) are produced.

The next stage is the clinkerisation, during this phase the raw material is fired in a rotary kiln at a temperature of between  $1,400^\circ\text{C}$  and  $1,600^\circ\text{C}$  together with silica, alumina and ferrous oxide. The chemical reactions that occur during this process lead to the production of Portland cement clinker, the semi-finished basic component of cement. Portland cement clinker is produced by sintering a precisely defined mixture of raw materials (raw meal, paste or slurry) containing elements, usually expressed as oxides,  $\text{CaO}$ ,  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{Fe}_2\text{O}_3$  and small quantities of other materials. The raw meal, paste or slurry are finely ground and then mixed to render the mixture homogeneous.

The clinker is then mixed with other constituents (granulated blast furnace slag, pozzolanic materials, fly ash, burnt shale, limestone, silica fume and other secondary constituents) and additives to improve production or enhance the cement's properties. The cement is classified into different types according to the combination of constituents, as defined by European Standard EN 197-1 "Composition, specifications and conformity criteria for common cements" (see [box 1](#)).

As a final step, the cement then becomes part of the production cycle where it is used to produce concrete, which is made from a mixture of cement (approximately 10-15% of the total), water, aggregates and additional chemical additives.

A breakdown of the cement production phases ([Figure 4](#)) shows that the calcination and clinkerisation processes are responsible for all direct emissions<sup>26</sup> (Scope 1<sup>27</sup>). Of these, two-thirds are generated by the limestone calcination process. These are therefore process emissions that are intrinsic to the chemical decomposition of limestone. The other third result from the use of fuels to produce clinker. The emissions generated through the consumption of energy are particularly high

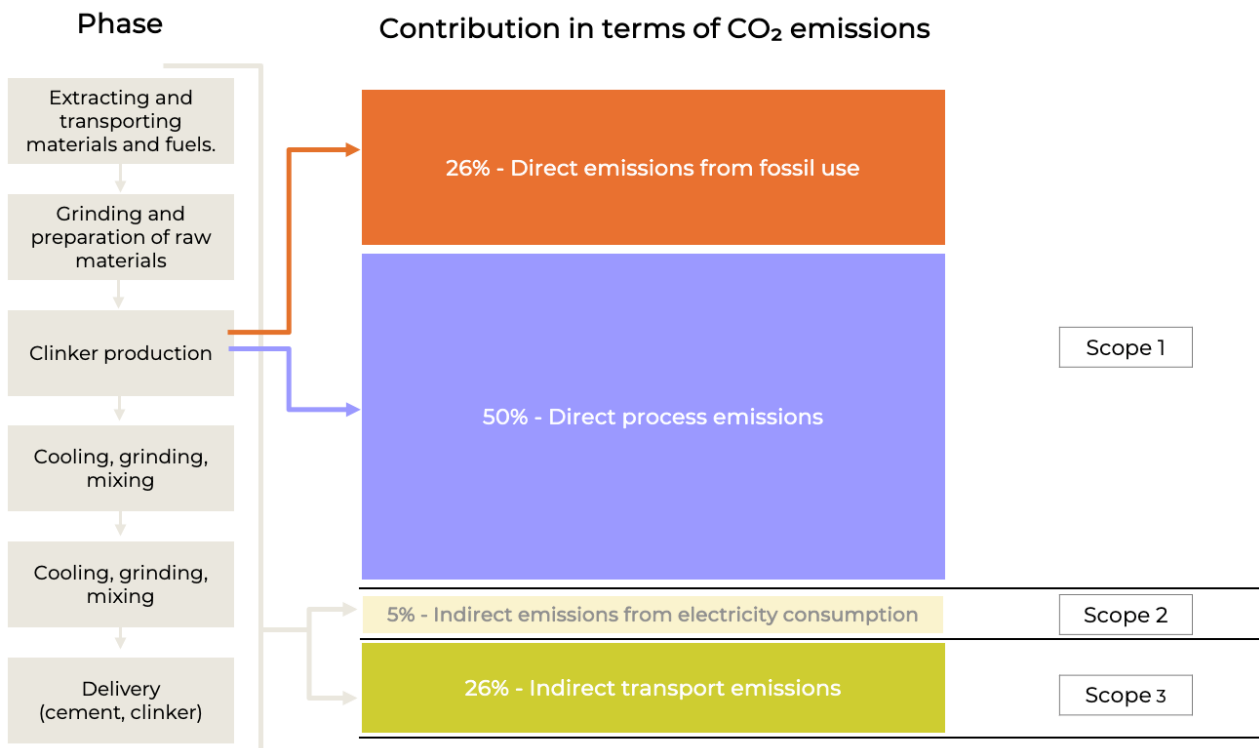
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<sup>26</sup> Data taken from the study "La strategia di decarbonizzazione del settore del cemento" (Decarbonisation strategy for the cement industry), *Federbeton* (2020).

<sup>27</sup> The [GHG protocol](#) distinguishes between three different types of emissions that a company might generate. Direct emissions from their activities, e.g. process emissions or emissions deriving from the burning of fossil fuels, are classified as Scope 1. Scope 2 includes indirect emissions related to the consumption of purchased or acquired energy, whereas Scope 3 are all indirect emissions that occur in the company's value chain, including both upstream and downstream emissions.

due to the extensive use of pet coke (accounting for 82% of all combustion emissions), while natural gas provides just 1% of the total energy requirement.

**Figure 4** – Breakdown of CO<sub>2</sub> emissions in Italy by production process phase (2019)<sup>28</sup>



When considering the entire cement supply chain, direct emissions (Scope 1) account for more than three quarters of the total emissions generated. The remaining indirect emissions derive from the consumption of electricity (Scope 2 - approximately 5% of the total) and the procurement and transport of materials and products (Scope 3 - approximately 19% of the total).

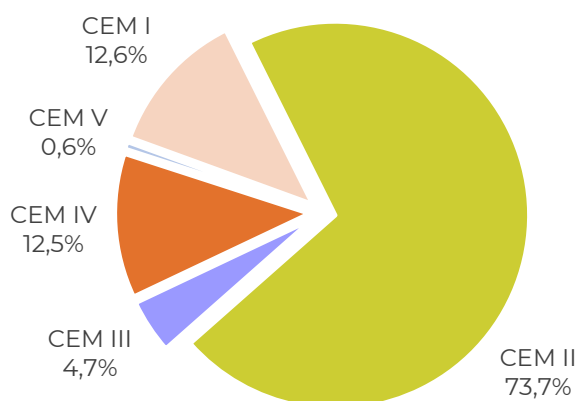
<sup>28</sup> From ECCO analysis of “La strategia di decarbonizzazione del settore del cemento” (Decarbonisation strategy for the cement industry), *Federbeton* (2020).

## BOX 1 – CEMENT TYPE CLASSIFICATIONS

Cements are classified into five main categories, based on the quantity of clinker and other substances they contain ([Figure 5](#) provides a breakdown for the various types in Italy):

- **Portland Cement I**, with a clinker content of at least 95%. Domestic production in 2022: 2.3 Mt.
- **Portland Cement II**, with a clinker content of at least 65%. Domestic production in 2022: 13.3 Mt.
- **Blast Furnace Cement III**, with a clinker content of between 20% and 64% and a blast furnace slag content of between 36% and 80%. Domestic production in 2022: 0.8 Mt.
- **Pozzolanic Cement IV**, with a clinker content of between 45% and 89% and a pozzolanic material content of between 11% and 55%. Domestic production in 2022: 2.3 Mt.
- **Composite Cement V**, with a clinker content of between 20% and 64%, a granulated blast furnace slag content of between 18% and 50% and a pozzolanic material or fly ash content of between 18% and 50%. Domestic production in 2022: 0.1 Mt.

