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INDUSTRIAL TRANSFORMATION POLICIES

Green public procurement for construction materials

POLICY PAPER
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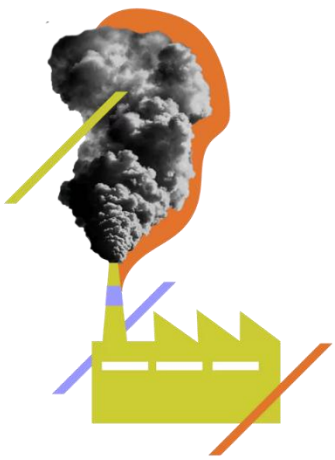

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EXECUTIVE SUMMARY

The drive to innovate that has resulted from the need to meet today's decarbonisation objectives has given rise to a new industrial revolution based on clean technology. This has triggered a profound transformation in production systems and has reconfigured the global competitive landscape. If, in such a context, Europe and Italy are to continue playing a strategic role, climate change policies must look to preserve their strategic autonomy[1], whilst also maintaining the Continent's competitiveness.

The challenge of undertaking an industrial transformation that aligns with decarbonisation objectives is particularly complex. This is especially true for energy-intensive production processes, where the physical and chemical procedures required generate greenhouse gases, since the carbon content is an inherent feature of the raw materials used. This is the case, for example, in the production of construction materials such as steel and cement.

Globally, approximately 50% of the climate impact from construction (the built environment), assessed over the entire life cycle, derives from the use of concrete, bricks and other cement-based materials, while the remainder is attributed to the use of metals (15%), fossil fuels (29%) and biomass (10%)[2].

As was recently underlined by two papers analysing the industrial transformation policies for the steel and cement industries, for complex sectors such as those involved in the manufacture of construction materials, any emissions reduction strategy must focus on a range of solutions that can be implemented over time. To this end, a portfolio of industrial policies with varying priorities is required, coordinated and integrated in such a way so as to ensure that the actions aimed at both the supply and demand sides of the equation are fully coordinated. These include: supply-side support policies, to tackle issues relating to the need to fund investment and meet higher energy costs; demand-side incentive and protection mechanisms to facilitate the development of a market that can provide a vehicle for the commercialisation of more expensive green products.

The new policy guidelines of the European Commission, along with the Draghi report, also recognise the need to stimulate demand for green products by introducing standardised criteria for public procurement that encourage the use of low-carbon materials.

Green Public Procurement - GPP

In Europe, each year, more than 14% of GDP, approximately €2 trillion, is spent by over 250,000 public authorities to pay for services, works and goods. Of this, an estimated €13.4 billion is spent on construction materials. In Italy, the total amount spent on public procurement contracts with a value

[1] The European Commission defines its "open strategic autonomy" as "the EU's ability to make its own choices and shape the world around it through leadership and engagement, reflecting its strategic interests and values". Communication COM(2021) 66 final https://eur-lex.europa.eu/resource.html?uri=cellar:5bf4e9d0-71d2-11eb-9ac9-01aa75ed71a1.0001.02/DOC_1&format=PDF

[2] UNEP (2024), *Global Resources Outlook 2024*, https://www.unep.org/resources/Global-Resource-Outlook-2024

of €40,000 or more is approximately €283.4 billion[3]. In 2019, Italy's public spending in the construction and infrastructure sector amounted to €48 billion.

By using green products and facilitating their procurement, public administrative bodies can help drive industry towards more sustainable production[4], acting as a catalyst for growing the demand for climate-compatible products, even in private markets. Indeed, the purchasing decisions of public authorities can certainly encourage innovation in clean technologies by providing access to economies of scale, even for smaller companies and start-ups[5].

This policy briefing, which analyses the current situation in relation to public procurement legislation in Europe and Italy[6], sets out a proposal for revising the minimum environmental criteria (*Criteri Ambientali Minimi - CAMs*) for the public procurement of construction materials, which are currently under review.

[3] Thomas Wyns, Harri Kalimo, Gauri Khandekar (2024) *Public procurement of cement and steel for construction* https://www.brussels-school.be/sites/default/files/2024-06/Public%20procurement%20construction%20steel%20and%20cement%20EU%20FINAL.pdf. June 2024

[4] Joint Research Centre (2019), *Revision of the EU Green Public Procurement Criteria for Transport*, JRC Science for Policy Report.

[5] Intereconomics, Volume 57, 2022 · Number 3 · JEL: H57, Q58, O52. *Green Public Procurement: A Neglected Tool in the European Green Deal Toolbox?* https://www.intereconomics.eu/contents/year/2022/number/3/article/green-public-procurement-a-neglected-tool-in-the-european-green-deal-toolbox.html

[6] Fondazione Ecosistemi (2024) (Technical Report on GPP in Italy), Fondazione Ecosistemi (2024) *Report Tecnico sul GPP in Italia*" (Technical Report on GPP in Italy)

1. WHAT IS GREEN PUBLIC PROCUREMENT (GPP) AND WHY IS IT IMPORTANT FOR ACHIEVING NET-ZERO?

Green Public Procurement (GPP), as defined by the European Commission, is a tool for public authorities (PAs) to integrate environmental selection criteria into every stage of their purchasing process.

The objective is to encourage the selection of goods, services and works with minimal environmental impact throughout their lifecycle, facilitating the adoption of sustainable technologies and the development of products that are more environmentally[7] friendly.

In **Europe**, each year, **public authorities spend over 14% of GDP, approximately €2 trillion, on services, works and goods[8].**

In 2019, direct emissions from publicly procured steel and cement totalled **51 $MtCO_2eq$, representing 2% of the EU's total emissions[9]**. That same year, EU Member States spent approximately €13.4 billion on steel and cement for use in public construction projects[10], accounting for around 3% of public spending in the construction sector. In the EU, the steel and cement industries are respectively responsible for approximately 175 $MtCO_2eq$/year and 125 $MtCO_2eq$/year, almost 10% of the continent's annual greenhouse gas emissions.

Establishing selection criteria that favour products with lower emissions would, therefore, help reduce greenhouse gas emissions and reward producers who are more environmentally responsible, compensating them for the extra costs incurred to transform their production processes to meet higher environmental and emissions standards.

As outlined by the European Commission in the policy guidelines for its new mandate, the creation of so-called "lead markets" for products with a lower environmental and emission impact supports domestic demand and encourages the transformation of production processes towards less intensive production, a process for which public authority demand can act as a catalyst. Therefore, GPP can clearly play a key role in Europe's strategy for reducing emissions and furthering sustainability, since it supports the development of markets for green products and acts as a catalyst for generating private demand for products with high environmental standards. Indeed, in this regard, it has been announced that a revised Public Procurement Directive will be prepared[11].

