A Methodological Approach to Assessing the Territorial Impacts of Industrial Decarbonisation on Real Estate Values

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Abstract. This research proposes an innovative methodological approach to assess the territorial impacts of industrial decarbonisation, using the real estate market as a proxy indicator. The present study focuses on the investigation of how property values reflect both the negative externalities of industrial activities and the potential benefits associated with low-carbon transformation processes. The developed methodological proposal is structured into two phases: in the first one, there is an analysis of the current state carried out to evaluate the influence of an industrial site on residential property values; in the second, there is the definition of a transformation scenario performed to simulate the prospective effects of decarbonisation on the real estate market. An econometric technique is implemented to analyze the relationships between property characteristics, environmental factors and market dynamics, both in the current situation and in the post intervention scenario assuming the stability of the functional relationship derived from the current context. The results demonstrate that changes in property values can provide a valuable lens for understanding the broader socio-economic and environmental consequences of industrial transformations. The methodology is adaptable and replicable in other contexts, offering a tool to support public and private decision-making and to guide regeneration policies consistent with the objectives of the ecological transition.

Keywords: Industrial Decarbonisation · Real Estate Market · Property Values

1 Introduction

The decarbonization of production systems represents one of the main objectives of contemporary climate policies and constitutes a fundamental pillar for the pursuit of climate neutrality targets in the medium and long term.

The industrial sector accounts for a significant share of global greenhouse gas emissions, arising both from fossil fuel combustion for energy production and from inherently emission-intensive production processes, such as those involved in steel, cement

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and basic chemicals manufacturing. In this context, the transition towards low- carbon production models constitutes a structural transformation affecting technologies, value chains, plant location decisions and territorial infrastructures.

Since the Paris Agreement, the European Union has progressively consolidated its commitment to reducing greenhouse gas emissions, proposing a regulatory and strategic framework aimed at the rational transformation of both the economic and the industrial development model [1, 2].

In this context, the European Green Deal outlines a transition strategy aimed at achieving a climate-neutral economy in the European Union by 2050; it encourages the shift of growth models towards lowering reliance on heavy use of natural resources and cutting carbon emissions [3, 4]. Therefore, decarbonisation is not imposed as an external constraint on the economy, but rather it is an intrinsic and integral element of the new European development paradigm, in which environmental sustainability, industrial competitiveness and social cohesion are strictly interconnected.

The *Fit for 55* regulatory package, introduced in 1990, reinforces this goal. It sets binding targets for emissions reduction by 2030, strengthening both regulatory and market tools, including the *European Union Emissions Trading System* (EU ETS) and the *Carbon Border Adjustment Mechanism* (CBAM) [5, 6]. These measures directly affect energy- and carbon-intensive industrial sectors and foster accelerated technological innovation and production transition processes [7].

In Italy, European objectives have been included through planning and programming tools such as the National Integrated Plan for Energy and Climate (NIPEC) and the National Recovery and Resilience Plan (NRRP), both of which assign a central role to the ecological transition and the decarbonisation of industry. These frameworks not only set ambitious targets for reducing greenhouse gas emissions but also provide a roadmap for investments in clean energy, technological innovation and sustainable industrial practices. In particular, the so-called "*hard-to-abate*" sectors – including steel, chemical metallurgy, cement, glass, and other energy-intensive industries – represent one of the most significant challenges for the transition. This is due to the inherent process emissions that cannot be easily eliminated, to the high energy consumption associated with production, and to the long operational lifespan of existing industrial plants, which limits the speed at which emissions reductions can be achieved. Addressing these challenges requires a combination of technological innovation, policy incentives and investment in low-carbon infrastructure, as well as the promotion of circular economy principles to maximize resource efficiency and minimize environmental impact [8].

Consequently, the decarbonisation of heavy industry opens up new scenarios not only from a technological standpoint, for example regarding plant design and operation, but also in economic and institutional terms, creating opportunities for innovation, regulatory adaptation, and sustainable growth.

