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Global warming, ageing of population, reduction of energy consumption, immigration flows, optimization of land use, technological innovation

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TeMA Journal was established with the primary objective of fostering and strengthening the integration between urban transformation studies and those focused on mobility governance, in all their aspects, with a view to environmental sustainability. The three issues of the 2024 volume of TeMA Journal propose articles that deal the effects of global warming, the ageing of population, the reduction of energy consumption from fossil fuels, the immigration flows from disadvantaged regions, the technological innovation and the optimization of land use.

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The cover image shows railway street in Hanoi, Vietnam (Source: TeMA Journal Editorial Staff).

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Contents

REVIEW NOTES

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REVIEW NOTES – International Regulation and Legislation for the Energy Transition

Energy transition and renewable energy policies in Italy

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Abstract
Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always remaining in the groove of rigorous scientific in-depth analysis. This section of the Journal, Review Notes, is the expression of continuously updating emerging topics concerning relationships between urban planning, mobility and environment, through a collection of short scientific papers written by young researchers. The Review Notes are made of four parts. Each section examines a specific aspect of the broader information storage within the main interests of TeMA Journal. In particular, this section, International Regulations and Legislation for the Energy Transition, explores the challenges and opportunities in the urban context to understand the evolving landscape of the global energy transition. In this direction, the contribution of this review note examines contribution examines the role of cities in the energy transition, focusing on Italian and European policies and regulations, with particular attention to Renewable Energy Communities (RECs). It analyzes the Renewable Energy Directive II and its transposition in Italy, highlighting challenges and the need for coordination between urban and energy planning.

Keywords
Energy transition; Energy communities; Italian regulations.

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1. Introduction

The energy transition is a crucial and complex process involving the transformation of traditional fossil fuel-based energy systems to sustainable and renewable systems. This change is closely linked to urban life, as cities are major centres of energy consumption. The interplay between cities, energy consumption and energy transition is essential to understanding the dynamics of this process. Cities play a crucial role in this transition: currently, more than half of the world's population lives in urban areas, and by 2030 nearly 60 per cent of the global population is expected to reside in cities (Staricco et al., 2020).

These occupy only 3 % of the earth's surface but are responsible for 60 to 80 % of global energy consumption and 75 % of carbon emissions (UN - United Nations Regional Center, 2022). This concentration of energy consumption and emissions makes cities a focal point for energy transition policies. With more than half of the global population living in urban areas, cities represent both a challenge and an opportunity for energy transition. The importance of the issue lies in the need to reduce CO_2 emissions, improve air quality and ensure a sustainable future for future generations (Lai et al., 2021). Cities, being large consumers of energy, can significantly influence energy supply and demand. Therefore, effective urban policies and spatial governance tools are crucial to drive this transition. This transition involves not only a technological transformation, but also an economic and social one, involving all sectors of society, especially cities that are at the centre of global energy consumption (Fasolino et al., 2020).

The energy transition is one of the main global goals that address challenges related to climate change, energy security, and sustainable development.

Energy transition in cities requires an integrated approach that considers not only the adoption of renewable energy sources, but also energy efficiency, sustainable mobility, smart resource management and active citizen participation (Magnani & Carrosio, 2021). Urban and spatial planning policies play a key role. Spatial government tools are essential to facilitate this transition. Urban planning must integrate sustainable energy policies, promoting energy efficiency in buildings, the use of renewable sources and the implementation of sustainable mobility infrastructure. Governance involving national, regional and local actors is crucial to coordinate efforts and overcome administrative barriers that often hinder renewable energy development (Mazzeo & Polverino, 2023).

In addition, active citizen participation and collaboration between public and private entities are essential to the success of energy transition initiatives (Carra et al., 2022). Efficient energy management, adoption of renewable sources, and implementation of smart technologies are essential tools for reducing the ecological footprint of urban areas. The current crisis requires the construction of a new model of social organization based on the production and consumption of energy from renewable sources, inspiring a more sustainable lifestyle and protecting the most disadvantaged users (Szulecki & Overland, 2020). In this context, Renewable Energy Communities (RECs), play a key role by promoting renewable energy production and consumption at the local level.