**Figure 5** – Production percentages in Italy of the various cement types (2022)<sup>29</sup>

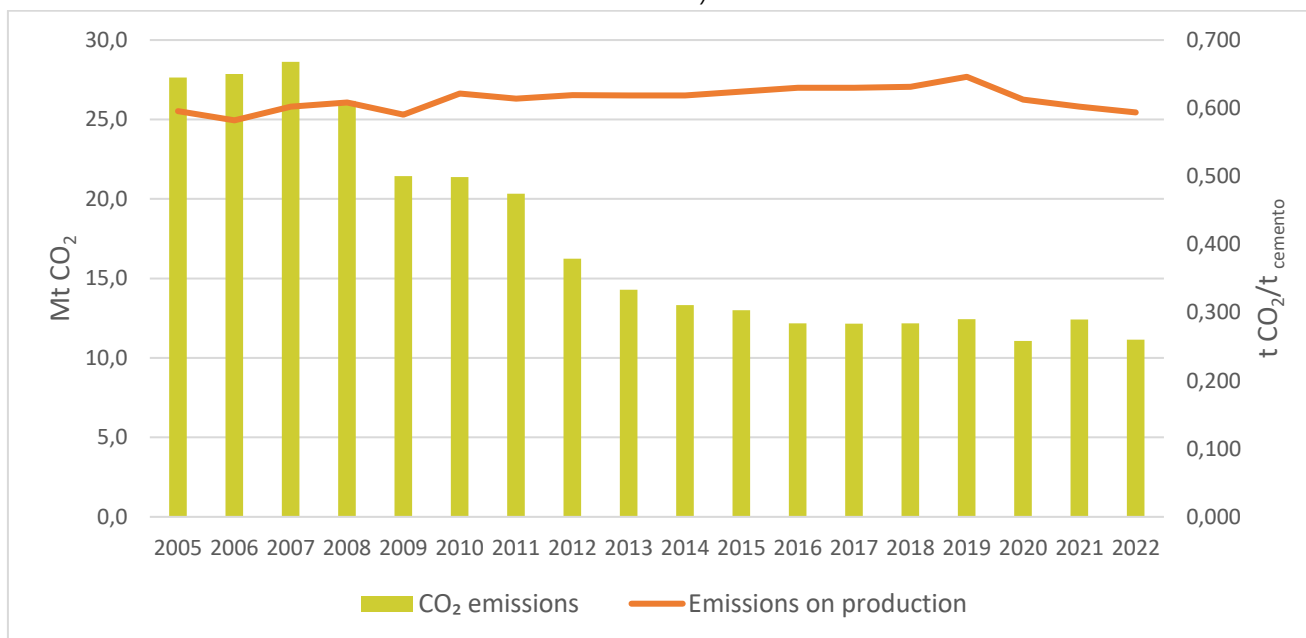


<sup>29</sup> From ECCO analysis of the “Rapporto di filiera 2022” (Supply Chain Report 2022), *Federbeton* (2023).

## 2.2 EMISSIONS AND TRENDS IN THE ITALIAN CEMENT INDUSTRY

From its peak in 2007 (28.6 Mt) to 2022 (11.2 Mt), direct CO<sub>2</sub> emissions from the cement industry in Italy decreased by 61%<sup>30</sup>. These emissions account for 3% of the national total and 15% of that generated by the entire manufacturing industry in Italy<sup>31</sup>.

**Figure 6** – Direct CO<sub>2</sub> emissions from cement production in Italy (in absolute terms and relative to production volumes)<sup>32</sup>



As [Figure 6](#) shows, the decrease in total CO<sub>2</sub> emissions was not accompanied by a reduction in emission intensity, which remained stable at around 656 kg of CO<sub>2</sub> per tonne of cement produced<sup>33</sup>. This decrease in direct CO<sub>2</sub> emissions was not the result of any decarbonisation of production processes, it was simply due to the fact that there was a reduction in the quantity of cement produced domestically ([Figure 7](#)).

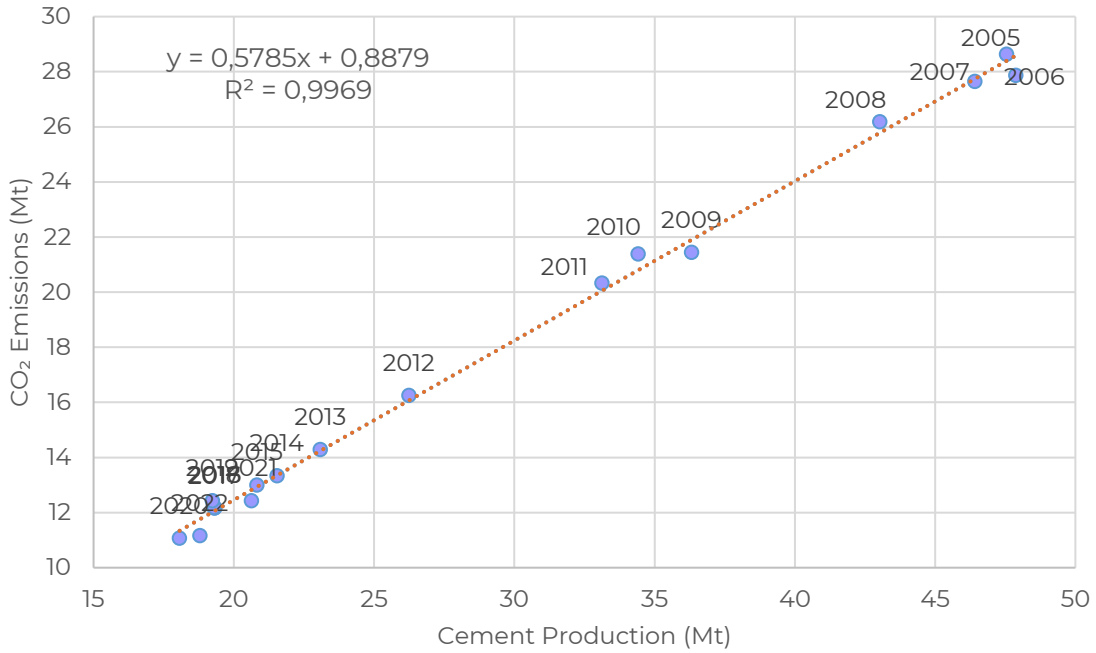
<sup>30</sup> From ECCO analysis of Aitec and Federbeton annual reports (various years).

<sup>31</sup> From ECCO analysis of ISPRA data and the EU ETS database. Figures relate to 2022.

<sup>32</sup> From ECCO analysis of Aitec and Federbeton annual reports.

<sup>33</sup> From ECCO analysis of Federbeton data.

**Figure 7** – Correlation between trends in cement production and direct CO<sub>2</sub> emissions in Italy (2005-2022)<sup>34</sup>



Currently, the potential for decarbonisation in the cement sector as a result of falling production volumes appears limited, since domestic demand remains stable. Furthermore, as previously mentioned, relying more significantly on imports cannot represent a viable decarbonisation strategy, since such supplies would primarily come from non-EU countries where the cement production is subjected to less stringent emission constraints. Therefore, achieving any national decarbonisation objectives within the cement industry would necessitate an approach that was aimed at reducing the sector's emission intensity.