Numerous production processes, however, require high temperatures or are based on chemical reactions that generate emissions that are not easily reduced and/or eliminated, making the electrification of consumption alone insufficient. At the same time, the reconversion of plants implies the need for significant investments and prolonged implementation times, which require close coordination between industrial policies, incentive mechanisms and public regulation [9, 10].

Fundamentally, the European Green Deal marks a shift from the traditional paradigm of the State as a mere regulator, emphasizing a more proactive and strategic role for public institutions and governments in directing industrial transformation through green industrial policies, targeted support measures and comprehensive planning tools.

This framework highlights that the ecological transition entails costs and benefits that are unevenly distributed across sectors, regions and social groups, thereby necessitating policies capable of managing its economic, technological, and social implications [11].

By positioning public authorities as active facilitators of sustainable development, the Green Deal reinforces the need for coordinated action across innovation, legislative frameworks and industrial strategy, ensuring that decarbonization pathways are both feasible and equitable, while fostering long-term sustainable growth.

Within decarbonisation processes, a particularly critical aspect concerns how transformations are planned, monitored and managed over time. Climate and industrial policies are typically designed with long-term horizons (e.g., 10–30 years), setting emission reduction targets and industrial transition strategies.

However, the areas where these policies produce concrete effects—such as local communities, industrial sectors, or energy markets—respond according to different timescales, often shorter and highly sensitive to cyclical factors such as economic fluctuations, demand shifts, or energy price changes.

This temporal misalignment between long-term planning and the immediate response of economic and social systems complicates the assessment of the actual impacts of the ecological transition, particularly in intermediate phases. In other words, while policies are designed for the future, their tangible effects show themselves at different times, making it difficult to determine promptly whether the strategies are achieving the intended outcomes or require adjustments [12].

In addition to temporal challenges, territorial governance introduces further complexities in decarbonisation processes that extend beyond the simple measurement of avoided emissions or the technological efficiency of industrial plants.

Industrial transformations progressively reshape the economic and social landscape of territories, influencing the location of economic activities, public and private investments and the expectations and behaviours of local communities. These impacts, however, are often difficult to capture using conventional monitoring tools typically employed in environmental policy. Current evaluation frameworks are frequently constrained by their focus on discrete phenomena, whereas industrial decarbonisation generates cumulative and dispersed effects that unfold over time. Without tools capable of interpreting these dynamics, a significant risk that transition policies will be assessed solely on the basis of technical targets is strong, thereby overlooking the territorial and social dimensions that ultimately determine their medium- and long-term economic and social sustainability [13].

In this context, the assessment of industrial transformations requires a relevant shift in perspective, aimed at observing local responses to transition processes. Attention is therefore moved from the interventions to their effects on local dynamics; the need to identify indicators that integrate environmental, economic and spatial domains is highlighted. This requirement is particularly critical in complex industrial contexts,

where the ecological transition is intertwined with consolidated production legacies and fragile regional balances.

In this scenario, an analysis of the territorial impacts of decarbonization is increasingly fundamental. This research line is currently partially unexplored but crucial to support decision-making processes. Indeed, understanding the reaction of territories to industrial transformations allows for a more informed orientation of regeneration policies, evaluating the effectiveness of the ecological transition not only in environmental terms, but also in relation to its capacity to produce lasting territorial benefits [14].

By taking into account the multilevel nature of decarbonization processes, in which both regulatory and strategic choices profoundly change production and territorial systems, assessing these transformations is essential for effectively guiding public policies to promote investments consistent and adequate with climate objectives and to ensure a fair and sustainable transition.

Despite the extensive national and international literature on decarbonization technologies, attention to tools capable of interpreting their territorial and socioeconomic impacts remains limited, particularly in complex European industrial contexts.

2 Aim

The present research aims to develop a structured, step-by-step methodological approach to assess whether, and to what extent, the real estate market can serve as a proxy indicator for interpreting the territorial impacts associated with the presence of the steel plants and the ongoing industrial decarbonisation processes. The assumption is that property values and market dynamics may incorporate, over time, both the negative externalities linked to industrial activities and the expected benefits arising from environmental upgrading and low-carbon transition.

