

Climate and development: an industrial strategy

Matteo Leonardi

Giulia Novati

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1 Executive summary

Italy represents the seventh largest manufacturing power in the world and the second largest in Europe. The industrial sector employs about 4 million workers and contributes to 20% of GDP. In addition, the manufacturing sector is responsible for about 20% of national greenhouse gas emissions, 30% if indirect emissions from electrical uses are included.

Full decarbonization by 2050 requires the development of new industrial strategies aligned with climate goals. These will need to direct innovation and investment on technologies and processes fully aligned with the climate goal, avoiding the risks of further carbon lock-in. This will also have strong co-benefits for people's health and the protection of nature and biodiversity.

Building a new shared and resilient prosperity must go through decarbonization. The latter can become an opportunity for innovation, productivity, competitiveness, resilience and a generator of quality jobs in the long run. This can be achieved through the ability to attract new public and private investments in technological innovation, through financial and fiscal leverage and through a clear European and national policy framework. In addition, the transition must be accompanied by a new welfare policy and active labor policies to be both inclusive and just.

This strategic policy must become specific and applied to different industrial sectors to enable Italy to remain internationally competitive, decrease dependence on natural gas and oil imports, generate new employment and boost the economy. Conversely, delaying climate investments would generate loss of competitiveness and employment in the new markets of the zero-emission economy and would be a waste of resources.

Directing investment toward meeting climate goals requires having a clear plan of action. However, at present there is still no strategy for decarbonizing Italian industry that allows actors to calibrate investments, carefully managing the risk of lock-in. All of this is absent from the National Recovery Plan (NRP), the National Integrated Energy and Climate Plan (NIECP) and the Long-Term Strategy (LTS). **But there is still (little) time. The NRP is the last call to set industrial development for the next decade in line with the 2050 net zero emissions goal.** Central to managing this process will be the role of the public, in clarity of policies, targets and investment support.

From 1990 to 2019, direct emissions from the industrial sector fell by 37%. The reduction is due in significant part to a decrease in production following the 2008 economic crisis, a shift from coal to natural gas and an increase in renewables and energy efficiency. The strategy for the next decade must have as its central goal the abandonment of all fossil sources, including natural gas. To delay this action is to miss the decarbonization goals. Even in sectors where natural gas is a transitional fuel, such as steel, the industrial strategy will have to indicate in advance when and how it can be completely abandoned.

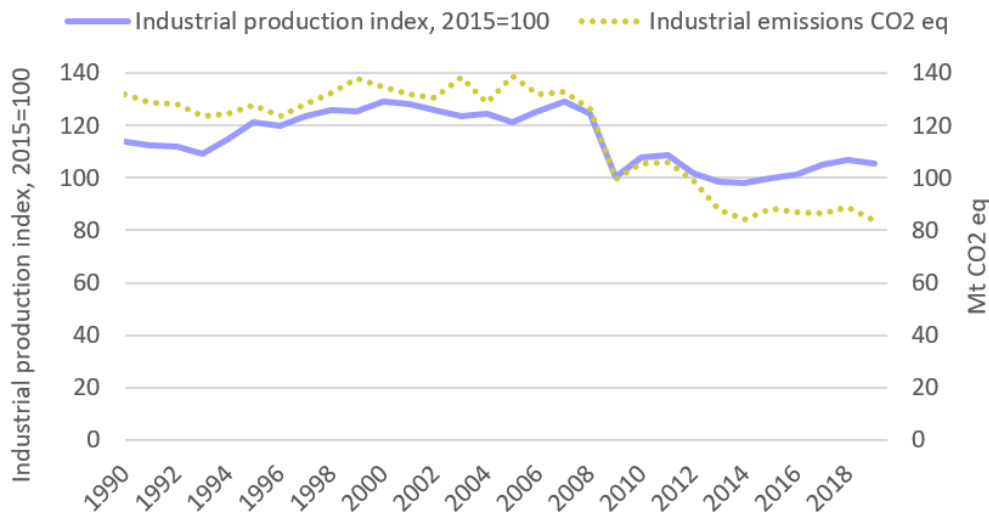


Figure 1 - Trend of industrial production index (2015 = 100, primary axis) and CO2 eq emissions of Italian industry from 1990 to 2019 (secondary axis).