<sup>34</sup> From ECCO analysis of Aitec and Federbeton annual reports (various years).

### 3 AN INDUSTRIAL DECARBONISATION STRATEGY FOR THE CEMENT INDUSTRY

Devising a strategy for decarbonising the cement industry is particularly challenging, due to the high percentage of direct CO<sub>2</sub> emissions that derives from the chemical reactions required to process the raw materials. Furthermore, the component that's obtained through the generation of heat also poses significant difficulties, given the elevated costs associated with using alternative fuels and the high temperatures involved.

Therefore, the decarbonisation of such a sector requires public sector interventions<sup>35</sup>.

For these reasons, the decarbonisation strategy that ECCO sets out below suggests an integrated approach, consisting of a coordinated set of actions on both the supply side and demand side aimed at transforming production processes and making them sustainable from an operational cost standpoint, as well as ensuring a competitive market for “decarbonised” national cement.

Before discussing the specific measures in detail (see sections [3.2](#) and [3.3](#)), it is first necessary to clarify what the priority actions for decarbonising the cement industry should be.

#### 3.1 AN ACTION STRATEGY FOR THE PRODUCTION AND UTILISATION PHASES

Due to the difficulties associated with reducing the direct emissions stemming by the cement production process, any strategy aimed at such an objective must consider adopting a diverse range of technical and technological solutions over the short, medium, and long term, utilising solutions that are already available and feasible, as well as setting the groundwork for the research and development of future solutions.

In implementing such a strategy, it is important to consider the resulting reduced profitability margins for the sector, the emission contribution per tonne of product ( $0.7 \text{ tCO}_2/\text{t}_{\text{cement}}$ <sup>36</sup>), the impact of the costs of CO<sub>2</sub> on domestic clinker production (approximately 60-70 euros/tCO<sub>2</sub>, which translates to 42-49 euros/t<sub>cement</sub>), but also the anticipated effects that the implementation of the CBAM will bring about.

A strategy for reducing direct CO<sub>2</sub> emissions generated by the cement industry, one that ensures adequate levels of production and employment are maintained, could easily be based on currently available technologies and measures, as well as on solutions and actions which, if implemented today, could continue to be utilised over the medium and long term (see Figure 9) with a view to achieving climate neutrality by 2050.

Below is a summary of the main decarbonisation strategies identified for the sector, categorized according to their availability and applicability in the short, medium, and long term. An estimate of the emission reductions that might be achieved by each solution is provided, these have been taken from industry documents and are broken down for each of the different emission categories: Scopes

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<sup>35</sup> “The National Energy and Climate Plan: A Plan for Action – Chapter 4 The Plan and the Manufacturing Industry, ECCO (2023). [https://eccoclimate.org/wp-content/uploads/2024/03/Technical-report\\_Necp\\_A-plan-for-action.pdf](https://eccoclimate.org/wp-content/uploads/2024/03/Technical-report_Necp_A-plan-for-action.pdf)

<sup>36</sup> Federbeton sustainability reports.

1, 2, and 3. By 2050, if all the emission reduction strategies described below are implemented, it is estimated that their combined effect will result in the following reductions:

- Scope 1 - 74%;
- Scope 2 - 5%;
- Scope 3 - 21%.

### 3.1.1 SHORT-TERM DECARBONISATION STRATEGIES

**1. Increased energy efficiency in the production processes.** One potential strategy for reducing the cement industry's emissions is to retrofit the kilns used in the production process with systems to improve their thermal and electrical efficiency. This may include the implementation of technologies that enable the thermal energy that's generated during the combustion processes to be recovered, as well as the adoption of innovative grinding technologies. The most advanced kilns already incorporate techniques for recovering excess heat, using it to pre-heat and pre-calcify the raw materials that are added to the kiln. Excess heat can also be utilised to generate additional electricity via a heat recovery boiler and turbine system. In this case, an Organic Rankine Cycle (ORC) can be used to generate power. Recent studies have indicated that, depending on the technology used, between 8 and 22 kWh of electricity can be generated per tonne of clinker produced<sup>37</sup>. It is estimated that more energy-efficient production processes can reduce CO<sub>2</sub> emissions by 21 kg for every tonne of cement produced.

**2. Reducing the percentage of clinker in the cement,** by partially substituting the clinker with other materials (materials of volcanic origin such as pozzolanic material or industrial by-products like blast furnace slag and fly ash). This measure has an impact on both the emissions generated by the production process as well as from the consumption of fuel, since it reduces the absolute quantity of clinker, the production of which comprises the phases of the cement production process that generate the most emissions. This can be achieved through the introduction of regulatory measures aimed at influencing the demand for cement towards types that contain a lower clinker content, but which offer the same structural performance. Federbeton estimates<sup>38</sup> that decreasing the clinker content in cement - from 760 kg per tonne in 2019 to 728 kg per tonne in 2030 - could bring about a reduction of 46 kg of CO<sub>2</sub> per tonne of cement produced. This would amount to a decrease of 7.1% in CO<sub>2</sub> emissions per tonne of cement produced (compared to 2019).

**3. Reduced use of concrete in the construction industry.** When designing buildings, it is possible to prioritise the use of components that are able to fulfil their function whilst incorporating less material. It's worth bearing in mind that a significant amount of the concrete that's used in the construction of buildings isn't strictly necessary for providing structural strength. The quantities of concrete specified in orders tend to be more than is actually required (approximately 20% more<sup>39</sup>). It is therefore possible to design buildings in such a way so as to reduce the use of concrete without compromising the stability of the structure, and in so doing achieve major benefits in terms of

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<sup>37</sup> "[La strategia di decarbonizzazione del settore del cemento](#)" (Decarbonisation strategy for the cement industry), Federbeton, June 2020.

<sup>38</sup> "[La strategia di decarbonizzazione del settore del cemento](#)" (Decarbonisation strategy for the cement industry), Federbeton (2020).

<sup>39</sup> "[La strategia di decarbonizzazione del settore del cemento](#)" (Decarbonisation strategy for the cement industry), Federbeton (2020).

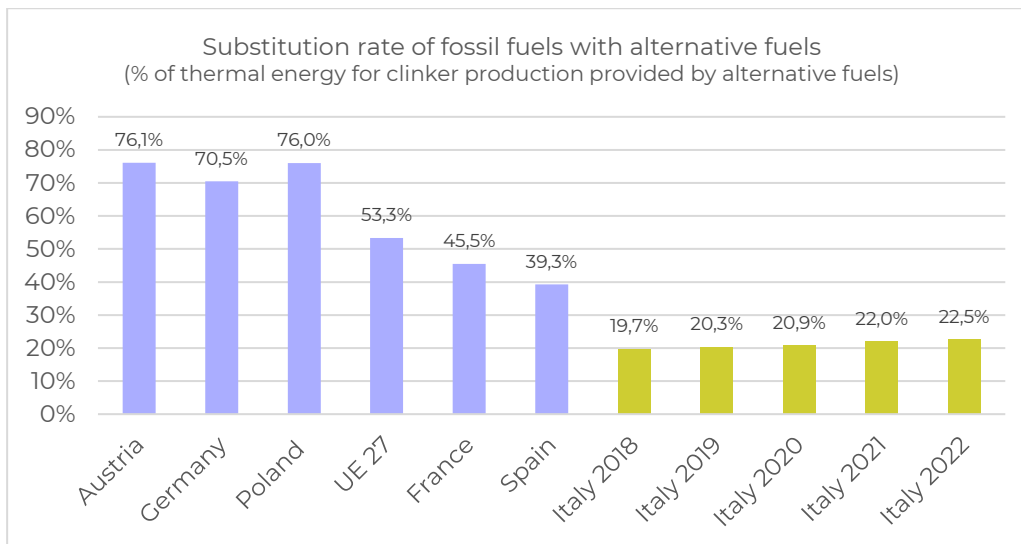


reducing emissions. The Federbeton report “*Strategia di decarbonizzazione del settore del cemento*” (Decarbonisation strategy for the cement industry) suggests that such an approach would lead to a reduction in emissions of 32-33 kg CO<sub>2</sub> per tonne of cement produced.