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[7] "Piano d'azione per la sostenibilità ambientale dei consumi nel settore della Pubblica amministrazione" (Action Plan for the Environmental Sustainability of Public Authority Consumption) *Official Journal of the Italian Republic*, Decree of 3 August 2023 - Attachment 1

[8] Public procurement - European Commission (europa.eu)

[9] Public procurement data is not routinely collected, either in Italy or in Europe. The fact that public tenders are issued by different public administrative bodies with varying levels of authority is one of the reasons why collecting such data is so difficult, it is for this reason that the economic and emissions-related benchmark values can only be based on estimates. The data referenced in this document has been taken from Thomas Wyns, Harri Kalimo, Gauri Khandekar - Public procurement of cement and steel for construction. June 2024

[10] €5.1 billion was spent on cement, while €8.2 billion was used to purchase steel.

[11] Directive 2014/24/EU https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0024

Currently, within the EU, green procurement criteria are not mandatory. Of the 14 existing GPP guidelines, one is specifically aimed at office buildings, encompassing all stages from their design to their management, including the use of construction materials. These criteria are intended to ensure sustainability is a consideration in the design and construction of such buildings, thus helping to reduce their environmental impact throughout their life cycle. These guidelines were developed in 2016 and are currently under review. Furthermore, the recently revised European Directive on the Energy Performance of Buildings (EPBD) mandates the calculation of a building's Global Warming Potential (GWP), an indicator that quantifies the potential contribution a building will make to global warming throughout its full life cycle. However, this obligation only applies to new buildings starting from 2030, although the European Commission is calling for this indicator to gradually become part of Energy Performance Certificates (EPCs) for existing buildings as well.

According to statistics published by the European Commission on GPP in 2020, 80% of public procurement spending in Europe is still awarded to the bidder offering the lowest price, resulting in a fragmented approach to, and therefore limited progress in, developing "lead markets" for products that generate less emissions, are more energy efficient and reduce the consumption of materials.

GPP was introduced in Italy in 2008 when the "*Piano d'Azione per la sostenibilità ambientale dei consumi del settore della Pubblica Amministrazione*" (GPP NAP - Action Plan for the Environmental Sustainability of Public Authority Consumption) was published, which set out national objectives for using the minimum environmental criteria (*Criteri Ambientali Minimi - CAMs*) to increase efficiency, save resources, minimise waste and reduce the use of hazardous substances. The CAMs are environmental standards established for various stages of the purchasing process to identify, depending on market availability, the best design, product or service solution from an environmental standpoint. **In 2019, the value of Italy's GPP market stood at 10.4% of GDP, or €186 billion. Of this, 26% was for construction projects alone[3].**

In 2023, Italy became the only European country where GPP is mandatory for all public procurements. There is no doubt that GPP, domestic or otherwise, is a crucial tool for fostering demand for more sustainable products and processes.

According to the *Codice degli appalti* (Public Procurement Code), a public procurement contract is considered green when the proposal documents contain all the technical specifications and contractual clauses stipulated by the CAMs, and the winning proposal is that which **offers the best value for money**. This criterion takes into account scores awarded in relation to the adoption of advanced environmental criteria or alternatives guaranteeing benefits that exceed the minimum requirements. While the CAMs are mandatory for all public authorities, it is still possible for them to adopt more ambitious environmental criteria where adequate technical and market assessments demonstrate that additional environmental benefits can be gained by doing so.

Therefore, as part of the GPP NAP, the CAMs represent a vital tool. Currently, **the CAMs cover the use of materials such as steel, cement and concrete containing a minimum quantity of**

recycled materials and incentivise the use of products from facilities subject to the EU ETS directive[12].

By applying the CAMs, public authorities can, to a certain extent, reduce the carbon and environmental footprint of the products they purchase. However, the CO_2 emissions resulting from the production of construction materials are not explicitly considered. Therefore, there is still room for improvement, something which could be addressed as part of the current CAM revision process.

Indeed, the current revision of the construction sector CAMs, promoted by the *Ministero dell'Ambiente e della Sicurezza Energetica* (MASE - Ministry for the Environment and Energy Security), aims to strengthen the criteria by introducing more stringent requirements for reducing greenhouse gas emissions. Introducing criteria for monitoring and limiting emissions generated in the production of construction materials would represent a significant step towards encouraging the use of materials from low-emission production processes, which in turn would facilitate the drive to decarbonise the manufacturing sectors.

[12] The EU Emissions Trading Scheme, established under Directive 2003/87/EC and subsequent amendments, is a permit trading system that has been adopted by the EU to mitigate the climate change impact of the electricity generation and industrial sectors.

2. OVERVIEW OF EXISTING CO_2 STANDARDS FOR STEEL, CEMENT AND CONCRETE

2.1 GPP GUIDELINES AT THE EUROPEAN LEVEL

As the previous chapter highlighted, a common framework of minimum environmental criteria or carbon footprint standards does not exist for Member States to apply to their public procurement procedures.

The European Union's GPP criteria currently only apply to the construction of office buildings. These criteria, which were published in May 2016 and are currently being revised, cover a number of aspects, including the design, site preparation and construction, as well as the ordinary maintenance and management of the building. Their primary purpose is to reduce the GWP of buildings throughout their entire life cycle. To this end, Green Public Procurement takes into account both direct and indirect effects, from production to disposal, including the materials used. In particular, criterion B8.2 focuses on the GWP across a building's entire life cycle, and B10.1 looks at the performance of the main building elements by aggregating the Environmental Product Declarations (EPDs[13]). These criteria assess the GWP of various technical elements of the building and, as a result, indirectly consider construction materials such as steel, cement and concrete.

The contracting public authorities assign scores based on improvements in GWP performance by comparing the performance against a reference building or competing projects, although no specific benchmarks are provided. The EPDs, prepared in accordance with the ISO 14025 or EN 15804 standards and verified by third parties, are used to assess the environmental impact.

A new document, published in June 2023, aims to update the GPP criteria to include other types of public buildings, i.e., not just office buildings. This document introduces more ambitious criteria, including the requirement of a CO_2 emissions assessment for the entire life cycle of the building. Whilst these criteria are certainly more comprehensive in terms of calculating a building's carbon footprint, they do not currently provide for specific CO_2 equivalent emission limits for steel, cement and concrete.

Furthermore, as was underlined in Fondazione Ecosistemi's technical report on GPP in Italy[14], even for materials such as steel or cement, the EPDs - albeit prepared in accordance with the ISO 14025 or EN 15804 standards - are based on life cycle assessments and, therefore, information pertaining to specific sites and locations, making them difficult to compare even for similar products.

[13] Product Environmental Declarations (EPDs) are voluntary documents that detail, based on a life cycle assessment, a product's environmental impact. This assessment considers the resources consumed and the environmental impact for each of the various stages in the life cycle, from the extraction of raw materials through to production, and sometimes even up to the product's disposal. The results are summarised as a set of environmental indicators, such as the GWP, and are regulated by specific standards, such as ISO 14025 and EN 15804, via Product Category Rules which provide the rules, requirements and guidelines for each product category.