The publication of the Fit for 55 package by the European Commission on 14 July 2021 and the Next Generation EU resources provide the framework within which to structure the national industry strategy for the next 30 years.

Based on these considerations, the work of the think tank ECCO intends to independently deepen the study of emission reduction technology options and the formulation of industrial decarbonization policies and strategies, starting with the production sectors with the highest emission impact. The in-depth study and analysis aim to stimulate a public debate involving all stakeholders. Climate change is indeed a systemic issue and it is from a systemic perspective that it needs to be addressed.

The tools, policies and strategies identified will help support the actions needed to transform production systems and final demand. The goal is to contribute to an industrial strategy in which innovation and welfare are the answer to the risks of de-industrialization, social instability and lock-in in processes and fuels that are incompatible with the goal of net zero emissions.

2 The manufacturing industry in Italy

Italy represents the seventh largest manufacturing power in the world and the second largest manufacturing country in Europe¹. Italian industry employs just under 4 million people, 22% of total employment². In pre-Covid period the industrial sector contributed to 20% of national GDP. In 2020 the contribution to GDP fell to 19.5%, with 322 billion euros, down 11% from 363 billion in 2019. At the European level, Italy is the country whose industrial production index experienced the sharpest decline between March and April 2020 (Figure 2).

¹ "[Dove va l'industria italiana](#)", *Confindustria*, May 2019.

² "[Imprese e addetti](#)", *ISTAT*.



Figure 2 - Industrial production trends in Italy and the eurozone from 1990 to early 2021. Index January 2000 = 100³.

Unlike Germany, the leading manufacturing country in Europe, the Italian industrial sector, in addition to the presence of basic industry, is also characterized by a significant presence of small and medium-sized enterprises (SMEs, defined here as companies with fewer than 250 employees). About 371 thousand SMEs are active in the Italian manufacturing sector, accounting for 99.6% of the total⁴. Most of them are microenterprises, that is, they have less than 10 employees and collectively employ nearly 3 million people. SMEs are mostly found in northern Italian regions, particularly in Lombardy and Veneto, and contribute to 54% of the manufacturing sector's turnover⁵. They generate an added value of 62'000 euros per employee, which is well above the European average of 48'000 euros. Another particularly interesting aspect is that the value added generated by small and medium-sized Italian companies accounts for as much as 64% of the total (2020 value), while in Germany there is a substantial balance between the value added generated by small and medium-sized (49%) and large companies (51%)⁶.

With a view to decarbonization and the revitalization and transformation of the Italian manufacturing sector, it is necessary to consider the dynamics of large industries, but it is also crucial to thoroughly analyze the characteristics of SMEs. These, in fact, play a significant role on production and employment diversification, procurement and innovation capacity.

³ ["Gli andamenti di lungo periodo dell'economia italiana"](#), Presidenza del Consiglio dei Ministri.

⁴ ["Imprese e addetti"](#), ISTAT.

⁵ ["Pmi, quanto conta in Italia il 92% delle aziende attive sul territorio?"](#), *Il Sole 24 ore*, 10 July 2019.

"Risultati economici delle imprese: Tutti i settori economici (Ateco 4 cifre) e classe di addetti", ISTAT.

["Guida alle PMI"](#), *Osservatori.net*.

⁶ ["Internal Market, Industry, Entrepreneurship and SMEs"](#), *European Commission*.

3 Industrial sector emissions in Italy

In Italy there are currently no real national policies and instruments or even an industrial decarbonization strategy, even though the NIECP⁷ and the national Long-Term Strategy (LTS⁸) have already been published.

The main policy instruments for decarbonization have been established at the European level. The instrument identified for the decarbonization of the energy and industrial sectors is the so-called *EU Emissions Trading System* (EU ETS⁹), a system of tradable emission permits. In this system a maximum level of emissions is set and industrial facilities exposed to the risk of international competition and relocation receive free emission allowances.