**4. The use of alternative fuels.** The Italian cement industry could increase its alternative fuel substitution rate (with alternative fuels such as non-recyclable waste, particularly that containing biomass). Compared to other European countries, Italy has a significantly lower alternative fuel substitution rate (% of thermal energy for clinker production provided by alternative fuels). As [Figure 8](#) shows, Italy has only marginally increased its substitution rate in recent years, reaching 22.5% in 2022 - well below the EU average of 53.3%<sup>40</sup>. Action can be taken in this area with measures to facilitate authorisation processes, while continuing to maintain control guarantees and transparency, aimed at protecting the climate from greenhouse gas emissions. Federbeton estimates<sup>41</sup> that with a substitution rate of 47% - compared to the approximately 20% in 2019 - a reduction of 41-51 kg of CO<sub>2</sub> per tonne of cement produced could be achieved by 2030. A more streamlined authorisation procedure would also be crucial to underpin this strategy.

Furthermore, a simultaneous increase in the consumption of natural gas (i.e. to replace coal) from 1% to 30% of the clinker production process’ total energy requirement could lead to a further decrease of 13-28 kg CO<sub>2</sub> per tonne of cement produced by 2030. Subsequently, replacing natural gas with green hydrogen could further reduce the percentage of emissions generated through fuel consumption. Taken as a whole, fuel substitution measures would lead to a 10.7% reduction in CO<sub>2</sub> emissions per tonne of cement produced (compared to 2019).

**Figure 8** – Comparison of alternative fuel substitution rates between Italy and other European countries (data from European countries for 2021)<sup>42</sup>



<sup>40</sup> Data from 2021.

<sup>41</sup> “*La strategia di decarbonizzazione del settore del cemento*” (Decarbonisation strategy for the cement industry), Federbeton (2020).

<sup>42</sup> From ECCO analysis of the “Rapporto di sostenibilità 2022” (Sustainability Report 2022), Federbeton (2023) and previous editions.

**5. Using cement alternatives and recycling cement.** Cement and concrete can play an important role in the implementation of circular economy practices, as the use of recycled materials, by-products and end-of-waste become a more integral aspect of production chains. Since the majority of the CO<sub>2</sub> generated by cement production comes from the limestone calcination process, partially replacing this material with previously decarbonised waste products and by-products from other industries, such as recycled fine materials from demolished concrete, can significantly contribute to reducing greenhouse gas emissions. In this regard, the possibilities for recycling inert waste materials, especially those deriving from the construction sector, are particularly promising. However, current demolition practices and the characteristics of the waste materials produced mean that the quantity, quality and technical performance of the recycled materials is somewhat limited. By 2030, it is estimated that using substitute materials could reduce CO<sub>2</sub> emissions by 6 kg per tonne of cement produced.

### 3.1.2 MEDIUM/LONG-TERM DECARBONISATION STRATEGIES

**1. Increased use of renewables.** A number of technologies are currently being researched and developed to make greater use of renewables at all stages of the cement production process. Concentrated Solar Power (CSP) facilities, for example, are systems designed to convert solar energy into thermal energy and can be used to provide the heat required to produce clinker. Currently, the maturity of such systems is only at the “technology demonstrated in the relevant environment” stage (TRL of 6<sup>43</sup>) and there are still some critical factors limiting their wider deployment within the sector, such as the need for large areas to install mirrors and the continuity of the energy supply.

**2. Electrification.** Research is currently being undertaken to explore technologies for the electrification of clinker kilns; these systems have not yet been sufficiently developed for large-scale use in industry, but prototype studies are underway to assess their potential. The two most likely alternatives are plasma generators and microwave ovens. Plasma generators, for example, which are powered by electricity, are able to generate heat to the temperature required for cement production, however, although they’ve already been tested in various industrial contexts, their adoption is limited due to problems caused by the presence of dust and the need for frequent maintenance and cleaning.

**3. Using CCUS facilities to capture the CO<sub>2</sub> emitted during the calcination process.** This approach would aim to directly combat the CO<sub>2</sub> being emitted during the calcination process, but it would come at a considerable cost to producers and would require capital investment support. One of the technologies that is of particular interest to many European producers is the Oxyfuel process; this involves replacing the air inside the kiln with pure oxygen, thus enabling the optimal combustion of all the fuels used to generate the necessary heat. Oxyfuel combustion creates an exhaust gas with a high concentration of CO<sub>2</sub> that’s relatively easy to capture and process.

HeidelbergCement is currently working on a joint project to develop Oxyfuel technology that recirculates exhaust gases to the burner while pure oxygen is added, this keeps the combustion process effective whilst enabling the CO<sub>2</sub> concentration in the exhaust gas to rise to 70%. Having made considerable progress since 2007, two facilities in Europe, including the Colleferro plant in Italy,

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<sup>43</sup> “ETP Clean Energy Technology Guide”, IEA, 2020.

will be converted to test the technology on an industrial scale. The testing costs are expected to be approximately €80 million, with HeidelbergCement contributing €25 million<sup>44</sup>.

The main [project that's currently under development](#) is that being conducted by Eni and Snam, the aim of which is to create a CO<sub>2</sub> storage facility off the coast of Ravenna. According to the NECP proposal, the project is due to enter its initial operational phase in 2024 and the objective is to capture over 25,000 tonnes of CO<sub>2</sub> from Eni's Casalboretto power plant. In the subsequent industrial phase, starting in 2027, the facility is expected to store 4MtCO<sub>2</sub>/year from industries in the Ravenna area as well as in northern Italy (reaching a total of 12MtCO<sub>2</sub>eq<sup>45</sup>). From 2030, the project aims to increase the quantities stored at a rate of 16 to 20 Mt CO<sub>2</sub> per year<sup>46</sup>. It is not yet known whether or to what extent the project will be able to assist cement companies in their quest to reduce CO<sub>2</sub> emissions.

