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Innovative green finance for renewable energy interventions in gap housing for South Africa: a case study of rooftop PV for Windmill park residential complex Johannesburg

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Abstract

In light of the current rapid growth of the gap housing market segment, the electricity crisis facing South Africa and adverse impacts of coal-based electricity generation on climate change, this study helps to qualify the viability of integrating rooftop solar pv in gap housing towards improving gap housing affordability and mitigating power challenges currently facing the country.

Using a case study approach, the study addressed four key research questions which are: affordability of housing in the gap housing market in South Africa, estimating the generation potential from the available rooftop space in the case study area, establishing a business model for integrating rooftop solar pv in the gap housing market, and the extent to which rooftop solar pv can augment housing affordability in the gap market segment. Various software and web-based applications were utilized to establish the solar pv generation potential of the study area.

From the available rooftop space of 36 593.65m^2 in Windmill Park Estate, a production potential of 7 848 124.71 kW/h per annum was estimated. This is sufficient to make the estate a net-zero grid electricity consumer. Based on these findings, two scenarios were analysed using the net present value (NPV) to determine the profitability and the business model for integrating rooftop solar pv in the case study. Exporting only 50% of the generated electricity proved the most viable scenario with thirteen to fourteen year payback period. Affordability to purchase housing in the estate increased by R 399,633.30 in the twentieth year and rent affordability increased by R 706.25 per month in the first year.

This understanding of the extent to which rooftop solar pv can augment housing affordability is important to encourage, guide and inform policy makers and other stakeholders in the formulation and deployment of various gap housing finance schemes that support such interventions.

Keywords: Rooftop solar pv, gap housing market, housing affordability, business model.