In July 2021 the European Commission published the Fit for 55 package¹⁰, containing thirteen proposals including revisions to existing regulations and directives and new legislative initiatives, including a revision of the EU ETS. The new emissions reduction target for sectors within the scope of the Directive is increased from 43% to 61% in 2030, compared to 2005. This is done by increasing the annual emission reduction rate from 2.2% to 4.2%. Part of the new proposal includes the prospect of replacing the current free allocation of allowances to certain industrial sectors with mechanisms to protect the European single market against products from countries that do not adopt such environmental legislation. Indeed, included in the package is a proposal to introduce a new mechanism, the *Carbon Border Adjustment Mechanism* (CBAM), which is an import tax on certain products.

In 2019 emissions from the entire EU ETS amount to 1'530 Mt CO_{2eq} (-35.4% since 2005 and -19.8% since 2013)¹¹. Combustion plants account for the majority share, with 62.6% of emissions in 2019. This is followed by the refining (8%), cement (7.9%) and steel (7.6%) sectors. Based on the distribution of emissions from ETS sectors in European countries, Germany accounts for more than 24% of the total in 2019, almost double the 12% of Poland, which is the second largest European country in terms of GHG emissions in EU ETS sectors (Figure 3). The two countries' combined share increases from 31% in 2005 to 36% in 2019. In contrast, Italy and the United Kingdom reduce their share from 22% in 2005 to 17% in 2019.

⁷ ["Piano Nazionale Integrato per l'Energia e il Clima"](#), Ministry of Economic Development, December 2019.

⁸ ["Strategia di lungo termine sulla riduzione delle emissioni dei gas a effetto serra"](#), Ministry of Environment and Land and Sea Protection.

⁹ ["Sistema per lo scambio delle quote di emissione dell'UE \(ETS UE\)"](#), European Commission.

¹⁰ ["Pronti per il 55%"](#), European Council.

¹¹ ["Il sistema EU-ETS in Italia e nei principali Paesi europei"](#), ISPRA Reports 327/2020.

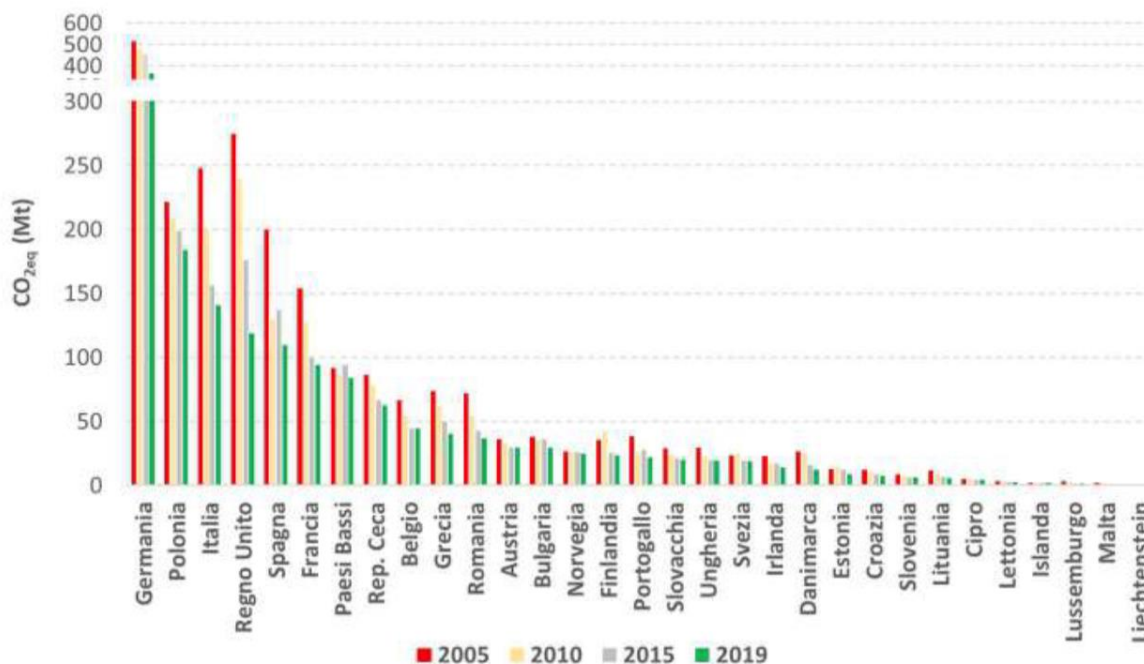


Figure 3 - ETS emissions by country. Countries in descending order of 2019 emissions.