**Figure 9** – Possible solutions for reducing CO<sub>2</sub> emissions in cement production<sup>47</sup>. Estimated reductions relate to scopes 1, 2 and 3 and do not include estimates for technologies that are not yet fully developed

### Short-term solutions

1. Energy efficiency in production processes	-21 kg CO <sub>2</sub> / t cement
2. Reducing the share of clinker in cement	-46 kg CO <sub>2</sub> / t cement
3. Less use of concrete in construction	-32/33 kg CO <sub>2</sub> / t cement
4. Use of alternative fuels	-41/51 kg CO <sub>2</sub> / t cement
5. Use of substitute materials and recycling of cement	-6 kg CO <sub>2</sub> / t cement

### Medium/long- term solutions

1. Increased use of renewable energy sources
2. Electrification of kilns
3. CCUS

<sup>44</sup> "Oxyfuel technology for carbon capture at HeidelbergCement plant Colleferro", Heidelberg Materials. <https://www.heidelbergmaterials.com/en/ecra-oxyfuel>

<sup>45</sup> Equivalent to 9% of Italy's ETS emissions in 2021 (From analysis of [https://climate.ec.europa.eu/document/download/f71076c0-0ffd-4e7d-aeb7-28f6cbb6905\\_en?filename=it\\_2022\\_factsheet\\_en.pdf](https://climate.ec.europa.eu/document/download/f71076c0-0ffd-4e7d-aeb7-28f6cbb6905_en?filename=it_2022_factsheet_en.pdf))

<sup>46</sup> [https://commission.europa.eu/publications/italy-draft-updated-necp-2021-2030\\_en](https://commission.europa.eu/publications/italy-draft-updated-necp-2021-2030_en)

<sup>47</sup> From ECCO analysis of "La strategia di decarbonizzazione del settore del cemento" (Decarbonisation strategy for the cement industry), Federbeton (2020).

## 3.2 ANALYTICAL OVERVIEW OF INDUSTRIAL POLICIES REQUIRED TO DECARBONISE THE CEMENT INDUSTRY

An overview of industrial policies for decarbonising the cement industry, as proposed by ECCO and discussed in the following paragraphs, is set out in [Figure 10](#). It specifies a number of action areas where individual policies may be able to have an impact. The action, demand and supply policies are distinguished according to whether they are aimed at the cement producer (direct) or at implementing certain enabling conditions (indirect).

The policies and actions, described in detail in sections [3.2.1](#) and [3.2.2](#), include a broad spectrum of activities that may contribute to the decarbonisation of the Italian cement industry. However, in the context of the activities outlined in [section 3.1](#), some policies are more relevant than others.

For example, in view of the fact that the sector only generates relatively low profitability margins, support and regulatory measures that are able to provide investment assistance, as well as the adoption of short-term solutions, would be absolutely essential. In relation to the objective of reducing the percentage of clinker contained in cement whilst maintaining an equivalent structural performance, it is also important that demand-side measures are adopted to facilitate the creation of markets that favour sustainably produced cement over that which is produced using more emission-intensive processes.

Likewise, a favourable environment should be created for the development of technologies with lower TLRs so as to facilitate more feasibility testing of such innovations, particularly in light of the long-term time horizon and the possibility of implementing solutions that haven't yet been developed to an industrial scale, including CCUS.

### 3.2.1 SUPPLY-SIDE ACTIONS FOR TRANSFORMING CEMENT PRODUCTION PROCESSES

The aim of supply-side policies is to decarbonise the cement production processes by reducing the quantity of CO<sub>2</sub> emitted during the chemical transformation processes and by replacing fossil fuels with alternatives that produce less emissions. For this to be possible, a number of action areas need to be considered:

- the capital expenditure that companies ("Company CapEx") will need to incur to transform their existing production facilities
- the operating costs that companies ("Company OpEx") will need to incur to produce decarbonised cement
- infrastructure required to transport and store the CO<sub>2</sub> generated by the cement production processes
- the development of technologies to make the production processes more efficient and thus reduce operating costs, even those that aren't yet sufficiently scaled up for industrial use.

Regarding direct policies to support the capital investments of cement producers, these shall include grants or subsidised loans aimed at helping to fund the installation of CCUS facilities. Indirect actions shall include measures to support the development of a national supply chain for industrial CCUS systems, in order to increase efficiencies of scale and reduce installation costs, as well as to generate direct and indirect economic value from the demand for CO<sub>2</sub> capture facilities.

With regard to companies' operating costs, the public authority can support the switch from coal to the more expensive natural gas and alternative fuels (obtained from waste containing biomass) by awarding Contracts for Difference<sup>48</sup> (CfDs) with a predetermined duration. Furthermore, measures to indirectly disincentivise emissions - such as the ETS - effectively increase production costs and, in so doing, create a competitive advantage for less carbon-intensive producers.

Policies aimed at acting on infrastructural aspects are mainly indirect in nature, and relate to the transport and storage capacity of CO<sub>2</sub> captured by CCUS facilities, or the need to create systems and facilities to enable electrification or the use of green hydrogen.

Finally, innovation support policies (direct) can help improve the energy efficiency of processes at the individual facility level, while also providing the opportunity to test new technologies or to scale up decarbonisation enabling technologies (indirect), such as CCUS systems.

### *3.2.2 DEMAND-SIDE ACTIONS FOR CREATING CEMENT MARKETS WITH A LOWER EMISSIONS IMPACT*

Demand-side policies should be aimed at reducing the consumption of cement, or rather clinker, in the end-uses of cement and concrete, while maintaining the same structural performance. Furthermore, such policies should also be instigated to ensure the existence of markets that are willing to meet the higher costs associated with cement produced by less emission-intensive processes.

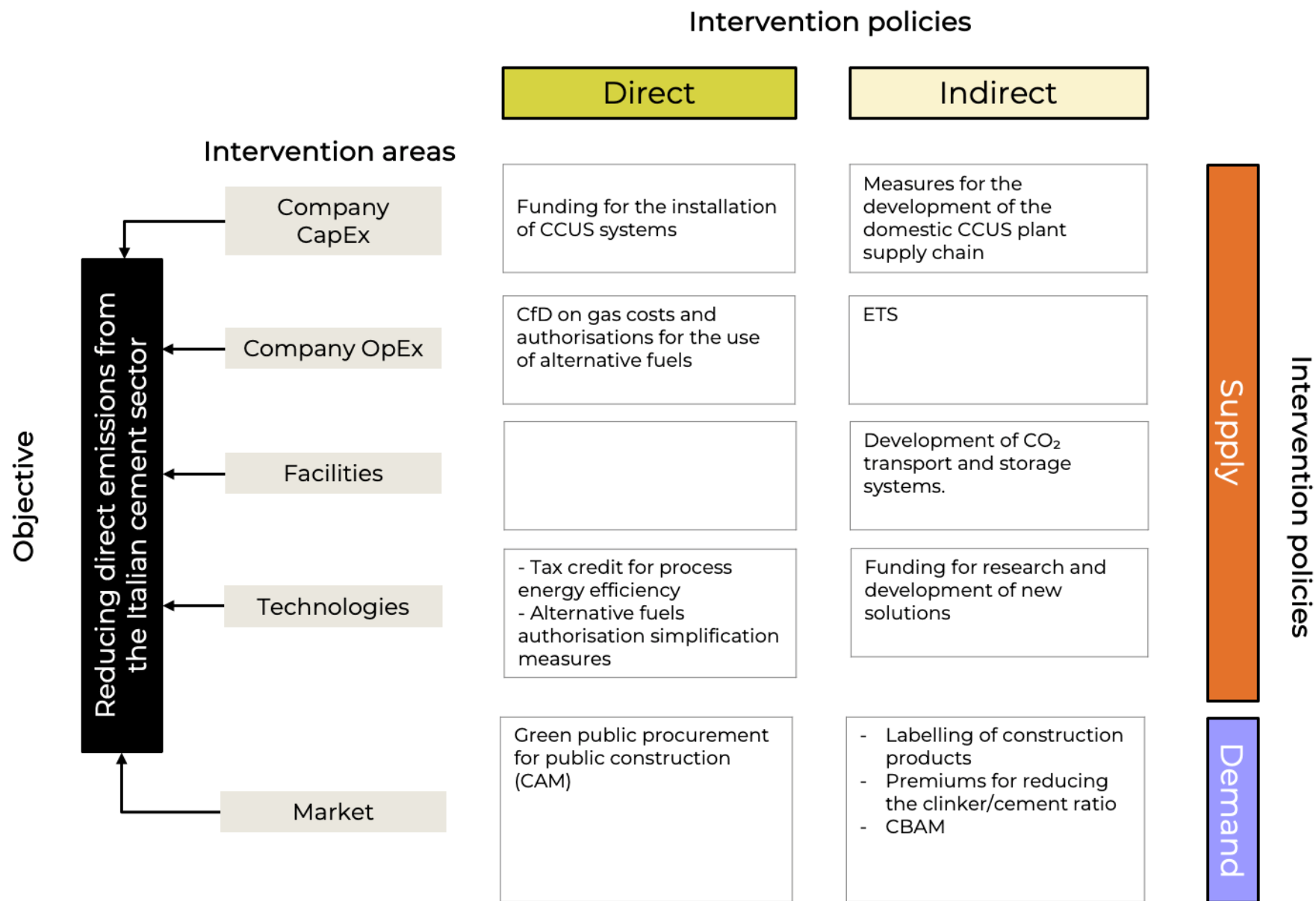
Public procurement is a direct tool that can be used to create markets. More specifically, Green Public Procurement (GPP), using minimum environmental criteria (CAM - Criteri Ambientali Minimi), makes it possible to favour construction materials for use in public works that have a low clinker content and a lower CO<sub>2</sub> emissions per tonne.

