PREFACE

As we battle with the difficulties of climate change and attempt to create a more ecologically friendly future, renewable energy and sustainable development have become more important themes in today's world. In this study, we dig into the realms of solar power generation and energy consumption in both low and high-income housing sectors, with the goal of shedding light on potential constraints and opportunities.

Our research focuses on determining the viability of solar power generation in low-income households where energy poverty is a major problem. We offer a depressing discovery by evaluating data and calculations based on a production rate of 0.3 kWh/square metre: more than 90% of low-income dwellings lack the ability to generate enough solar power to fulfil their yearly consumption demands. This highlights the importance of targeted policies and alternative energy solutions for vulnerable areas in order to ensure that they are not left behind in the transition to clean and sustainable energy sources.

Our research, however, reveals a positive element in the form of subsidised price for solar panels, which stimulates their use in low-income households. We investigate the impact of these regulations from the standpoint of policymakers, recognising the potential they have in increasing renewable energy use. Nonetheless, we believe that authorities should broaden their emphasis beyond solar panels. We emphasise the need of promoting the use of insulating materials such as fibreglass in high-income dwellings in particular. This is especially important in humid climes, where cooling systems account for a large amount of power use. We can minimise energy consumption and create more sustainable living areas by combining energy-efficient building materials.

Furthermore, as we investigate the possibilities of using footprint data to guide urban development initiatives, our research provides insights for city planners. We offer a unique method for charting this data as three-dimensional representations with the appropriate attribute values. As a result, we provide city planners with a low-cost alternative to pricey LiDAR data, allowing them to acquire useful insights into urban energy usage trends. This enables planners to make educated judgements and construct energy-efficient and sustainable cities.

Finally, this study goes into the difficulties of solar energy generation, energy consumption, and sustainable urban design. It aims to bridge the gap between policy ambitions and realistic housing solutions for poor and middle-income households. We hope to contribute to the

continuing conversation about sustainable energy and urban development by investigating the issues encountered by low-income families, investigating the possibilities of insulating materials in high-income homes, and emphasising the relevance of footprint data for city planners. In the end, we want to pave the path for a more inclusive, resilient, and ecologically conscientious future for everyone.