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Transition to Carbon-Neutrality: A Study of Urban Sustainability in Kigali, Rwanda

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Abstract

This novel research into practice project explores Kigali, Rwanda's transition towards carbon neutral urban planning and its implications for sustainability and urban development in the Global South. Notably, African countries are leading in the shift towards renewable energy, inspiring smart city initiatives, particularly in Kigali. The study documents architectural and infrastructural transformations in Kigali, examining socio-technical elements facilitating these changes and the effectiveness of implemented strategies. Our methodology utilizes cloud-based simulation analysis, generative design optimization, and building physics tools, incorporating Kigali's geographical and climatic specifics. These strategies have led to an array of initiatives such as sustainable smart buildings, smart traffic management, and digitally enabled economic environments. A case study, the Kigali Innovation City (KIC), exemplifies Kigali's sustainable vision but also reveals challenges like neglect of demographic and economic realities. Learning from these hurdles, the team, including the author, is working on Vision City Phase 2, aiming for International Well-Being Institute certification. This project illustrates the significance of embracing challenges to achieve urban sustainability targets, offering insights into other cities' sustainability and carbon-neutral endeavours and research benchmarking.

Keywords: Kigali, Carbon-Neutral, Smart Cities, Renewable Energy, Generative Design Optimization.