In 2019 418 million tons of CO_{2eq} were emitted in Italy, 20% of which came from the manufacturing sector (84 Mt)¹². From 1990 to 2019, Italian industry's GHG emissions fell by 37%, both due to the reduction in production and the number of companies remaining active following the 2008 economic crisis, but also due to energy efficiency measures taken and the switch from more emissive fossil fuels to natural gas and renewables (Figure 1).

Europe emerges internationally for the efficiency of its industrial production, with Italy and Germany together in first place for energy and economic efficiency and for policies aimed at reducing consumption¹³. Scenarios based on scientific evidence call for a full decarbonization of our economy, in which energy efficiency is necessarily complemented by a strategy to exit fossil fuels. For our country, the condition for maintaining international leadership and limiting exposure to fossil fuel price volatility is through a strategy for climate-friendly production process innovation. The decarbonization challenge cannot be met by offering a progressive deindustrialization of the country, but on the contrary reinterpreted by an overall strategy of innovation and revitalization.

¹² "Documento di Economia e Finanza 2021", Ministry of Economy and Finance.

¹³ "The 2018 International Energy Efficiency Scorecard", American Council for an Energy-Efficient Economy.

4 What role do the NRRP, the Italian Long-Term Strategy and the NECP play on reducing greenhouse gas emissions?

None of the three key plans for the post-Covid recovery and decarbonization of the Italian economy presents a clear, specific and targeted strategy for the decarbonization of Italian industry.

The NRRP

In July 2020 the European Union approved the Next Generation EU program¹⁴, from which Italy will receive 191,5 billion euros, which it must spend by 2026. About the manufacturing industry, under Mission 1 "Digitalization, Innovation, Competitiveness, Culture and Tourism," the NRRP¹⁵ renews some business financing instruments and some funds for the enhancement of production chains. However, the terms of reference set out in Mission 1 do not allow us to understand how this investment constitutes an element of discontinuity and contributes to the ecological transition of the industry.

In Mission 2 Component 2 (M2C2) "Renewable Energy, Hydrogen, Grid and Sustainable Mobility," an investment of 2 billion euros is planned for the use of hydrogen in hard-to-abate sectors. Through this funding line, the NRRP aims to launch calls for project proposals:

1. For hard to abate industries such as cement, glass, paper, ceramics, the calls are dedicated to promoting the transition from methane to green hydrogen;
2. For the steel sector, on the other hand, it is intended to promote the study of:
 - a. Direct hydrogen reduction pilot plants;
 - b. Electric furnaces for smelting the pre-hydrogen obtained by direct reduction;
 - c. Reheating furnaces for subsequent rolling processes.

The investment line clarifies the prospects and timeframe for implementation, although it is not entirely clear how much this investment line also overlaps with the other instruments in Mission 1.

While there is a glimpse in the NRRP of a funding line for some industries through the use of green hydrogen, a strategic vision for addressing the decarbonization of the plastics supply chain is missing. The petrochemical sector is indirectly involved in section M2C1 "Circular Economy and Sustainable Agriculture," where €0,6 billion is allocated to "Circular Economy Flagship Projects." This investment aims to support the improvement of collection and development of facilities for recycling various materials, including plastics, by encouraging projects that have the characteristics of "circular districts." However, the investments are not framed within a clear industrial strategy to decarbonize plastics and, at present, the initiative is fragmented.

The LTS and the NECP

The Long-Term Strategy does not include any action plan for the decarbonization of the Italian industry. Only four "levers" for reducing emissions are identified, to be integrated with energy efficiency:

1. The shift from fossil fuels to "renewable fuels" such as hydrogen, bioenergy and synthetic fuels. However, in both LTS scenarios, the industrial sector continues to consume natural gas and petroleum products;
2. The electrification of consumption;
3. CO₂ Capture and Storage (CCS) facilities;

¹⁴ "[Piano per la ripresa dell'Europa](#)", *Commissione Europea*.

¹⁵ "[Piano Nazionale di Ripresa e Resilienza](#)".