[14] "Report Tecnico sul GPP in Italia" (Technical Report on GPP in Italy), Fondazione Ecosistemi (2024)

2.2 THE EU TAXONOMY

The EU Taxonomy imposes disclosure obligations to certain large companies and financial market participants[15]. Companies covered by the Corporate Sustainability Reporting Directive (CSRD) are required to assess whether it applies to them and, if so, to assess their alignment with the taxonomy. This mechanism was developed as part of the European Green Deal to steer investments towards sustainable practices and to reduce the environmental impact of companies and their activities.

The environmental sustainability criteria stipulated by the NFRD and, subsequently, the CSRD are based on six key environmental objectives:

1. climate change mitigation
2. climate change adaptation
3. sustainable use and protection of water and marine resources
4. transition to a circular economy
5. pollution prevention and control
6. protection and restoration of biodiversity and ecosystems

For an economic activity to be considered environmentally sustainable, it must meet three fundamental criteria:

1. make a substantial contribution to one or more of the above-mentioned environmental objectives,
2. do no significant harm to any of the other environmental objectives[16] (DNSH),
3. and comply with the Minimum Social Safeguards.

Through its implementing regulations, the taxonomy defines specific technical screening criteria for each sector and activity, including quantitative or qualitative thresholds for establishing what is considered environmentally sustainable in relation to one or more of the six above-mentioned objectives. Delegated Regulation (EU) 2021/2139, sets out the technical screening criteria for the climate change **mitigation** and **adaptation** objectives prescribed for the various manufacturing sectors, including the steel (section 3.9) and cement (section 3.7) industries.
For the climate mitigation objective for steel and cement production (sections 3.7 and 3.9 of Annex I of Delegated Regulation (EU) 2021/2139) the benchmark values for the criteria are based on the EU ETS directive's implementing regulations and relate to the direct emissions generated during their production processes, as outlined by the system boundaries specified in Delegated Regulation (EU) 2019/331. These values reflect the average performance of the 10% most efficient installations in

[15] From 2024: The requirement applies to companies already subject to the Non-Financial Reporting Directive (NFRD), i.e., listed companies, banks and insurance companies with more than 500 employees, with reports due from 2025. From 2025: All large companies, including those not listed, meeting at least two of the following criteria: annual revenue greater than €50 million, total assets exceeding €25 million, more than 250 employees, will be required to prepare sustainability reports (to be published from 2026).
[16] The "Do No Significant Harm" principle requires that, even if an activity positively contributes to one of the environmental objectives, it must not cause significant harm to any of the others. This means the activity must meet safeguarding criteria to ensure it does not impact negatively on other environmental areas. This applies to all stages of the activity, from design to production, through to its use and disposal.

Europe, according to assessments conducted in 2016 and 2017[17]. On the other hand, in Annex II (of Delegated Regulation (EU) 2021/2139), which **covers the climate adaptation objective**, the technical screening criteria determine the conditions under which an economic activity significantly contributes to climate change adaptation. This annex also sets out the thresholds for greenhouse gas emissions during the production process, which determine whether an activity causes significant harm to climate change mitigation. These thresholds reflect the median values of the installations assessed in 2016 and 2017

CEMENT

Product	**Threshold (Taxonomy) – referring only to direct emissions (scope 1)**	
Delegated Regulation (EU) 2021/2139	**Technical Screening Criteria – ANNEX I (Mitigation)**	**DNSH Criterion for Mitigation – ANNEX II (Adaptation)**
Grey cement **clinker**	0.722 $tCO_2eq/t_{product}$	0.816 $tCO_2eq/t_{product}$
Cement from grey clinker or alternative hydraulic binder	0.469 $tCO_2eq/t_{product}$	0.530 $tCO_2eq/t_{product}$

STEEL

Product	**Threshold (Taxonomy) – referring only to direct emissions (scope 1)**	
Delegated Regulation (EU) 2021/2139	**Technical Screening Criteria – ANNEX I (Mitigation)**	**DNSH Criterion for Mitigation – ANNEX II (Adaptation)**
Hot metal	1.331 $tCO_2eq/t_{product}$	1.443 $tCO_2eq/t_{product}$
Sintered ore	0.163 $tCO_2eq/t_{product}$	0.242 $tCO_2eq/t_{product}$
Coke (excluding lignite coke)	0.144 $tCO_2eq/t_{product}$	0.237 $tCO_2eq/t_{product}$
Iron casting	0.299 $tCO_2eq/t_{product}$	0.390 $tCO_2eq/t_{product}$
Electric Arc Furnace (EAF) high alloy steel	0.266 $tCO_2eq/t_{product}$	0.360 $tCO_2eq/t_{product}$
Electric Arc Furnace (EAF) carbon steel	0.209 $tCO_2eq/t_{product}$	0.276 $tCO_2eq/t_{product}$
Alternatively, for steel produced in EAFs, it is possible to use the minimum ratio between steel scrap input and product output:		
Type of steel	**Minimum ratio steel scrap input/product output**	
Electric Arc Furnace (EAF) high alloy steel	70%	
Electric Arc Furnace (EAF) carbon steel	90%	

In relation to concrete, the relevant guidelines are provided for by Delegated Regulation 2023/2486[18]. The technical screening criteria set forth by this regulation establish limitations that look to further the objective of **transitioning towards a circular economy**, an approach that the sector must adopt if it is to effectively reuse and recycle non-hazardous waste and, therefore, ensure compliance with the sustainability goals. Furthermore, to comply with the DNSH principle, specific greenhouse gas emission limitations have also been established. These are consistent with those for cement as outlined in Annex II, and are summarised in the following table.

[17] As established by Delegated Regulation 2021/447 https://eur-lex.europa.eu/legal-content/en/TXT/PDF/?uri=CELEX:32021R0447

[18] Delegated Regulation (EU) 2023/2486, section 3.5 of Annex II

CONCRETE

Product	Threshold (Taxonomy) – referring only to direct emissions (scope 1)- DNSH Criterion for Mitigation
Grey cement **clinker**	0.816 $tCO_2eq/t_{product}$
Cement from grey clinker or alternative hydraulic binder	0.530 $tCO_2eq/t_{product}$

2.3 ECODESIGN REGULATION (ESPR) AND CONSTRUCTION PRODUCTS REGULATION (CPR)

On 13 June 2024, the new Ecodesign Regulation was approved[19], establishing a framework for setting the ecodesign requirements for sustainable products, extending the range of products to which it applied, and as a result also encompassing construction products. The Regulation stipulates that, in defining specific ecodesign requirements for products, a range of environmental aspects, set forth in article 5, must be taken into account. These include the amount of recycled material contained within products and the carbon footprint, defined in article 2 as "*the sum of greenhouse gas emissions and greenhouse gas removals in a product system, expressed as CO2 equivalents and based on a life cycle assessment using the single impact category of climate change*".