In a specific way the study tries to evaluate the true capacity of the real estate market to absorb and reflect industrial plants transformation processes, considering both short-term modifications and longer-term structural changes.

In this perspective, real estate prices are interpreted not merely as economic variables, but as composite indicators capable of capturing broader socio-economic expectations, perceiving environmental quality and shifts in territorial attractiveness.

Methodologically, the study aims to contribute to the debate on evaluation tools capable of integrating environmental, industrial and territorial dimensions, by proposing an assessment tool for the analysis of the relationship between decarbonization strategies and real estate values. Through an econometric analysis of the current context, property values are linked to intrinsic housing characteristics, environmental conditions, and proximity to the industrial site, capturing the externalities associated with its presence.

A prospective industrial decarbonisation scenario is then constructed to simulate how technological and environmental improvements may affect contextual variables and, consequently, future property values. By comparing estimated prices before and after the intervention, changes in real estate values are interpreted as an indirect measure of the territorial benefits of decarbonisation. In this perspective, the real estate market serves as a synthetic indicator of economic, environmental, and perceptual dynamics, supporting public and private decision- making in areas undergoing industrial transformation.

In this sense, the expected outcomes of the research are intended to provide knowledge support to public decision-makers - particularly in the context of cost– benefit analyses, industrial transition strategies, and territorial regeneration policies - as well as to private investors assessing the attractiveness and risk profile of real estate investments in areas undergoing profound industrial and environmental transformations. Finally, the research aspires to suggest an interpretative framework that enhances the understanding of how ecological transition processes are inserted within local socio-economic systems and reflected in property market dynamics.

The structure of the present paper is outlined as follows. Section 3 provides the background framework, discussing the main dynamics linking industrial regeneration and decarbonisation strategies with local environmental conditions and their potential effects on residential property markets. Section 4 describes the proposed methodological approach, detailing the different phases to be carried out. In Sect. 5 the conclusions are explained, discussing the main methodological implications and outlining possible future developments.

3 Background

Industrial regeneration and energy transition processes are gradually assuming an increasingly central role in territorial transformation policies, particularly in contexts characterised by the presence of large production plants and energy-intensive industrial sectors. Decarbonisation and technological conversion strategies for productive systems are progressively redefining the relationship between industrial activities and the surrounding territory, affecting not only economic and production dynamics, but also environmental quality and the residential attractiveness of nearby areas [15].

Several international studies have shown that local environmental conditions represent a determining factor in the functioning of property markets. According to hedonic pricing approach, the value of properties does not depend exclusively on their intrinsic characteristics – such as dwelling size, construction quality or maintenance state – but also reflects the characteristics of the territorial context in which they are located, including variables such as air quality, noise levels, the presence of environmental amenities and the perception of environmental risk [16–18].

A fundamental key factor, that is represented by the air quality, influences the value of residential properties: several empirical researches attest that improvements in air quality can translate into significant increases in housing prices [19].

A particularly relevant study analyses the effects of air pollution regulation policies in the United States by exploiting changes in air quality determined by the Clean Air Act, one of the main federal environmental strategies introduced to reduce industrial emissions and improve air condition [20].

The outcomes indicate that emissions reduction contributed to measurable improvements in air quality, which were subsequently capitalised on in property values: a decrease in atmospheric particulate matter concentrations is associated with increases in housing prices of approximately 0.7% to 1.5% per unit reduction in the pollutant [21].

In addition, more recent evidence confirms this relationship, demonstrating that the decline in fine particulate matter (PM2.5) concentrations associated with more stringent environmental policies can lead to average increases in property values of up to

approximately 6% in the areas concerned [22]. Similar analyses carried out on residential property markets detect that higher levels of air pollution are connected to significant reductions in residential prices of up to 8% [23, 24]. Further empirical findings emerge from the analysis of Toxic Release Inventory data in the United States, which shows that the decrease in industrial emissions has been progressively reflected in property values in the areas close to production facilities [25].

Complementary to air quality, noise pollution is also a significant environmental disamenity in urban contexts, arising from industrial activities and heavy traffic. High levels of environmental noise negatively affect residents' quality of life and, consequently, residential property values.

