

AN MACROECONOMIC OVERVIEW TO THE CHALLENGES FACING THE ENERGY TRANSITION IN COLOMBIA

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Keywords

Climatic change, economic development, energy, GDP, energy transition, market reform, renewable energy.

Overview

The concept of energy transition has become paramount in this context, representing a global imperative to mitigate the impacts of climate change. Colombia, steadfast in its commitment to this cause, has not only endeavored to modernize its energy landscape but also to ensure a "just energy transition," where social, economic, and environmental considerations are carefully balanced. This paper will delve into how this holistic approach has influenced the country's policies and practices within the electricity sector.

The intricacies of energy systems demand meticulous planning, necessitating the tailored development of comprehensive strategies, plans, and roadmaps. These blueprints delve into the intricate progression of various components within these systems over the forthcoming decades, as highlighted by the IDB [1]. Within the realm of the energy transition, industrial policy plays a pivotal role in capitalizing on economic prospects and fostering employment opportunities. Strategic implementation of industrial policies holds the potential to propel the manufacturing and adoption of clean technologies, spur innovation in the energy sector, and bolster local production of renewable energy-related equipment and components, thus contributing to the IDB's vision. Moreover, the transition to sustainable energy presents significant prospects for job creation, local economic growth, and national reindustrialization, underscoring the importance of embedding these opportunities within Long-Term Climate Strategies and explicitly delineating them in Energy Sector Expansion Plans [1].

Effective planning of energy systems hinges upon the utilization of integrated assessment models. These models comprise two primary components: the climate block, which translates greenhouse gas emissions into temperature projections through equations simulating atmospheric and oceanic behaviors, and the economic block, depicting the GDP evolution of a region in response to the economic ramifications of temperature changes. The vital connection between these blocks is encapsulated in the damage function [1].

Methods

Review of the aspects of the electricity sector in Colombia, such as the behavior of energy demand and supply, as well as the growth perspectives given by the energy transition, such as the incorporation of electric vehicles and other trends.

Review of the macroeconomic context and the impact of some of the main variables of economic development in the face of the energy transition, as well as the general impact of some externalities associated with it, the view of regional integration and the perspective of the challenges for the country regarding the structure of the Colombian electricity market, highlighting some points of the path that the country will have to follow for the energy transition, pointing out how some of these

concerns are shared with other countries that have already advanced in this path, proposing some of the possible solutions that have been applied to respond to these same situations.

Results

Over the past three decades, the Colombian electricity market has undergone a profound transformation that extends beyond technical and economic dimensions. This article delves into the significant milestones and challenges that have shaped the trajectory of the Colombian electricity market, with a particular emphasis on its role in the ongoing energy transition. Throughout this thirty-year period, notable changes have occurred, ranging from the implementation of structural reforms to the adoption of new technologies and strategies aimed at addressing mounting environmental concerns.

Conclusions

When undertaking the comprehensive planning of an energy system with a substantial reliance on renewable sources, careful consideration of multiple factors is paramount to devise effective solutions that contribute to achieving climate and sustainable development objectives. These factors encompass the technical design necessary for the optimal functioning of the electric power system, ensuring security and flexibility, relevant regulatory frameworks, and monitoring key macroeconomic indicators that gauge economic growth within the electricity supply chain.

The Human Development Index (HDI) underscores the profound influence of energy on enhancing the quality of life in nations. Energy plays a pivotal role in driving income growth, facilitating the establishment of education and healthcare systems, fostering industrial advancement, facilitating trade, and overall economic progress. Despite similar HDI values, variations in energy consumption among countries may arise due to factors such as divergent energy policies, incentives, the availability of renewable resources, and disparities in energy efficiency across different sectors.

This process represents an ongoing endeavor aimed at transforming the energy system towards sustainability and efficiency, thereby maximizing the benefits of transitioning away from fossil fuels while mitigating the economic impacts associated with the replacement of technologies entrenched in various systems for years. Achieving this goal necessitates the design and implementation of innovative public policies that foster education, adaptation, and the fortification of institutions. Additionally, it requires the enactment of new regulations aimed at attracting foreign direct investment and fostering stability to ensure the longevity of such investments.

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