In the future, delegated regulations will be published to establish specific ecodesign requirements for different product categories. The process will initially focus on products with a high environmental impact, such as iron, steel, paints and chemicals. Subsequently, other product types will also be subject to specific technical requirements.

The ESPR approach focuses on the life cycle and steel will be among the first products to be regulated, significantly influencing the definition of the ecodesign requirements. This approach will help to ensure that the regulatory process is more robust and coherent, providing a foundation for defining "green product categories" that could also form the basis for GPP.

Similarly, in relation to cement and its derivatives, the European Commission proposed a revision of the CPR Regulation in March 2022. The objectives of the new version, which was approved on 10 April 2024[20], include the introduction of new and more stringent environmental sustainability requirements for construction products, aiming to make them longer lasting as well as easier to repair, recycle and remanufacture. 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. The regulation also includes specific provisions for GPP.

Both these regulations favour the LCA approach, and it will be important to stay abreast of developments in the implementing legislation to ensure that national standards remain aligned with those of the EU.

[19] Regulation (EU) 2024/1781 of the European Parliament and of the Council which repeals Directive 2009/125/EC
[20] Procedure 2022/0094 https://www.europarl.europa.eu/doceo/document/TA-9-2024-0188_EN.html

2.4 VOLUNTARY APPROACHES

Environmental sustainability protocols and assessment systems for sustainable construction, such as Level(s), GBC Italia, BREEAM and Itaca, can offer significant support to Green Public Procurement as they promote sustainable building practices and evaluate the environmental performance of construction materials.

The Level(s) system offers a holistic approach to sustainability, incorporating a life cycle analysis of a building's performance and taking CO_2 emissions into consideration. By using indicators such as GWP, Level(s) provides a clear framework for assessing the environmental impact of construction materials. This supports GPP, as it facilitates the adoption of low-carbon materials and encourages more sustainable construction practices. Protocols developed by Green Building Council Italia, like GBC Home and GBC Historic Building, encourage the use of materials for which environmental declarations and life cycle assessments have been completed. Whilst they do not impose any specific GWP requirements, they do help to ensure greater transparency, as well as improve the availability of information on the materials used. As an international certification protocol, BREEAM provides a detailed assessment of the environmental performance of buildings. Since its credits are categorised and can therefore be obtained for using certain construction materials as well as for using an LCA approach, BREEAM encourages sustainable building practices and improves the environmental efficiency of public projects. The Itaca protocol sets requirements for the environmental sustainability of buildings, providing a framework for the assignment of certifications issued by accredited bodies.

2.5 OVERVIEW OF EXISTING CO2 STANDARDS

Table 1 – *Overview of CO_2 standards from various regulatory and voluntary approaches for buildings and construction materials*

Instrument	Reference regulation	Approach	Mandatory?	If not, reason for applying	Values verified by third parties
Green Public Procurement - GPP	Voluntary GPP criteria	Life Cycle Assessment (LCA)	No	Promotes sustainability in public procurement and new sustainable technologies	Yes
Taxonomy	Regulation (EU) 2020/852	Direct emissions from production process (scope 1)	Yes		Yes
Ecodesign	Regulation (EU) 2024/1781	Sustainable design and product durability, directive pending	Yes, for steel		A Digital Product Passport will be compulsory from 2030
Level(s) Protocol (EC)	n.a.	LCA	No	Environmental performance assessment of the project, and a performance comparison of selected materials	No

Instrument	Reference regulation	Approach	Mandatory?	If not, reason for applying	Values verified by third parties
GBC Italia Protocol	n.a.	LCA	No	Certification issued to confirm the quality and environmental performance.	Yes
BREEAM Protocol	n.a.	LCA	No	Internationally recognised certification issued to confirm the environmental and social performance of buildings.	Yes
Itaca Protocol / UNI/PdR 13:2019	n.a.	LCA	No	Certification recognised in Italy issued to confirm an environmental sustainability assessment of the building has been conducted.	Yes

3. EMISSIONS PROFILE AND ECONOMIC OVERVIEW OF CONSTRUCTION MATERIALS IN ITALY

3.1 CEMENT AND CONCRETE PRODUCTION

The European cement industry employs over 36,000 direct employees, and in 2019, generated a value added of approximately €4 billion[21]. This sector also has a significant indirect impact, contributing to the generation of approximately 13 million jobs and accounting for 10% of the EU's GDP[22]. However, the sector has experienced a significant decline in demand over recent decades, primarily due to the 2008 financial crisis and the subsequent slowdown in the property market[23].

In 2022, Italy produced 18.8 million tonnes of cement, accounting for 0.5% of global production, a 60.7% decrease compared to its historical peak in 2006[24]. This decline was largely due to a reduction in domestic consumption, which fell from 813 kg per capita to 324 kg over that period, placing Italy 23rd in Europe in terms of per capita cement consumption. By 2020, Italy became a net importer of cement, with a trade deficit of 1.4 million tonnes in 2022 (16.3% of national consumption). The main exporters of cement and clinker to Italy include Turkey, Greece, Slovenia, Tunisia and Algeria, many of which are non-EU countries with less stringent environmental regulations and lower production costs. The concrete sector has also seen a marked downturn, producing 33 million cubic meters in 2022, down 7.5% on the previous year. Imports and exports of additives for concrete also fell by 6% and 10% respectively, with Israel, France and Germany being the main export markets[25].

Approximately 75% of Italy's national cement production is concentrated in three large companies: Heidelberg Materials, Buzzi Unicem and Colacem. In 2021, the turnover generated by Italy's cement sector was €2.115 billion, contributing an added value of €533 million to the national economy. Furthermore, the sector employs more than 4,000 full-time workers[26].

The Italian cement sector is characterised by a smaller number of employees and reports lower value added compared to Germany, Poland, France and Spain, both in absolute terms and in relation to the manufacturing sector. However, Italy's workforce productivity, measured in terms of value added per employee, is in line with that of Germany and France, and higher than that of Poland. The gross operating margin - at 10.7% of revenue - is also quite low but not significantly different from the values seen in France and Germany.

In 2022, cement production in Italy generated 10.2 million tonnes of direct CO_2 emissions, accounting for 3% of the country's total emissions (389.1 $MtCO_2eq$[27]) and approximately 14% of the total emissions generated by Italy's industrial sector (78.3 $MtCO_2eq$[28]).