The relevant literature points out that higher levels of noise exposure are generally associated with reductions in housing prices. Analyses based on hedonic price models indicate that a 1 dB increase in environmental noise levels can determine a decrease in property values of between approximately 0.5% and 2% [26].

Similarly, empirical investigations developed on the Stockholm property market validate these results, highlighting that exposure to road traffic noise has significant negative impacts on residential market mechanisms. In particular, dwellings located in areas characterised by higher levels of traffic-related noise may experience price reductions of up to approximately 5–10%, depending on the intensity and persistence of noise exposure [27].

Additional evidence concerns the role of landscape quality and the presence of urban environmental amenities on real estate dynamics.

A substantial number of studies reveal that proximity to green spaces or contexts characterised by high landscape quality can generate significant increases in housing prices. For example, proximity to urban parks is capable of affecting property values, leading to increases of approximately 7% to 15% [28]. With the same aim, other studies show that the presence of green spaces can generate rises in residential prices of up to around 20% in immediately adjacent neighborhood [29]. More recent analysis also highlights how the quality of natural landscape views can result in marked property premiums in urban residential markets [30].

Furthermore, residents' perception of environmental risks related to industrial activities or contaminated sites constitutes another factor influencing property values.

The scientific literature emphasizes how the presence of polluting industrial sites can give rise to a reduction in property values in the surrounding areas [31]. Conversely, environmental remediation and targeted redevelopment measures may produce the opposite effect. In this sense, contaminated site remediation programmes in the United States have been shown to positively impact the real estate prices of nearby residential units [32]. Moreover, empirical analyses suggest that brownfield redevelopment may contribute to higher property values in adjacent urban zones, especially when remediation efforts enhance environmental quality and visual appeal or provide new public amenities [33, 34].

Overall, these findings point out that the property market is strongly sensitive to changes in local environmental conditions. Improvements in air quality, noise levels, landscape quality and in the perception of environmental safety tend to be progressively reflected and, therefore, capitalised in housing prices, as they contribute to increased

livability, attractiveness and residential desirability. From this perspective, industrial regeneration processes aimed at decarbonisation - and, more generally, at ecological transition strategies that do not involve the dismantling of existing production activities - may play a crucial role in shaping local environmental conditions.

These processes are based on the technological transformation and conversation of industrial facilities, favouring the adoption of innovative solutions capable of reducing the environmental impact of production systems. In recent years, the growing emphasis on ecological transition objectives has fostered the development of technological policies designed to lower emissions and improve the environmental performance of industrial processes [35].

In this context, among the main technological solutions currently being developed in energy-intensive industrial sectors, Carbon Capture, Utilisation and Storage (CCUS) systems, industrial hydrogenation processes (Green Hydrogen) and the electrification of production processes are included, as well as the specific measures aimed at upgrading the plants energy efficiency. These technologies are assuming an increasingly important role in the so-called hard-to-abate sectors, such as steelmaking, cement production and basic chemicals [36–39].

Within the mentioned framework, residential property markets provide particularly sensitive indicators of territorial transformations, as housing prices tend to incorporate changes in environmental quality, risk perception and expectations of economic and urban development over time. From this perspective, trends in property values can act as an indirect yet meaningful proxy for assessing the impacts of industrial regeneration processes on the local context, encompassing both ecological changes and evolving expectations for economic and urban development.

It should be pointed out that, however, despite the growing attention and relevance of production regeneration or decarbonization strategies in contemporary industrial and climate policies, scientific literature has so far paid limited attention to the effects of these targeted processes on residential property markets. Indeed, most existing studies focus on the impacts of the presence of polluting industrial sites on real estate mechanisms or on the territorial implications of environmental remediation plans, whereas the dynamics through which technological transformations aimed at reducing CO_2 emissions can affect property values in areas surrounding production facilities remain largely underexplored.

From this standpoint, the analysis of the relationship between industrial regeneration processes oriented towards decarbonisation and the residential property prices is a field of research that is still partially unexamined but potentially interesting for understanding the territorial effects of the ecological transition and for effectively supporting decision-making processes in industrial development and urban regeneration governance initiatives.

