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Editorial

The Role of Spatial Policy Tools in Renewable Energy Investment

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1. Introduction

There is an extensive and rapidly growing body of literature on renewable energy. However, there are far fewer studies that directly link renewable energy investment and spatial planning. Existing attempts are mostly limited to selected case studies or the analysis of particular policy documents. Hence, there is a need for a more wide-ranging analysis which would combine and transcend the threads associated with the two strands. From the perspective of renewable energy sources, these are, for example, issues around the categorisation of renewable energy sources, resolving the energy trilemma (energy transition, energy justice and energy security), impacts on economic development and the social sphere, and environmental protection. From the spatial planning perspective, the effectiveness of particular spatial planning instruments, their assumptions, as well as the issue of flexibility in planning are discussed.

The implementation of renewable energy sources depends on the features of national spatial planning systems and their governance purposes and principles [1,2]. A review of European countries [3] shows that in about a quarter of the countries analysed, the integration between renewable energy and spatial planning takes places at the local government level. However, a lack of interaction between planning and renewables is very often noticeable [4–6]. This raises questions about potential directions for the integration. Klepinger [7], referring to the case study of Michigan and wind energy, suggests the importance of zoning as a tool to address wind energy needs. Nadai and Labussiere [8] discuss the example of France and the attempts to designate wind energy zones. Teschner and Alterman [9], focusing on small-scale wind turbines, also point to the danger that an opaque legal and planning framework may discourage these investments. On a broader international scale, the role of legal barriers is found to be much greater than that of technological barriers in the establishment of distributed energy [10]. Asarpota and Nadin [11] point to the contextual variation of the physical and spatial characteristics of cities in the context of their relationship with the energy sector.

This brief overview indicates the complexity and diversity of the topics. There is no doubt that the combination of the issues of spatial planning and renewable energy sources is of much importance, both academically and in terms of policy impact. This Special Issue of *Energies* seeks to broaden our understanding of the relationship between spatial planning and renewable energy investments. It aims to analyse key trends, and furthermore, to identify how a country's planning culture and formal planning framework influence the development of renewable energy investments.

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2. Scope of the Special Issue

In this Special Issue, the matter of renewable energy sources in spatial planning has been addressed in several different but interrelated ways. Geissler et al. [12] analyse the case of Austria and identify a problem in the relationship between the federal level of planning and the local level of implementation. Local spatial conflicts and the divergence of approaches in local implementation of renewables remain a barrier. The authors propose, on the one hand, to clarify the content of spatial plans at the local level and, on the other hand, to develop a broader transparent method to resolve spatial conflicts.

Solarek and Kubasińska [13] take the case of Poland while referring to practices in other countries. They note the excessive requirements of planning acts, as well as frequent changes in regulations. The Polish example demonstrates a limited scope of investment implementation. A very large number of the Polish local plans either fail to refer to renewable energy, or do so in a generic and unclear manner. This is further confirmed by Blaszke et al. [14], who have examined several thousands of Polish local planning acts. Their research shows that, in almost half of the municipalities, the issue of renewable energy sources is not addressed at all in their spatial strategic acts. The authors propose to unify the terminology related to microinstallations and wind power plants. However, while it is advisable to create a broader basis for investment implementation, it should be remembered that an excess of wind power in a given area does not necessarily bring positive spatial effects. This also applies to the broader discussion on balancing rationales and values in spatial planning, including responding adequately to the challenges of climate change.

Research by Hołuj et al. [15] analyses the determinants of solar energy investments in peri-urban areas, in the context of urban sprawl tendencies. In this context, the authors postulate the promotion of small photovoltaic farms (allowing one to maintain the energy balance of cities in critical moments) and a focus on the creation of compact and efficient low-carbon spatial structures.

The publications included in this Special Issue also draw attention to other spatial concerns in the context of renewables. Kwaśniewski et al. [16] discuss the production costs of biomass used for heating purposes from perennial energy crops and associated issues around land use and rural planning. Buko et al. [17] consider the use of UAVs in courier and postal delivery. The use of this technology can break down terrain barriers and reduce congestion in urban areas. Moving away from polluting fossil fuels and investments from courier companies in low- and zero-emission modes of transport is advocated.

Myszczyszyn and Suproń [18], in a broader discussion, point out that addressing the problems of environmental degradation requires contextually nuanced and differentiated policies. In Poland, for example, the elimination of coal and lignite mining may translate into a slowdown of economic growth in the short run, and increased costs of living. According to the authors, it is necessary to prepare specific strategies to limit the negative social consequences of the transition.

3. Key Findings and Recommendations for Further Research

Several conclusions can be drawn from the publications collected in the Special Issue:

1. The implementation of investments in renewables must be adapted to the particular country's context. Not only the national planning framework, but also the existing state of renewable energy deployment, constraints, and barriers are important factors to consider. Socio-economic barriers may be a blocking factor for the effective application of spatial instruments. The basic framework for clarifying the direction of renewable energy deployment can be defined at the supranational level (e.g., the European Union). However, it is still necessary to adapt this framework to national, highly differentiated specificities.

2. One of the main barriers in the planning system is the terminology used, which is not always consistent or coherent. Another barrier is changes to regulations, which create confusion in practice;
3. Spatial planning adapted to renewable energy sources must negotiate a number of different issues and objectives. On the one hand, this will include a comprehensive response to climate change; on the other, spatial plans need to consider the rationality of locating different renewable energy sources in selected zones of municipalities or cities. Implementing renewable energy sources into spatial policy systems is connected with numerous possible spatial conflicts. It is important to develop a certain scheme for resolving these conflicts;

We believe that the Special Issue provides important material for a better understanding of the role of spatial planning in renewable energy investment. This analysis suggests a need to further advance the topic. Several lines of further research can be outlined, for example:

1. Further investigation of how renewable energy deployment can be better integrated with the objectives of spatial planning with respect to land use, housing, transport, and public services.
2. Larger comparative reviews informing discussions on the role of different types of plans and planning systems in mitigating spatial conflicts around renewables.
3. Understanding relationships between different actors within the spatial planning process with regard to renewables.

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