Setting product standards and introducing incentives for reducing the clinker content in the cement produced indirectly influence the cement market, thus creating a cost advantage for more decarbonised products. Mechanisms that discourage imports of more carbon-intensive cement – such as the CBAM – may also indirectly boost the demand for decarbonised cement.

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<sup>48</sup> Contracts for Difference are an instrument that allows a public authority to fix the supply price for a particular energy product at a certain value for an extended period of time. In the event that the market price for the energy product rises above the stipulated value, the public authority shall cover the price difference so as to ensure the supplier is paid accordingly and the consumer doesn't have to bear excessive costs.

Figure 10 – Proposed policy framework for decarbonising the cement industry (developed by ECCO)



### 3.3 OVERVIEW AND ASSESSMENT OF EXISTING POLICIES

This section provides an overview of existing national and EU policies that can help facilitate the decarbonisation of the Italian cement industry. [Table 3](#) provides a summary of these, defining them by type (as described in [Figure 10](#)), potential relevance (for decarbonising the sector) and current impact (if any).

**Table 3** – Assessment of current policies within the Italian-EU context

Policy	Italy or EU	Type	Relevance	Impact
Italian Decree Law on Energy	Italy	Supply Indirect Companies	◆◆◆◆◇	◆◆◆◆◇
Transizione 5.0	Italy	Supply Indirect Companies	◆◆◆◆◇	◆◆◆◆◇
Ministerial Decree No. 152 of 27 September 2022 - end of waste	Italy	Supply Indirect Companies	◆◆◆◆◇	◆◆◆◆◇
Criteri Ambientali Minimi (CAM - Minimum Environmental Criteria)	Italy	Demand Direct Market	◆◆◆◆◇	◆◆◆◆◇
Construction Products Regulation (CPR)	EU	Demand Indirect Market	◆◆◆◆◇	Not assessed Regulation under implementation
Project of Common Interest (PCI)	EU	Supply Indirect Infrastructure	◆◆◆◆◇	◆◆◆◆◇
IPCEI for Hydrogen	EU	Supply Indirect Technologies	◆◆◆◆◇	◆◆◆◆◇
EU Innovation Fund	EU	Supply Direct Company CapEx	◆◆◆◆◇	No projects involving Italy
EU ETS	EU	Supply Indirect Company OpEx	◆◆◆◆◇	◆◆◆◆◇
CBAM	EU	Demand Indirect Company OpEx	◆◆◆◆◇	◆◆◆◆◇

### 3.3.1 ITALIAN DECREE LAW ON ENERGY

Decree Law No. 181 of 9 December 2023 provides for both a “preference” mechanism, where there are multiple competing cases, for renewable energy projects aimed at meeting the energy needs of high energy users, and an advance on a proportion of the electricity produced by newly developed facilities, or those in the process of being developed, ahead of them becoming operational, so as to enable companies to benefit immediately from the anticipated reduction in energy expenditure without having to wait for the facilities to become operational. This measure is aimed at accelerating investments in self-generated renewable energy in sectors with high energy consumption and where carbon leakage is commonplace, such as the cement industry, particularly in view of the need to reduce the impact of energy price variations on energy expenditure - the spot price of electricity stood at €128/MWh in 2023, compared to €52/MWh in 2019. With the current market situation, in which significant uncertainty remains due to the Russian-Ukrainian conflict and the resulting geopolitical fallout, the increased use of renewables helps to contain rises in energy costs and reduces exposure to electricity price volatility, which can be a significant issue for companies in terms of their international competitiveness.

Such a measure has a two-fold benefit: it helps to maintain the competitiveness of companies, especially those with high energy consumption requirements, and simultaneously facilitates the increased use of renewable energy.

The relevance and, potentially, the impact of such a measure as a decarbonisation policy is assessed as being significant.

### 3.3.2 TRANSIZIONE 5.0 (TRANSITION 5.0)

Article 38 of Decree Law No. 39 of 2 March 2024 establishes the Transizione 5.0 Plan as part of Mission 7 of the EU's RePowerEU plan and sets out how it will be applied and implemented, largely by MIMIT (Ministero delle Imprese e del Made in Italy - Ministry for Enterprises and Made in Italy). The idea behind the plan is to use tax credits to finance innovation projects that lead to a reduction in energy consumption during 2024 and 2025 for companies located either within Italy (minimum 3% reduction) or abroad (minimum 5% reduction).

Furthermore, in accordance with the DNSH (Do No Significant Harm) principle, investments intended for “activities directly related to fossil fuels” or ETS facilities whose performance is worse than the sector benchmark are not eligible<sup>49</sup>.

Once again, the article introduces the possibility of financing investments in self-generated renewable energy for self-consumption, with the exception of biomass, including facilities to store the energy produced, thus establishing an important stimulus to encourage the installation of renewable facilities to meet the energy needs of companies (in line with the Decree Law on Energy).

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<sup>49</sup> The benchmarks are defined according to the Free Allocation Rules, the latest revision of which is COMMISSION DELEGATED REGULATION (EU) 2024/873 of 30 January 2024, published in the Official Journal on 4 April 2024 [https://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=OJ:L\\_202400873](https://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=OJ:L_202400873)



The incentive is conditional on the presentation of special certificates, issued by an independent assessor, attesting to the actual savings achieved.

For SMEs and non-ETS facilities in particular, this measure represents an important source of financing<sup>50</sup>. For ETS facilities, the need to comply with the benchmark reduces the number of operators that may be eligible for financing, because the emission levels associated with the relevant benchmarks should be achievable even without funding. The evaluation of this measure in terms of its relevance and impact are, therefore, affected by the limitations described.