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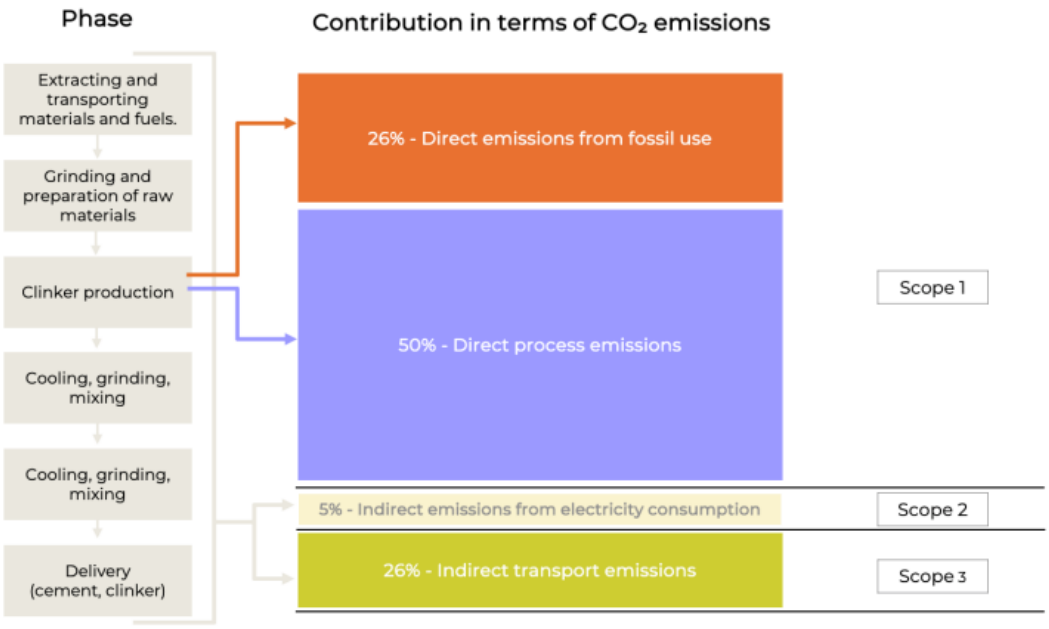
[21] EUROSTAT. Data from EU 27 countries.
[22] CEMBUREAU (2020).
[23] Marmier, A; "*Decarbonisation options for the cement industry*", JRC, 2023.
[24] Aitec and Federbeton annual reports (various years).
[25] *Rapporto di filiera* 2022 (Supply Chain Report 2022), Federbeton (2023)
[26] Economic data for the "Manufacture of cement (23.51)" sector from Eurostat (Structural Business Statistics).
[27] *European Environmental Agency, 2022.*
[28] Ispra, 2024

The cement production process starts in quarries and mines, where raw materials (primarily limestone and clay) are extracted. These are then fragmented and prepared for the following phases. Once extracted, they are dried, ground and mixed to obtain raw meal, which consists of 80% limestone (mainly calcium carbonate, $CaCO_3$) and 20% clay. This raw meal is then pre-heated to approximately 900°C, at which point calcination occurs, the process by which calcium carbonate decomposes into calcium oxide (CaO) and carbon dioxide (CO_2). The material is then fired in a rotary kiln at temperatures between 1,400°C and 1,600°C, together with silica, alumina and ferrous oxide. This is the process of clinkerisation, whereby Portland cement clinker is formed as a mixture of raw materials is sintered. This phase generates a significant quantity of emissions, primarily due to the extensive use of pet coke, a fossil fuel which accounts for around 82% of the energy used. Indirect emissions (Scope 2 and 3) generated by the use of electricity account for approximately 5% of the total, while those relating to the supply chain, as well as the need to transport raw materials and final products, account for 19%.

***Figure 1**– Breakdown of CO_2 emissions in Italy by production process phase (2019)*[29]



The clinker is then mixed with other constituents, such as granulated blast furnace slag, pozzolanic materials and a range of additives, to enhance the cement's properties. This mixture is then ground to a fine powder.

The cement is classified into different types according to the combination of constituents, as defined by European Standards EN 197-1, EN 187-5 and EN 197-6. Finally, the cement is used as a component in the production of concrete.

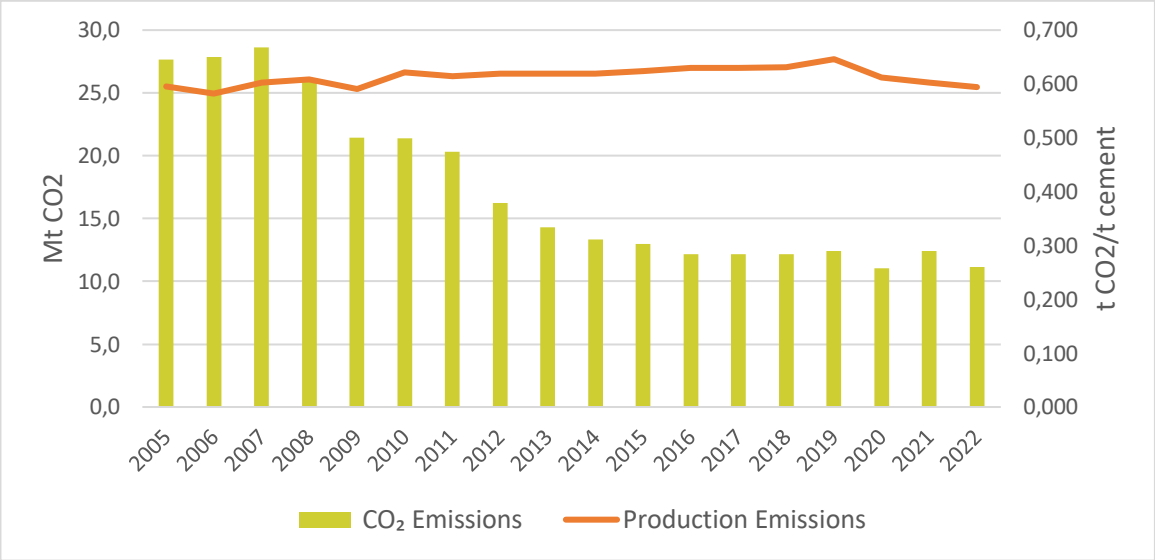
[29] From ECCO analysis of "La strategia di decarbonizzazione del settore del cemento" (Decarbonisation strategy for the cement industry), Federbeton (2020).

In Italy, in 2022, 49.5% of cement was used by ready-mixed concrete manufacturers, 21.9% was distributed to wholesalers and 10.8% was used to manufacture prefabricated products. The construction sector consumed approximately 8.2% of the total cement produced[30].

Concrete is a mixture of cement, water, aggregates and additives to enhance its properties, if required. Aggregates make up around 60-75% of the total composition and can include materials such as gravel, crushed rock, sand or even recycled concrete. The choice in terms of the type of cement and aggregate depends on the concrete's intended purpose. The production of concrete in itself does not generate significant emissions, it is the production of clinker and, therefore, cement that represents the major source of emissions.

Over the years, the emission intensity per tonne of cement produced has remained largely stable at around 0.656 tCO_2/t_{cement} (Figure 2[31]).