Cities, with their population density and economic activities, offer unique opportunities to implement innovative energy solutions such as RECs, which promote self-production and shared consumption of clean energy (Grignani et al., 2021). These initiatives not only contribute to emissions reduction, but also promote social cohesion and economic inclusion, transforming citizens from mere consumers to active players in energy production. Therefore, cities not only contribute to the problem but can also be part of the solution, becoming laboratories of innovation for energy sustainability (Gargiulo & Papa, 2021).

2. Transposition of the Renewable Energy Directive II in Italy

The energy transition is a key pillar of European Union (EU) environmental and climate policy, aimed at reducing greenhouse gas emissions, improving energy efficiency and increasing the use of renewable energy (D'Amico, 2024). In 2018, the EU adopted the Clean Energy for All Europeans Package (CEP), a set of measures

aimed at facilitating the transition from fossil fuels to renewable energy, setting ambitious targets such as achieving 32 percent of energy from renewable sources by 2030. One of the key instruments in this package is Directive (EU) 2018/2001, known as Renewable Energy Directive II (RED II). This directive not only sets binding targets for renewable energy at the European level, but also introduces Renewable Energy Communities (RECs) and requires member states to create regulatory frameworks that support their implementation (Candalise & Ruggieri, 2020). The transposition of RED II varies among member states due to different geographic, cultural, economic, and political conditions. Energy communities are defined as legal entities based on open and voluntary participation, independently managed by shareholders or members (Felice et al., 2022). These members, which can be individuals, small and medium-sized enterprises or local authorities, including municipal governments, must be located in the vicinity of renewable energy production facilities owned by the entity itself. The main objective of energy communities is to provide environmental, economic and social benefits to their members and the local areas in which they operate, rather than to generate financial profits (Martinelli, 2024). The concept of "Energy Communities" was introduced in Italy in 2017 with the Strategia Energetica Nazionale (SEN), adopted by the Ministry of Economic Development and the Ministry of the Environment. The SEN, influenced by the European Commission's Clean Energy for All Europeans Package, redefined the role of the consumer from passive to active, able to respond to price changes and provide grid services. The strategy identified the deployment of renewables, distributed generation, and the application of information technology to energy as key elements to foster self-consumption and active consumer participation in energy markets. In Italy, the energy transition is being driven by several regulations and initiatives aimed at promoting the use of renewable energy sources and improving energy efficiency (Errichiello & Demarco, 2020). Among these, the Piano Nazionale Integrato per l'Energia e il Clima (PNIEC) is a key tool, outlining the country's goals and strategies for 2021-2030. The PNIEC recognizes energy communities as a crucial element in Italy's energy transition, promoting policies and incentives that encourage their deployment and sustainable development (MASE, 2023). It was only with Decree Law No. 162/2019 (Decreto Milleproroghe), converted into Law No. 8/2020, that there was a first transitional transposition of the RED II Directive, introducing the concept of Renewable Energy Communities in Italy. Initially, Italian law strictly applied the RED II proximity concept, limiting the power of plants to 200 kW and requiring plants and members of RECs to be connected to the same secondary transformer substation (medium/low voltage). With Legislative Decree No. 199/2021, Italy took a further step toward full transposition of RED II, expanding the scope and size of renewable energy plants associated with RECs. The area of association was extended to the high/medium voltage cabin and the maximum power of plants was increased to 1 MW. The decree provided an incentive of 22 billion from the Piano Nazionale di Ripresa e Resilienza (PNRR) for municipalities with a population of less than 5,000, but implementation of the provisions had to wait until the Ministero dell'Ambiente e della Sicurezza Energetica (MASE) approved Decree Law 414/2023 (CER Decree) in November 2023 and published in January 2024. The decree provides total incentives of 5.7 billion euros, including a national feed-in tariff and a grant for small municipalities. Italy quickly transposed RED II, as the absence of a specific regulatory framework for collective initiatives to support Renewable Energy Communities and off-grid energy production and self-consumption modes made it advantageous for the Italian government to promptly implement Directive (EU) 2018/2001. However, the delay in the approval of the implementing decree has limited the large-scale deployment of RECs in Italy. In our country, the lack of a single and clear regulatory framework, slow permitting, and discrepancies between regional regulations are significant obstacles to achieving the EU energy transition goals set by the European Union. Specifically, the lack of coordination between spatial government and energy planning continues to hinder the achievement of the energy transition goals defined by the European Union. In addition, the need for technical and managerial skills for RECs management is a barrier for many small municipalities. However, with updated incentive mechanisms and

simplifications in the issuance of permits for renewable energy installations, significant growth in CERs is expected in the coming years (Legambiente, 2023).