4 Methodology

According to the aim of the present research, the proposed methodological approach for the assessment of the decarbonization of industrial plants on real estate values is divided into twelve phases. This is designed to ensure internal consistency, transparency of the analytical process and replicability in other contexts characterized by the presence of large, polluting industrial sites and ecological transition processes.

The methodological approach adopts a sequential framework to evaluate whether, and to what extent, property prices can be interpreted as a proxy indicator of the territorial impacts associated with the presence of steel plants and ongoing decarbonisation processes. In this sense, the first part (phases 1–7) of the methodology is dedicated to the analysis of the current state, whereas the second part (phases 8–12) is oriented towards the prospective exam of the potential impacts associated with the planned transformation, through the construction of a future industrial decarbonization scenario. This distinction allows to separate the empirical observation of existing dynamics from the simulation of expected impacts, avoiding overlap between descriptive analysis and potential assessment. Therefore, the analysis is structured as a twofold investigation. The first stage examines the influence of the industrial and potentially polluting site on property values, assessing the extent to which its presence affects local real estate dynamics. The second one develops an ex ante predictive assessment aimed at estimating the potential impacts of the decarbonisation process on the property values, thereby exploring how environmental and technological transformation may reshape territorial attractiveness over time.

The steps into which the proposed methodology is structured are described below.

Phase 1 consists of the case study definition, which allows to delimit the analysis area and to frame the territorial industrial, and urban context in which the industrial site to be explored is located. This phase is essential for understanding local specificities and ensuring consistency between the research objectives, the scale of analysis and the available data.

Phase 2 focuses on the selection of intrinsic and extrinsic variables, identified in line with the factors most commonly considered during property bargaining processes. Particular attention is given to variables capturing urban quality and the perception of environmental risk, which are regarded as key determinants in the formation of residential property values, especially in the context of proximity to the industrial site.

Phase 3 concerns the identification of the real estate sample and is aimed at building a dataset representative of the local residential market. The sample is selected to ensure adequate spatial and temporal coverage, thus allowing for the analysis of price dynamics in relation to proximity to the industrial site and other variables considered.

Phase 4 involves the georeferencing of the collected data and the assessment of their statistical robustness through descriptive analysis. This step aims to identify potential anomalies, outliers and preliminary relationships among the variables, ensuring the reliability and consistency of the dataset prior to econometric analysis.

Phase 5 includes the application of the econometric technique, targeted at analyzing the relationships between real estate characteristics, environmental factors and property values. In this sense, this phase provides an empirical basis for isolating and interpreting the impacts of the presence of the industrial site and the territorial characteristics on real estate market dynamics.

Phase 6 addresses the critical analysis of the empirical findings. Particular attention is given to the magnitude, direction and statistical significance of the estimated effects, as well as to their coherence with the territorial and environmental local context specificities.

Phase 7 focuses on the validation of the econometric results, assessing their robustness and consistency with theoretical expectations and the evidence emerging from

scientific literature. This step strengthens the baseline analysis and provides a solid foundation for the subsequent development of the prospective assessment.

Phase 8 begins with the description of a (planned, to be implemented, in progress, etc.) transformation scenario related to the decarbonisation of the selected industrial site, focusing on its key technological, energy and territorial features.

Phase 9 concerns the identification of variables that are potentially subject to change in the transformation scenario, with particular reference to the environmental and perceptive components that can influence real estate values in the medium-long term. This step highlights the main contextual elements likely to be affected by the industrial transformation, providing a basis for simulating its potential impacts on the local property market. In this phase, the post-intervention values of the selected variables are assessed according to the nature of each factor:

(i) for variables directly related to measurable environmental or technological changes (e.g., air quality, noise levels, emissions), values are estimated by making assumptions;
(ii) for variables related to the perception of environmental quality and risk, values are estimated by implementing stated preference techniques, such as surveys aimed at capturing the perceptions of the community.

