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The Impact of the Energy Production from Renewable Sources on the Investment Plan of Electricity Distributors

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Introduction

The production of energy from renewable sources has seen significant growth in recent decades, having a substantial impact on the investment plans of electricity distributors. This synthesis of scientific literature explores different aspects of this phenomenon, highlighting recent research and providing insight into how renewable energy production influences the strategies and investment decisions of electricity distributors.

One of the important aspects addressed in the specialized literature is the connection between the increase in production capacity from renewable sources and the need to modernize the electricity distribution infrastructure. The studies carried out by highlighted that the expansion of energy production from renewable sources requires significant investments in distribution networks to ensure the integration and efficient management of this energy in the electricity system [1, 2].

In addition to upgrading infrastructure, electricity distributors also face challenges in managing the variability and uncertainties associated with renewable generation. Research by highlighted that the variability of energy production from renewable sources such as wind and solar can affect the stability and security of distribution networks, requiring advanced management and control solutions [3, 4].

In addition, the increase in energy production from renewable sources also requires adjustments to the electricity distribution infrastructure. According to the research of the modernization and expansion of distribution networks is necessary to efficiently manage the energy produced from renewable sources and to ensure the stability of the system [5].

Other factors influencing electricity distributors' investment plans are changes in energy demand and consumer behavior. The study by shows that electricity distributors must consider the growing interest of consumers in green energy and the need to offer flexible and customized distribution solutions [6].

In addition, the efficient integration of renewable energy into distribution networks requires the development and implementation of smart technologies and solutions. The studies carried out by highlighted the importance of advanced technologies such as energy storage systems and smart grids in optimizing operations and managing energy supply and demand [7, 8].

The distributor's investment plan for a regulatory period includes works that lead to obtaining at least one of the following benefits:

- improving service performance indicators.
- improving the energy efficiency of the network by reducing OTC (own technological consumption);
- reduction of OPEX operation and maintenance costs.
- ensuring the ability of users to connect to the system according to their requests and increasing the amount of electricity transported/distributed.
- improvement of working conditions in the case of modernization of administrative buildings/headquarters.
- fulfilling other legal obligations.

For each work included in the investment plan, at least one of the previously listed benefits is established and the estimated values to be obtained of the specific benefits pursued are determined/quantified ex-ante, to monitor the results obtained ex-post.

The monitoring of the benefits of the investments provided above does not apply to network strengthening works to create the necessary technical conditions for connecting new users or

changing the characteristics for existing users, electrification of localities and expansion of electrical distribution networks, taking over capacities from third parties, works of modernization of buildings/administrative offices, as well as works necessary to fulfill other legal obligations.

However, renewable energy production can also bring significant benefits to electricity distributors, such as reducing greenhouse gas emissions and increasing the sustainability of the energy system. Research by demonstrated that investments in renewable energy can help meet environmental goals and reduce dependence on traditional energy sources [9, 10].

However, investments in renewable energy can also bring several benefits to electricity distributors. According to the integration of renewable sources in distribution networks can lead to reduced operational costs and increased system efficiency, leading to greater market competitiveness [11].

The impact of renewable energy production on the investment plans of electricity distributors is a topic of major interest in the energy field. It is essential that distributors adjust their investment strategies to meet new market demands and contribute to the development of a more sustainable and efficient energy system.

In conclusion, the production of energy from renewable sources is a significant factor in shaping the investment plans of electricity distributors. Considering recent research, it is essential that distributors adopt innovative strategies and solutions to effectively manage the transition to a more sustainable and resilient energy system.

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