3. Energy transition and governance of urban and territorial transformation

The European Union has outlined ambitious energy transition goals aimed at reducing carbon emissions and promoting the use of renewable energy. To achieve these goals, it is crucial to integrate the management of urban and spatial transformation with energy planning. Such integration not only improves energy efficiency but also facilitates the implementation of Renewable Energy Communities (RECs), which are essential for promoting sustainability and social equity. Urban and energy planning must be conceived as interconnected aspects. Cities, responsible for 65 % of global energy consumption and 70 % of CO_2 emissions, represent key areas for implementing the transformations needed to address the climate crisis (La Rocca & Fistola, 2014). Effective integration of these aspects enables the creation of resilient, efficient and sustainable cities, reducing carbon emissions and improving citizens' quality of life. In Italy, this integrated approach is crucial to reduce carbon emissions, improve energy efficiency, and promote collective self-consumption through RECs. These communities not only reduce emissions, but also incentivize active community participation, mitigating energy poverty and improving social equity. Concrete examples in Italy demonstrate how RECs can be tools for local development, bringing significant economic and social benefits. At the national level, there are specific challenges, such as the need for an appropriate regulatory framework and the lack of necessary infrastructure, that hinder the implementation of RECs. However, local governments also need to improve policies to promote energy efficiency and mitigate energy poverty. The decentralization process has stimulated an activism of regional and local governments, which has been crucial in promoting positive local energy strategies. Energy planning in Italy has undergone a significant evolution, characterized by a shift from centralization to decentralization of powers. With Law No. 10/1991, Italian regions acquired a key role in planning and managing energy policies, promoting the rational use of energy, energy conservation and the development of renewable sources at the local level. This decentralization has allowed energy policies to be better tailored to local needs, while creating tensions between different levels of government. In recent decades, the Italian government has introduced several reforms to incentivize renewable energy, including the Bersani Decree in 1999 and incentives for photovoltaics and other renewables in the 2000s. However, institutional fragmentation and complex permitting procedures have slowed the growth of renewable energy. Today, Italian energy policy is characterized by a complex system of interactions among various institutional actors at different levels of government. Although coordination mechanisms such as the State-Regions Conference exist, significant challenges remain, including slow permitting procedures and the lack of a uniform regulatory framework. RECs can take a leading role in accelerating the energy transition by supporting bottom-up practices and increasing the social acceptability of new installations. To achieve energy transition goals, obstacles such as restrictive building codes and lengthy permitting procedures must be overcome. In addition, greater coordination between energy and land-use planning policies is essential for integrating RECs into urban development projects. Despite the difficulties, significant opportunities exist. European directives such as the Clean Energy for All Europeans Package provide a favorable legislative framework and incentives for the development of RECs. The Piano Nazionale di Ripresa e Resilienza (PNRR) and other European programs provide funds to support the deployment of RECs. Collaboration between public and private entities, supported by a stable regulatory framework, is key to overcoming regulatory and technical barriers, fostering stakeholder mobilization and active citizen involvement. Integration of urban planning with energy planning is essential to promote sustainable urban development and achieve energy transition goals. In Italy, despite regulatory and operational challenges, there are opportunities offered by European support policies and funds that can foster the deployment of RECs. A coordinated approach that involves all local stakeholders and promotes the active participation of communities is essential. This integrated approach not only facilitates the implementation of

RECs, but also promotes sustainable urban development, improving architectural and landscape quality and contributing to urban regeneration. In sum, overcoming existing barriers through regulatory simplification, financial support, and cross-sector collaboration can enable Italy to move more rapidly toward a sustainable energy future, in line with European Union goals.

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