***Figure 2**- Direct CO_2 emissions from cement production in Italy (in absolute terms and relative to production volumes)*



There are a number of low-cost measures that the sector would be able to implement relatively quickly which could lead to a reduction of over 15%. However, the application of these measures is highly dependent on the adoption of specific policies, particularly in relation to the use of alternative fuels and the substitution of a proportion of the limestone with already decarbonised alternative materials.

In this regard, through a revision of the End of Waste regulation for inert waste (Decree No. 127 of 28 June 2024), efforts are already being made to incorporate recycled aggregates from construction and demolition waste into the cement production cycle. Additionally, sector companies are introducing low-clinker cements to the market, but the *Certificati di Valutazione Tecnica* (CVT - Technical Evaluation Certificates) need to be issued more quickly by the *Consiglio*

[30] Rapporto di filiera 2022 (Supply Chain Report 2022), Federbeton (2023)

[31] From ECCO analysis of Aitec and Federbeton annual reports: ECCO Industrial Transformation Policies – The Cement Industry

Superiore dei Lavori Pubblici (Superior Council of Public Works) if the adoption of these products is to be accelerated[32].

Another important measure is selective demolition, fundamental for implementing circular economy practices into the cement sector. Recycling materials, especially demolition by-products such as recycled concrete, offers significant potential for reducing CO_2 emissions as it reduces the quantity of virgin materials used to produce cement. Despite this potential, 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. It is estimated that using these recycled materials could reduce CO_2 emissions by 6 kg per tonne of cement produced by 2030. In reality, this is not a significant contribution (<1%), but in the context of decarbonising this sector, anything that contributes to that objective is important and necessary. As previously discussed, enabling policies need to play a key role in this case too, encouraging the adoption of these practices through regulatory and fiscal incentives, and facilitating the creation of the necessary infrastructure for recycling and recovering the materials.

Furthermore, the use of alternative fossil fuels (e.g., non-recyclable waste, particularly that containing biomass) in Italy currently stands at just 25.5%, well below the European average of 57.6%. Improving this percentage is a priority for the sector, with the objective to reach 47% by 2030 and 80% by 2050[33]. In this regard, policies can play a key role in terms of developing a favourable regulatory framework as well as stimulating the use of alternative fuels.

It is clear that, in order to take advantage of the opportunities on offer, implementing enabling policies is vital; adopting such policies would enable significant improvements within the sector immediately, which would, in turn, facilitate the use of more "advanced" products by virtue of their sustainability.

3.2 STEEL PRODUCTION IN ITALY

Italy is the second-largest producer of steel in Europe[34], producing 21.1 million tonnes in 2023[35], a decrease of 2.5% on the previous year. Of its national production, 86% is produced by recycling scrap using Electric Arc Furnaces, making Italy the leading producer of recycled steel in Europe[35]. The production of so-called primary steel, which accounts for the other 14% of the total, is produced entirely in Taranto, the only facility in Italy that manufactures flat steel products from iron ore and whose output has been in constant decline for years[36].

In Italy, steel is primarily used in the construction sector, accounting for 36.5% of its consumption. The next major user is the mechanical engineering sector (20.2%), followed by metal-based products (18.7%) and then the automotive industry (17.1%)[37].

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[32] "Rapporto di Sostenibilità 2023 (Sustainability Report 2023)", Federbeton (2024)
[33] "Rapporto di Sostenibilità 2023" (Sustainability Report 2023), Federbeton (2024)
[34] "World Steel in Figures 2023", Worldsteel (2023)
[35] "World Steel in Figures 2024", Worldsteel (2024)
[36] "Bilancio di Sostenibilità 2022" (Sustainability Report 2022), Acciaierie d'Italia (2023).
[37] "Come cambia il consumo di acciaio in Italia" (How steel consumption is changing in Italy), Federacciai (21 October 2020), Presentation by Flavio Bregant at the webinar entitled "Reagire alla crisi: i settori utilizzatori di acciaio" (Reacting to the Crisis: the Steel-Using Sectors).

To meet demand, Italy relies heavily on imports, particularly for flat products, with a net trade deficit of 6.5 Mt in 2023 (compared to 8.1 Mt in 2022). In terms of volume, it is the world's fourth largest importer, but only the sixth largest exporter[38]. In 2023, the trade deficit was 2.6 Mt, continuing a negative trend that started in 2014. The primary steel industry has been declining sharply for the past decade now, with direct employment decreasing from 36,000 to less than 31,000 (-15.5%) and hours worked from nearly 58,000 to 44,000 (-25.2%). Total production dropped from 26.3 Mt in 2012 to 21.6 Mt in 2022, mainly due to the collapse in the production of hot-rolled flat products, falling from 14.5 Mt to 3.5 Mt.

Over the past few decades, the amount of CO_2 emitted as a result of steel production in Italy has decreased significantly. In 2020, direct and indirect emissions accounted for approximately 19% of the total emissions generated by the manufacturing industry. Between 1990 and 2020, the steel industry's emission intensity decreased by 60.4%, largely thanks to a more sustainable product mix and a reduction in the production of primary steel. The primary production processes, namely the integrated cycle and the use of EAFs, differ significantly from an emissions standpoint. The integrated cycle process, which uses coal, generates approximately 2 tonnes of direct CO_2 emissions per tonne of steel, while using technologies such as natural gas-fuelled Direct Reduced Iron (DRI) reduces these emissions to 0.8 tCO_2[39].

However, when DRI technology is fuelled by green hydrogen, it consumes around 7 times more electricity per tonne of steel produced than the natural gas-fuelled DRI-EAF approach. In the case of green hydrogen-fuelled DRI, approximately 65% of the electricity consumed is attributable to the production of hydrogen. Furthermore, the indirect emissions associated with DRI using green hydrogen depend on the average emission factor for the electricity produced by the national grid. With an emission factor of 300 gCO_2/kWh, the indirect emissions associated with the use of hydrogen-powered DRI-EAF technology are 1.4 tCO_2/t_{STEEL}. However, with the electricity sector due to become progressively more decarbonised, indirect emissions are set to decrease over time[40].

EAFs emit, on average, 70-90 kg of CO_2 per tonne of steel produced, but the actual figure is highly dependent on the type of steel. Emissions from this process mainly derive from the use of natural gas burners and charge carbons (e.g. anthracite). Replacing gas burners with hydrogen burners[41] or using alternative materials for the charge carbons could significantly reduce emissions.

[38] "World Steel in Figures 2024", Worldsteel (2024)

[39] Polytechnic University of Milan

[40] The complete methodology used for the calculations is outlined in the *Steel Sector Policy Paper*, published in June 2024.