Starting from these hypothesized variations, in phase 10 the determination of expected real estate values in the future transformation scenario is carried out, using the relationships derived from the current state analysis, to simulate the potential effects of industrial decarbonisation. It is assumed that the function linking real estate values to intrinsic and extrinsic factors remains unchanged and that, therefore, the variables influencing the price formation process remain the same.

The estimated prices are obtained by keeping constant the values of intrinsic variables and the values of those extrinsic characteristics that are not affected by the proposed transformation, while introducing the values of the extrinsic variables for which a variation is expected in the post-intervention scenario.

Phase 11 consists of comparisons between the estimated property values before the decarbonization process and those assessed after the intervention, i.e. in the transformation scenario. The interpretation of the differences between the two temporal periods is performed in order to point out the potential territorial benefits associated with the industrial transformation as reflected in the real estate market.

Phase 12 provides a final overview of the results obtained, which integrates the evidence from both phases analyses (that are current state and transformation scenario), offering a comprehensive assessment of the territorial impacts of decarbonization.

Figure 1. Provides a summary of the phases of the proposed methodological approach, highlighting the sequential structure of the process and the distinction between current state analysis and prospective assessment.

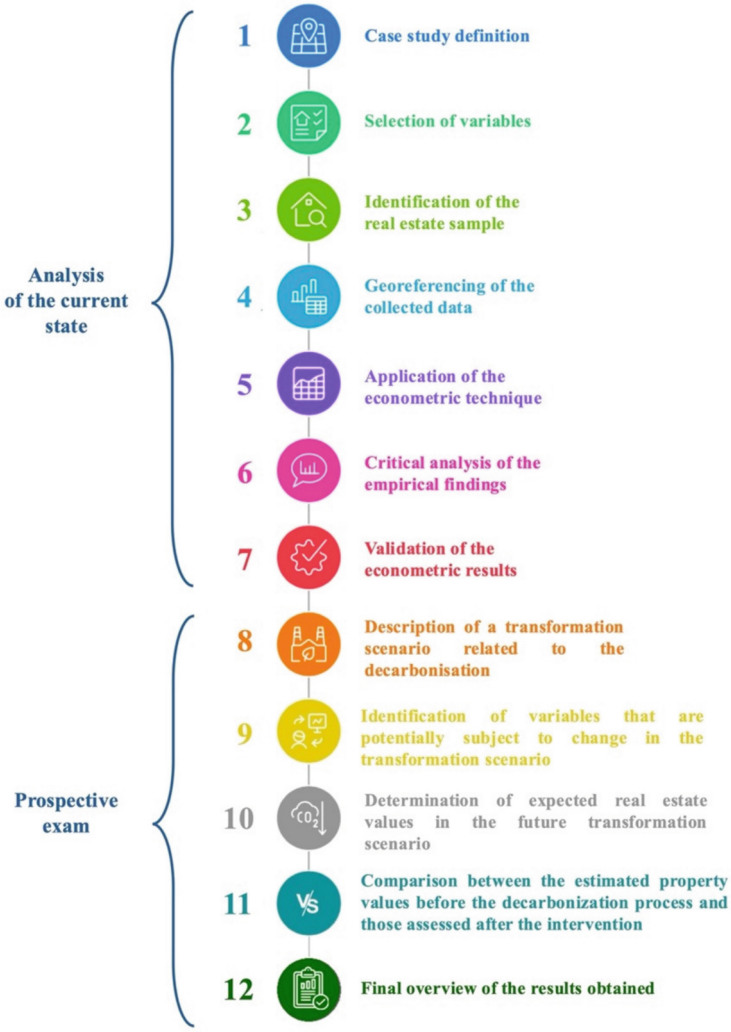

Fig. 1. Phases of the proposed methodological approach.

5 Conclusions

With reference to the current and relevant topic of industrial sites decarbonization, the present research has proposed a methodological approach aimed at assessing the impacts of transformation processes on real estate values. In this sense, the methodology aims to provide a practical evaluation tool capable of supporting environmental transition policies by offering insights into the broader socio-economic implications of decarbonisation.