4. New options for the circular economy.

The Strategy does not identify a precise technological path for the decarbonization of industrial sectors. It is simply reported that *the Italian manufacturing sector should undergo profound transformations by replacing traditional fossil sources with green fuels and carriers to contribute to the climate neutrality goal*. No estimate is made of the availability by 2050 of such green fuels and carriers, nor of the infrastructure needed to produce and transport them. Nor is it explained how process emissions, that is, those emissions that originate from chemical reactions that occur during some industrial processes, can be abated. The Strategy admits that *it appears quite difficult to achieve the full decarbonization of the sector by 2050*.

Neither is there an action plan for decarbonizing the industry in the NECP. Measures are mentioned that can help reduce emissions, such as increasing carbon prices, moving away from coal by 2025 and using hydrogen in energy-intensive sectors. However, to enable a significant volume of investment, it is not enough to activate a series of actions or projects; a coherent overall vision must be developed. In the absence of a clear policy choice and action plan on industry transition, available resources will be spent inefficiently and ineffectively, without putting emissions on the trajectory needed to reach the decarbonization target by 2050.

5 What approach for industrial decarbonization in Italy?

Within the framework outlined, an industrial and social decarbonization strategy needs to be developed. It needs to be done as soon as possible: it involves defining the national and European industrial set-up for the next 30 years. This is essential to guide manufacturing sectors, value and supply chains and public and private finance toward innovative, zero-emission projects. At the same time, the strategy should enable our country to increase resilience against international price volatility, reduce dependence on fossil imports and remain internationally competitive.

The social implications of the transition, particularly in terms of employment, need to be addressed in a fair and orderly manner. Indeed, while decarbonization is a challenge, it can trigger a profound transformation of production chains, which can lead to a significant reduction and diversification of energy and raw material supplies and the development of shorter and more local high value-added production chains. In this sense, alongside larger industries, the marked prevalence of medium-small enterprises with high value-added supply chains is a reality that plays a crucial role in the national economy's transition to full decarbonization.

The public sector is a key player in the transition process, not only as a drafter of policies and measures, but also as a funder and lever of decarbonization, with its choices of public spending, facilitation and support for business and research. The role of the state is crucial in reducing the risk associated with the adoption of innovative technological solutions through appropriate policies that support and direct change. Public resources are also an important stimulus for innovation by SMEs, which are often held back by technological, budget and skills shortage constraints. Finally, public resources must be used to leverage private resources, without which it will be impossible to make available the financial resources needed to achieve the -55 percent reduction target by 2030 (2,5 billion euros per year in the industrial sector¹⁶) and then full decarbonization by 2050.

It is necessary to take a short, medium and long-term approach and avoid generating carbon lock-in. For this reason, the cross-cutting impacts that the proposed measures have with

¹⁶ ["Il Green Deal conviene. Benefici per economia e lavoro in Italia al 2030"](#), *Economia e Sostenibilità*.

respect to the issue of climate change should be rigorously addressed in the NRRP. Many studies, such as the United Nations' *The impact of rapid technological change on sustainable development report*, have shown that with a rapid transition to sustainable technologies, the system settles into a higher growth trend than before, productivity starts growing again and employment rates increase. By identifying a plan for decarbonization and consistently investing at least 80% of European funds, it is estimated that the employment rate for the working-age population will rise from 57% in 2020 to 68% in 2030¹⁷. The increase in employment will cross all age groups, but particularly young people under 34 and women even in middle ages. If decisions are postponed instead, the opposite scenario will materialize, in which climate change damages will accumulate, leading to a regime with stagnant growth and high unemployment.

6 ECCO's initial focus: the steel, chemical and cement sectors

63% of domestic industrial emissions come from the basic materials industry, namely the steel, chemical, and non-metallic minerals (including cement) sectors¹⁸ (Figure 4). These sectors are defined as hard to abate, that is, their decarbonization is particularly complex because they require high temperature heat and because CO₂ is also emitted during chemical reactions that occur in the production process.