[41] In this regard, it is worth noting the initiative currently being undertaken at the Tenaris Dalmine facility, where they are testing the first industrial-scale use of green hydrogen in a steel production plant https://www.edison.it/it/onoff/produrre-acciaio-con-idrogeno-verde-dalmine

4. PROPOSALS FOR REVISING THE CONSTRUCTION SECTOR CAMS

To facilitate the industrial transformation towards net-zero production processes, particularly in hard-to-abate sectors such as those involved in producing construction materials, a portfolio of policies is required to stimulate both the supply and demand for products that align with the climate mitigation objectives of the European Union and Italy.

Establishing "lead markets", with standards aimed at supporting green products, impacts the demand side of the equation as it encourages the adoption of production methods that align more closely with climate mitigation objectives, thereby creating a market for such products, and public procurement should act as the catalyst for such a transformation.

Italy's public procurement regulations are among the most advanced in Europe: GPP is mandatory for all public procurement tenders, making it a vital tool for supporting the demand for more sustainable products and processes. However, a comparison with some of the regulations in other EU countries reveals that there are areas where improvements can be made. In Italy, applying the CAMs is mandatory, thus guaranteeing they are used ubiquitously. However, as they currently stand, they appear to lack ambition and do not address the embedded emissions of buildings. Monitoring the CAMs is voluntary, so a system does not exist to assess the extent of their application, or the economic and environmental impact they are having. In contrast, countries such as the Netherlands have a voluntary approach to GPP, but the process includes a detailed and extensive calculation of the embedded emissions of buildings. This is conducted through the Environmental Performance of Buildings (EPBs), which is mandatory for new residential and office buildings that exceed 100 m^2[42]. Moreover, monitoring in the Netherlands is managed by the RIVM (National Institute for Public Health and the Environment), which publishes reports every two years to analyse the environmental and social effects of GPP, thus ensuring greater transparency and accessibility of relevant data[43].

Mitigating climate change is one of the primary objectives set out in the latest version of Italy's GPP NAP, with the aim of reducing greenhouse gas emissions by improving the energy efficiency of products and services, reducing the use of non-renewable or emission-generating energy sources, promoting circular economy models, and rationalising consumption and procurement.

The so-called construction sector CAMs are currently being revised. The aim is to ensure that the minimum environmental criteria for green public tenders are aligned with technical progress and the evolution of relevant markets, as well as with the new GPP NAP and, therefore, the climate mitigation objective.

To this end, a national and European review of existing standards for greenhouse gas emissions associated with construction material production processes has been conducted to identify target

[42] The EPB is an indicator that is mandatory in the Netherlands for new residential and office buildings over 100 m^2. It measures the environmental impact of materials used, calculating their hidden environmental cost (shadow prices) per m^2 per year, providing an indicator for the potential environmental damage from the extraction, production, use, and disposal of the materials. The EPB promotes the use of sustainable materials, and the benchmark value for offices is €0.90/m^2/year.

[43] "Green Public Procurement in Construction", Ramboll (2024)

values that could serve as the basis for defining the new construction sector CAMs[44], ensuring that the embedded emissions of buildings are included.

Analysis of the Environmental Product Declarations (EPDs) developed for GPP has shown that comparing products, even within the same supply chain, is complex because the Product Category Rules used are so specific, resulting in criteria and values that are not easily compared or grouped. Furthermore, these declarations are based on life cycle assessments, so they include all the production phases "from cradle to grave" and, therefore, are often site-specific.

In contrast, the European taxonomy criteria use target values which:

- relate to very specific calculations, i.e., direct emissions generated by the production process, as defined in Regulation 2019/331;
- are verified by third parties in accordance with the implementing regulations of the EU ETS Directive;
- relate to the actual performance of existing production facilities in Europe and are regularly updated.

With respect to Life Cycle Assessment (LCA) criteria, these technical screening criteria more accurately reflect the embedded emissions of buildings, at least for the materials production phase. However, they lack information pertaining to the sourcing of raw materials, their transportation and emissions relating to the building's useful life, therefore offering a less comprehensive carbon footprint assessment of a building or product.

In terms of emissions, the most significant contribution derives from the "precursors" of the finished products, such as clinker in the case of cement and concrete, and pig iron or high-alloy or low-alloy crude steel in the case of steel.

For facilities operating further downstream in the supply chain, it is not difficult to understand who the suppliers are and, for the suppliers, evaluating their emissions performance and comparing it with the taxonomy values is not an administratively onerous task. In fact, they are already obliged to communicate and verify this data in accordance with their EU ETS obligations[45]. It is important to note that for energy-intensive production processes, such as that to produce steel using EAFs, the fuel/electricity exchangeability factor, as set forth by the relevant EU ETS regulations, must be considered in order to assess the alignment with the values in Annex I of Delegated Regulation (EU) 2021/2139.

In principle, the technical screening criteria for cement and steel set forth in Annex I of Delegated Regulation (EU) 2021/2139 could be used as a basis for defining minimum environmental criteria for construction materials.

Adopting these criteria could enable construction sector emissions to be reduced, aligning the CAMs with the EU's decarbonisation objectives and supporting a sustainable industrial transition

[44] "Report Tecnico sul GPP in Italia" (Technical Report on GPP in Italy), Fondazione Ecosistemi (2024)
[45] Article 14 of Directive 2003/87/EC https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02003L0087-20230605&qid=1694325427342

to net-zero. This approach would also facilitate the adoption of European standards, which would be opportune in view of the upcoming revision of the GPP Directive.

However, the availability of products on the market must be taken into consideration by the CAMs so as not to create distortions or make green procurement principles impossible to apply.

Therefore, a critical evaluation of the technical screening criteria concerning the specific emissions of the products being considered is necessary. For example, looking at the cement sector's emission intensity, we can see that the value has remained more or less constant over the years, at around 0.656 tCO_2/t_{cement} (Figure 2). This is not very different from the technical screening criteria value of 0.53 tCO_2/t, but the extent of the data dispersion is unclear. This dispersion needs to be verified and understood if the availability of products on the market that meet these standards is to be properly taken into consideration.

As a proxy for evaluation purposes, the EY EU Taxonomy Barometer 2023 was analysed. For steel, the alignment percentages with respect to the mitigation criteria are high, both in terms of revenue and CapEx, while for cement, the values are only high for CapEx (12%). Indeed, this indicator comprises investments aimed at reducing greenhouse gas emissions. From this analysis, we can therefore presume that investments are being made to better align the cement sector with the climate mitigation objectives, but it is too early to be absolutely certain.

The dispersion of national parameter curves could be verified using data collected annually by the Ministry of the Environment under the EU ETS directive and processed by ISPRA for the national emissions inventory.

In the meantime, before such a verification is completed, a "transitional" approach could be taken, whereby the taxonomy criteria are introduced into the definition of the CAMs in two phases:

PHASE I (CURRENT CAM REVISION):

- The CAMs are established in accordance with Annex II of Delegated Regulation (EU) 2021/2139, using the median emissions of existing facilities in the EU as a minimum threshold. This approach strikes a balance between sustainability requirements and ensuring companies can compete for tenders with their products.