The methodology relies on the real estate market as a proxy indicator for interpreting the territorial impacts associated with the presence of the steel plants and the ongoing low-carbon transformation processes. The main underlying assumption is that property

values and market dynamics reflect, over time, both the negative externalities of industrial activities and the expected benefits arising from environmental improvement [40, 41].

A key strength of the approach lies in its two-phase structure, which separates the analysis of the current state from the construction of a prospective transformation scenario. This design enhances the methodology's adaptability and potential replicability in other contexts characterized by environmental transition processes. In fact, the proposed approach is characterized by its flexibility and reproducibility, allowing for continuous monitoring of each step and adaptation to different inputs arising from evolving contextual conditions.

The possibility of adjusting the phases sequence to the characteristics of diverse territorial contexts enables its application to the exam of decarbonisation processes effects on real estate market, including their environmental, social, and economic impacts. Such adaptations can be proposed by public authorities, real estate market operators and local communities, according to the specific features of industrial areas undergoing transformation and the decarbonisation projects being implemented.

Nevertheless, several limitations must be pointed out. Firstly, the assumption that the fundamental structural dynamics of the real estate market remain constant represents a crucial aspect to be investigated.

The analysis, in fact, modifies only those variables deemed susceptible to change as a result of the industrial decarbonization intervention, while underlying the other market mechanisms that are considered unchanged, thus by assuming that supply-demand interactions, liquidity conditions and broader economic trends are unvaried.

This simplification allows for a controlled assessment of the intervention's potential effects but may underestimate or overlook indirect or systemic impacts that emerge when structural market conditions evolve over time [42].

In addition, the interpretation of changes in real estate values assumes that the residential market is able to timely and consistently incorporate information relating to environmental and industrial changes, a condition that may be affected by external factors such as macroeconomic trends or sector-specific policies.

Furthermore, the use of variables connected to the perception of environmental risk requires the definition of proxies that, while allowing for quantitative analysis, fail to fully capture the complexity of the socio-economic factors that influence the choices of real estate operators. In this sense, to address this critical issue, targeted qualitative analyses should be conducted to evaluate stakeholders' perceptions of the industrial site and its ongoing or planned transformation.

However, also in situations where the transformation scenario is only proposed, the prospective component of the methodology is crucial to provide indications to decision-makers for implementing effective regeneration policies on territories.

In fact, although the scenario-based estimations of the effects of industrial decarbonisation do not represent deterministic forecasts, they serve as interpretative tools for exploring plausible directions of change.

Accordingly, the results should be regarded as indicative of general trends of predictions of future property values [43], by supporting the choices processes of urban decarbonization initiatives. In light of these considerations, this work leads to several future developments.

Firstly, the proposed methodology could be applied to real-world industrial contexts undergoing transition processes, such as steel districts, petrochemical clusters or energy-intensive production areas. In these settings, the framework may support ex-ante evaluation of decarbonisation strategies, enabling public authorities to compare alternative technological pathways and to guide the allocation of public resources in territorial regeneration processes [44].

Secondly, the methodological approach could be further strengthened through the integration of complementary analytical techniques. In particular, spatial econometric models could be adopted to account for spatial dependence in property values, while panel data approaches may allow for the analysis of temporal dynamics associated with industrial transformation processes. In addition, machine learning techniques could be explored to capture non-linear relationships among variables, and stated preference methods could enhance the representation of residents' perception of environmental quality and risk.

Thirdly, further developments could focus on improving the construction of prospective scenarios by incorporating alternative pathways and sensitivity analyses. This would allow for testing the robustness of the estimated impacts under different assumptions and for better capturing the complexity and uncertainty associated with decarbonisation processes.

Finally, the application of the proposed framework to specific case studies represents a crucial step for future research, in order to validate its empirical effectiveness and refine the estimation procedures in real-world contexts [45].

From a broader perspective, the decarbonisation of industrial systems remains a critical challenge for territorial planning, environmental governance and sustainable urban development.

In this context, the proposed methodology aims to contribute to the development of integrated evaluation tools capable of supporting public and private decision-making processes, by linking environmental transformation dynamics with real estate market responses and territorial attractiveness.

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