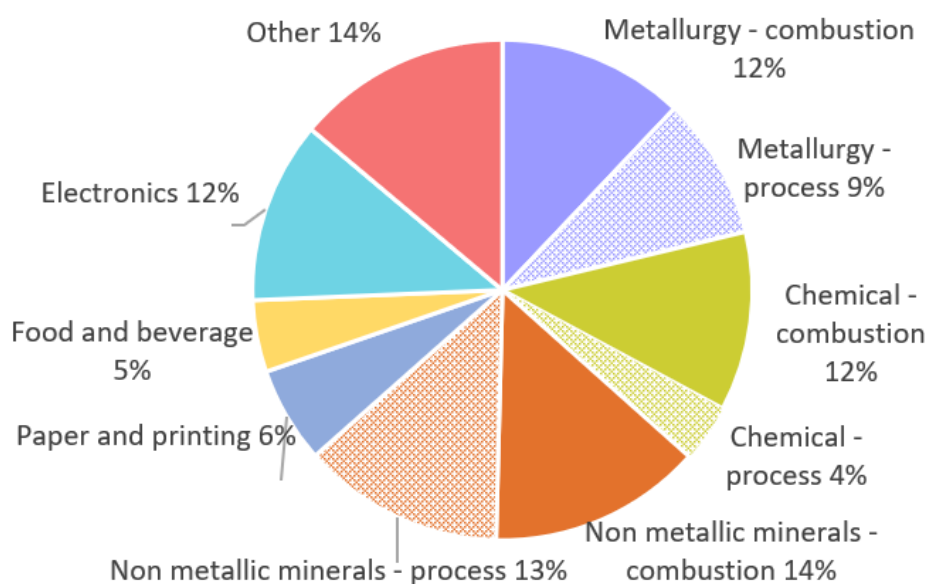


Figure 4 - Greenhouse gas emissions from the various sectors of Italian industry in 2018.

Italy is an international leader in the production of steel, chemicals and cement:

- Italy is the second largest steel producer in Europe (after Germany) and 11th worldwide: 23 million tons of steel were produced in our country in 2019¹⁹;
- With a production value of 55 billion euros in 2019, Italy is the third largest chemical producer in Europe (after Germany and France) and 12th in the world²⁰;
- Finally, our country is Europe's second largest producer of cement (after Germany): more than 19 million tons were produced in 2018²¹.

¹⁷ ["Ossigeno per la crescita"](#), 23 September 2020.

¹⁸ Data processing from ["Italian Greenhouse Gas Inventory 1990-2020"](#), ISPRA, 2022.

¹⁹ ["È tempo di agire - L'industria siderurgica italiana 2019"](#), Federacciai.

²⁰ ["Il volto della chimica in Italia"](#), Federchimica.

²¹ ["2019 Activity report"](#), Cembureau.

["Federbenton Rapporto di filiera 2019"](#), Federbenton, October 2020.

A total of almost 177 thousand people are directly employed in these three sectors, but if we also consider the ancillary industries, it comes to 1,7 million employees.

In hard-to-abate sectors few innovative solutions have reached high levels of technological and commercial maturity. It is therefore necessary that all significant sectors for the national economy be considered in the NRRP and that a significant share of resources be allocated to these sectors. It is a priority to accelerate the technological response to decarbonization because only by hedging, at least partially, the risk with public resources it will be possible to attract private investment as well. Without a clear strategy it will be difficult for private capital to contribute to growth.

ECCO is working on three reports that aim to provide insight into the technologies available for decarbonization of the steel, plastics and cement sectors. These papers identify technology pathways for producing these materials in a manner compatible with climate neutrality goals. In addition, this work lays the groundwork for the construction of an Italian climate policy that can support the conversion of these industrial sectors and related supply chains.

7 ECCO's five recommendations

For an effective and just decarbonization of the Italian industry ECCO suggests:

- **The development of strategies for the decarbonization of various industrial sectors**, aligned with the goal of climate neutrality by 2050. The strategies will serve to drive innovation toward low-carbon technologies and processes, avoiding lock-in investments, phasing out the use of all fossil fuels and allowing our country to remain internationally competitive;
- **The identification of tools and strategies that can help transform both production systems and final demand**;
- **The analysis of the characteristics and role of SMEs in the decarbonization process**, in terms of production and employment diversification and innovation capacity;
- **The activation of new welfare and labor policies**, so that the transition is inclusive and just and an engine for the generation of new employment and the revitalization of the economy;
- **An active role on the part of the public sector**, in policy clarity, target setting, including intermediate targets and investment support.