Product	Threshold - referring to direct emissions for the mitigation objective only
CEMENT	
Grey cement clinker	0.816 $tCO_2eq/t_{product}$
Cement from grey clinker or alternative hydraulic binder	0.530 $tCO_2eq/t_{product}$
STEEL	
Hot metal	1.443 $tCO_2eq/t_{product}$
Sintered ore	0.242 $tCO_2eq/t_{product}$
Coke (excluding lignite coke)	0.237 $tCO_2eq/t_{product}$
Iron casting	0.390 $tCO_2eq/t_{product}$
Electric Arc Furnace (EAF) high alloy steel	0.360 $tCO_2eq/t_{product}$
Electric Arc Furnace (EAF) carbon steel	0.276 $tCO_2eq/t_{product}$

Product	Threshold - referring to direct emissions for the mitigation objective only
Alternatively, for steel produced in EAFs the minimum ratio between steel scrap input and product output should be:	
Type of steel	**Minimum ratio steel scrap input/product output**
Electric Arc Furnace (EAF) high alloy steel	70%
Electric Arc Furnace (EAF) carbon steel	90%

- In this phase, the more stringent requirements outlined in Annex I could be used as award criteria.

PHASE II (NEXT CAM REVISION):

- The CAMs are established in accordance with Annex I of Delegated Regulation (EU) 2021/2139 and, as such, use the average value of the 10% most efficient installations in the EU as a minimum threshold, fully aligning the CAMs with the technical screening criteria associated with the taxonomy's mitigation objective.

Product	Threshold - referring to direct emissions for the mitigation objective only
CEMENT	
Grey cement clinker	0.722 $tCO_2eq/t_{product}$
Cement from grey clinker or alternative hydraulic binder	0.469 $tCO_2eq/t_{product}$
STEEL	
Hot metal	1.331 $tCO_2eq/t_{product}$
Sintered ore	0.163 $tCO_2eq/t_{product}$
Coke (excluding lignite coke)	0.144 $tCO_2eq/t_{product}$
Iron casting	0.299 $tCO_2eq/t_{product}$
Electric Arc Furnace (EAF) high alloy steel	0.266 $tCO_2eq/t_{product}$
Electric Arc Furnace (EAF) carbon steel	0.209 $tCO_2eq/t_{product}$
Alternatively, for steel produced in EAFs the minimum ratio between steel scrap input and product output should be:	
Type of steel	**Minimum ratio steel scrap input/product output**
Electric Arc Furnace (EAF) high alloy steel	70%
Electric Arc Furnace (EAF) carbon steel	90%

Systematic data monitoring should provide the basis for the transition from Phase I to Phase II, but such monitoring is still lacking in both Europe and Italy. If the policy's performance in relation to its objectives is to be continuously improved, monitoring data on how well GPP is being implemented is vitally important.

Finally, if the calculations were to be extended to include indirect emissions, related award criteria could be established, particularly for the steel sector where a significant proportion of the energy consumed is electricity. Initially, the award criterion could be based on the composition of a product's electricity consumption efficiency (MWh/t) and the emission factor of the electricity used (tCO_2/MWh). In this regard, to evaluate the efficiency of electricity consumption, the values

provided in Annex 3 of the state aid guidelines could be used as a starting point for the compensation of indirect emissions, while the emission factor could be based on the actual value of the electricity used by the installation (not the virtual or certified electricity consumption).

5. CONCLUSIONS

The construction sector contributes significantly to global greenhouse gas emissions. The emissions generated by the cement and steel production sectors account for 14-16% of global emissions and approximately 50% of the climate impact from construction (the built environment) assessed over the entire life cycle comes from the use of cement, bricks and other cement-based materials.

In 2019, direct emissions connected with the use of publicly procured steel and cement in Europe totalled 51 $MtCO_2eq$, representing 2% of the EU's total emissions[46]. It is clear, therefore, that public procurement can be an important tool for improving sustainability within the construction sector, harnessing the potential of public investment to stimulate the development and adoption of low-carbon products and processes, and creating "lead markets" for such products.

It is therefore no coincidence that one of the first measures announced for the European Commission's new mandate was to revise the GPP directive.

In 2019, the value of Italy's GPP market was 10.4% of GDP, or €186 billion, 26% of which was related to construction-related projects[3]. Furthermore, in 2023, Italy became the only European country where GPP is mandatory for all public procurements. Within Europe, Italy positions itself as a pioneer; however, the current minimum environmental criteria do not include benchmark values for directly reducing the carbon emissions associated with construction, focusing more on promoting circularity.

Furthermore, data monitoring remains somewhat fragmented, making it difficult to evaluate the effectiveness of these criteria from both an economic and environmental standpoint.

In Europe, with the adoption of the ESPR, CPR and EPBD, methods are emerging for assessing emissions from the construction sector (the built environment), and existing standards, such as those provided for by the taxonomy criteria, already include benchmark values for emissions associated with the production of construction materials. Aligning the construction sector CAMs with these standards could take us a long way towards integrating the climate dimension into public investments, helping to create a more sustainable, decarbonisation-oriented market and putting Italy on a positive footing ahead of the forthcoming changes to the GPP directive.

This brief proposes aligning the construction sector CAMs with the EU's Taxonomy in two phases:

- In the first phase, use the technical screening criteria relating to climate change adaptation (Annex II of Delegated Regulation (EU) 2021/2139) as a basis for establishing the CAMs and create a system for systematic monitoring.
- In the second phase, use the technical screening criteria for mitigation (Annex I of Delegated Regulation (EU) 2021/2139) as a basis for establishing the construction sector CAMs.

[46] Public procurement data is not routinely collected, either in Italy or in Europe. The fact that public tenders are issued by different public administrative bodies with varying levels of authority is one of the reasons why collecting such data is so difficult; it is for this reason that the economic and emissions-related benchmark values can only be based on estimates. The data referenced in this document has been taken from Thomas Wyns, Harri Kalimo, Gauri Khandekar - Public procurement of cement and steel for construction. June 2024

In this way, the CAMs would follow a transitional path consistent with the taxonomy and the EU's regulations for mitigating the industrial sector's CO_2 emissions, without becoming an administrative burden. This approach is necessary since it is impossible to verify the market availability of products that meet the required criteria.

Moreover, publishing additional delegated acts under the Ecodesign Regulation, particularly for materials like steel, could serve as a useful basis for any future revisions of the CAMs. These acts could introduce specific standards that will provide greater uniformity and a stronger regulatory framework. Pending these updates, we believe that this proposed alignment with the European Taxonomy would serve as an effective interim approach for incorporating the climate variable into GPP, and it would go a long way towards simplifying its application.

For Italy, aligning the CAMs with European standards, establishing more ambitious requirements and setting up a centralised monitoring framework would make GPP a more effective tool for facilitating sustainability and decarbonisation in the construction sector.

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