### *3.3.3 MINISTERIAL DECREE NO. 152 OF 27 SEPTEMBER 2022 – END OF WASTE AND INERT WASTE MATERIALS*

End of Waste is the process by which a waste-derived material ceases to be waste, through recycling or other recovery operation, and acquires the status of a product. Ministerial Decree 152/2022 sets out the regulation for determining when inert waste ceases to be waste, so as to obtain aggregates to be reused for the uses indicated in the regulation<sup>51</sup>. With respect to possible strategies for reducing emissions generated by the cement production process, it is clear how the full implementation of such a directive may have an impact on the possibilities for increasing the range of substitute materials to be used in the cement production cycle. As of today, work to adapt the operators' authorisations to align with the decree's criteria is still in progress and the deadline for adapting the End of Waste authorisations for inert construction and demolition waste to Ministerial Decree 152/2022 is 4 November 2024. The new Ministerial Decree, which is being introduced to replace the previous one, will set forth two new uses of recycled aggregate for clinker and cement production.

### *3.3.4 CRITERI AMBIENTALI MINIMI (CAM – MINIMUM ENVIRONMENTAL CRITERIA)*

The Criteri Ambientali Minimi<sup>52</sup> (CAM) are requirements of the public procurement procedures (GPP) and their purpose is to identify the most environmentally friendly products or services available on the market.

In Italy, the CAM are defined within the National GPP Action Plan<sup>53</sup> and are regulated by the Contracts Code<sup>54</sup>, which establishes the obligation for “technical specifications” and “contractual clauses” to be contained in the CAM, as well as the “contract award criteria” that favour the most sustainable and circular supply chains.

There are a number of CAM for construction products used in the building industry and they reward companies that procure cement and cement-based materials that are at least 90% produced by

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<sup>50</sup> However, the regulation presents an unresolved distinction between ETS and non-ETS companies, as the implementation of the DNSH principle should provide for the extended application of the comparison against sector or “fall-back” benchmarks in case these do not exist.

<sup>51</sup> Ministerial Decree No. 152 of 27 September 2022

<sup>52</sup> “[Green Public Procurement – Criteri Ambientali Minimi](#)”, Italian Ministry of the Environment and Energy Security.

<sup>53</sup> “National action plan for the environmental sustainability of consumption within the public administration sector” Ministerial Decree of 3 August 2023.

<sup>54</sup> Legislative Decree No. 36 of 31 March 2023.

facilities in an EU/ETS country<sup>55</sup>. With the exception of this specification, the CAM do not currently take 'climate' into consideration, although the need to align with EU regulations (see subsequent paragraphs) suggests that a tightening of the criteria may be on the horizon.

### 3.3.5 CONSTRUCTION PRODUCTS REGULATION (CPR)

The Construction Products Regulation (CPR)<sup>56</sup> is a European Union regulation, which came into force in 2013, that sets out harmonised conditions for the marketing of construction products within the single market. The primary objective of the CPR is to facilitate the free movement of construction products within the EU while ensuring high standards in relation to health and safety and environmental protection are maintained. This regulation establishes the basic requirements that construction products - including cement and its derivatives - must meet and defines standardised procedures for assessing the performance of these products.

In March 2022, the European Commission proposed a revision of the CPR Regulation. The objectives of the new version, which was approved on 10 April 2024<sup>57</sup>, include the introduction of new and more stringent environmental sustainability requirements for construction products so as to make them longer-lasting as well as easier to repair, recycle and reproduce. The increased use of remanufactured products forms part of the shift towards a more circular economy and a reduction in the environmental and carbon footprint of construction products.

Product design specifications will have to consider environmental aspects across the product's entire life cycle. These aspects should include: maximising the product's durability and reliability; **minimising greenhouse gas emissions**; maximising the reused, recycled and by-product content; the use of safe, sustainable and environmentally benign substances; reduced energy consumption and improved energy efficiency; optimising the use of resources; the ease of reuse, recycling and repair of components; the ease of maintenance and refurbishment; the recyclability and capability to be remanufactured; the use of materials from sustainable sources for sustainable procurement; minimising the product-to-packaging ratio; and minimising waste generation, particularly hazardous waste. Manufacturers will therefore be required to disclose the performance of their products with respect to these environmental considerations.

The regulation also includes specific provisions for Green Public Procurement (GPP). The regulation stipulates that public authorities must apply mandatory minimum environmental sustainability requirements for construction products when awarding contracts, using the technical specifications, selection criteria, execution clauses or the award criteria to ensure such requirements are met. In Italy, GPP was introduced in 2008 via a national GPP plan<sup>58</sup> that set forth the adoption of Criteri Ambientali Minimi (Minimum Environmental Criteria)<sup>59</sup>. Once the new CPR provisions come into force, it will be necessary for the CAM criteria to be adapted accordingly.

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<sup>55</sup> "[Minimum Environmental Criteria for the provision of planning and implementation services to building projects](#)", *Official Gazette of the Italian Republic*, 6 August 2022.

<sup>56</sup> "[Regulation \(EU\) No 305/2011 of the European Parliament and of the Council](#)", *Official Journal of the European Union*.

<sup>57</sup> Procedure 2022/0094 [https://www.europarl.europa.eu/doceo/document/TA-9-2024-0188\\_EN.html](https://www.europarl.europa.eu/doceo/document/TA-9-2024-0188_EN.html)

<sup>58</sup> "National action plan for the environmental sustainability of consumption within the public administration sector" Ministerial Decree of 3 August 2023.

<sup>59</sup> "[Green Public Procurement – Criteri Ambientali Minimi](#)", Italian Ministry of the Environment and Energy Security.

### 3.3.6 PROJECTS OF COMMON INTEREST

Projects of Common Interest (PCI)<sup>60</sup> are funding initiatives for cross-border EU energy infrastructure projects aimed at integrating the internal energy market and achieving the EU's energy and climate goals.

On 28 November 2023<sup>61</sup>, the European Commission published a list of potential PCI projects that could become recipients of funding. These included the Callisto project<sup>62</sup>, a joint venture between Eni, Snam and the French company Air Liquide to develop a CO<sub>2</sub> storage facility in Ravenna. On 4 April 2024, the Commission confirmed that the project is included in the EU's sixth PCI list<sup>63</sup>, it will therefore benefit from accelerated approval and implementation procedures, as well as, under certain conditions, access to European funding from the Connecting Europe Facility (CEF).

### 3.3.7 EU INNOVATION FUND

The EU Innovation Fund<sup>64</sup> is an EU climate policy funding programme that's focused on the development and commercialisation of technologies aimed at decarbonising industry. The EU Emissions Trading System (ETS) provides the revenues for the Innovation fund, which the European Commission estimates will amount to approximately €40 billion over the period 2020-2030.

Thus far, the Innovation Fund<sup>65</sup> has financed 12 projects (11 large-scale) whose aim is to decarbonise cement production processes, allocating a total of €1.94 billion (€161.3 million per project on average). These relate to direct grants or subsidised loans to 26 organisations to finance investment projects largely involving the installation of CCUS facilities. Other funded projects involve the development of clinker substitutes (ERACLITUS) and research and testing into the use of syngas (CLYNGAS). To date, none of these projects has involved any participation from Italy, whereas Germany and France are involved in 3 and 2 projects respectively (with 6 and 8 industrial organisations participating).

In light of Italy's limited fiscal space and, therefore, the difficulty of accessing government funding, this EU fund, despite the complexities often associated with using EU funds, could co-finance the capital expenditure of similar projects in Italy as well. In addition to the increase in the size of the fund and the specific mention of the CBAM sectors as the preferential recipients thanks to the reduction in free allocations, the latest version of the EU ETS directive also brings in a number of other important changes, these relate to:

- financing methods - it opens up the possibility of financing through Contracts for Difference (CfDs) and Contracts for Carbon Difference (CfCDs), a contract type that primarily provides

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<sup>60</sup> "[Projects of Common Interest](#)", *European Commission*.

<sup>61</sup> "[Annex VII to Regulation \(EU\) No 2022/869 replacing annex VII of the Regulation \(EU\) 347/2013](#)", *European Commission*.

<sup>62</sup> "[Eni: il progetto CCS di Ravenna entra nella lista europea dei Progetti di Interesse Comune](#)" (Eni: Ravenna CCS Project joins European List of Projects of Common Interest), *Eni Press Release* (28 November 2023).

<sup>63</sup> Commission Delegated Regulation (EU) 2024/1041 of 28 November 2023 amending Regulation (EU) 2022/869 of the European Parliament and of the Council as regards the Union list of projects of common interest and projects of mutual [interest](#)

<sup>64</sup> "[EU Innovation Fund](#)", *European Commission*.

<sup>65</sup> "[Innovation Fund Dashboard](#)", *European Commission*.

support with OpEx, often the major barrier for the development and implementation of technological innovations

- project types: compared to the past, when the fund was principally aimed at transitioning prototype technologies to commercial scale, the latest revision of the directive appears to proffer a broader objective, *supporting innovation in low- and zero-carbon techniques, processes and technologies that contribute significantly to the decarbonisation of the sectors covered by this Directive and broadly contribute to zero pollution and circularity objectives.*

It is therefore necessary that any subsequent implementation legislation reflects this concept, enabling the fund to rebalance, at least partially, the competitive imbalances that exist as a result of different possibilities for accessing EU transition financing, due to the different fiscal spaces of each of the Member States.

### 3.3.8 IPCEI FOR HYDROGEN

IPCEIs (Important Projects of Common European Interest) are public-private investment projects across multiple EU countries to facilitate innovation in certain key sectors and technologies, including hydrogen. Three hydrogen focussed IPCEIs – “Hy2Tech”, “Hy2Use” and “Hy2Infra” – have been launched between 2022 and 2024<sup>66</sup>, totalling €17.5 billion of state aid approved at the EU level.

Italy has thus far contributed a substantial amount of NRRP funds to the IPCEI projects, allocating €700m to “Hy2Tech”<sup>67</sup> and €350m to “Hy2Use”<sup>68</sup>.

Therefore, these projects have a certain degree of relevance and impact in terms of decarbonising hard-to-abate industrial sectors.

### 3.3.9 EU ETS

The European Union Emissions Trading System (EU ETS) is the primary tool used by the European Union to achieve its CO<sub>2</sub> emission reduction targets in the most polluting industrial sectors. In Italy, more than 1200 facilities (accounting for 40% of the country’s total emissions) are subject to the ETS directive. The ETS assigns a value to emissions, so-called emission allowances, and companies must purchase the emission allowances that correspond to their emissions. Some facilities have been receiving emission allowances for free, but these will be phased out from 2026 (CBAM Regulation).

For cement producers, the obligation to buy ETS allowances means an increase in operating costs, which in turn leaves them at a competitive disadvantage in relation to a producer whose processes are more emission-efficient. This should act as an incentive for companies whose facilities are more emission intensive to accelerate the transformation of their production process, otherwise the impact on their profit and loss account will be very difficult to sustain.

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<sup>66</sup> [“Approved IPCEIs in the Hydrogen value chain”](#), European Commission.

<sup>67</sup> [“IPCEI Idrogeno 1 \(H2 Technology\)”](#), Ministero delle Imprese e del Made in Italy (Ministry for Enterprises and Made in Italy).

<sup>68</sup> [“IPCEI Idrogeno 2 \(H2 Industry\)”](#), Ministero delle Imprese e del Made in Italy (Ministry for Enterprises and Made in Italy).

The directive and its implementing legislation<sup>69</sup> also sets out conditional requirements for the allocation of free allowances to operators of facilities whose greenhouse gas emission levels are above the 80th percentile of emission levels for the relevant product benchmarks if, by 1 May 2024, they have not yet established a climate neutrality plan. Notwithstanding the implementation timeframes, such a provision appears to be in line with the need for companies to start planning the transformation of their industrial processes to meet the transition requirements and to plan their investments accordingly.

All sector companies are included within the directive's scope of application, whose relevance and impact, therefore, are assessed to be particularly significant.

### *3.3.10 CBAM REGULATION*

The EU's Carbon Border Adjustment Mechanism (CBAM) was recently introduced to put a fair price on the CO<sub>2</sub> emitted during the production of goods imported into the EU. The payment of a price for the embedded carbon emissions generated in the production of certain goods imported into the EU ensures the carbon price of imports is equivalent to the carbon price of domestic production, thus safeguarding the EU's climate objectives. The CBAM will become operational from 2026, with a gradual introduction and simultaneous phasing-out of the allocation of free allowances from 2026 to 2033. From 2023 to 2025, the monitoring and reporting of emissions embedded in imported products will be mandatory. The directive will be fully operational from 2034 onwards.

The CBAM system will also apply to imports of non-EU cement. Therefore, those companies that import products for processing and re-exportation should be disincentivised, while EU producers should benefit since the competitive disadvantage that may exist between EU and non-EU producers is levelled out. There remains the need to generate domestic demand for these products, through selective demand mechanisms, since there are currently no mechanisms to help these products become more competitive on the global markets.

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<sup>69</sup> Art. 10 bis, para. 1, of Directive 2003/87/EC, Art. 22 ter of COMMISSION DELEGATED REGULATION (EU) 2024/873 [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L\\_202400873](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202400873) and Commission Implementing Regulation (EU) 2023/2441 of 31 October 2023

## 4 CONCLUSIONS

The decarbonisation of the Italian cement sector is a difficult challenge, because it requires the reduction in the emissions that are inherent in its production process as well as those generated by burning fuels. This is further complicated by the investment costs associated with decarbonisation which, for manufacturing companies operating with reduced profit margins despite the market concentration that's occurred over the last decade, are very difficult to sustain.

For these reasons, the competitiveness of the cement sector and its decarbonisation can only be made possible with coordinated public sector support through priority actions aimed at the short and long term. In the short term, the focus should be on reducing combustion emissions, by replacing fossil fuels with alternative fuels wherever possible and supporting such investments, as well as by creating a regulatory environment that also favours the use of alternative fuels, including those derived from waste. Alongside this, a long-term strategy should be established and pursued, aimed at identifying possible new solutions and/or developing those that exist but which are not yet sufficiently advanced and scaled up for industrial purposes (such as CCUS). Furthermore, it will be necessary to create, at a national and European level, a market for cement products that places a higher value on those types with a lower environmental impact, particularly those with a reduced clinker content, and facilitates the substitution of cement and the reuse of inert materials, while maintaining the same level of structural performance and achieving lower overall emissions in the LCAs of buildings and infrastructure.

Italy hasn't yet developed a coordinated industrial plan for decarbonising its cement sector. The measures being considered are either not yet strong enough or haven't yet been implemented (as in the case of funding from the EU Innovation Fund).

This policy paper offers a perspective and a conceptual outline for defining a policy framework that's consistent with the country's emission reduction goals and the review of the NECP could provide an opportunity for discussion and for establishing policies for decarbonising the cement production industry over the 2030 to 2050 timeframe.



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