

A Feasibility Study Of a Net Zero Energy HDB House in Singapore

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Extended Abstract

Singapore is a modern city with a dense population of people and infrastructure buildings; hence, the energy consumption rate was very high, which consists of energy from electricity and thermal. This project aimed to help most of Singapore's homes be sustainable and thrifty with energy dealings. In conjunction with the current national and international sustainability plans, the result of this project was to model and simulate the energy consumption of a home that became constructed with plans for Net Zero Energy Building technologies. In addition, the improvement of the Optional Component Scheme (OCS) was investigated. OCS helps make future HDB flats follow the green mark rating appliances recommendation, which will help the home to be able to cope with being dependent on renewable energy supply only.

The simulation for this project was based in Costa Ris HDB estate, one of the many recently developed HDB flats. In order to achieve net zero energy home, it is found that the OCS needs to follow a specific set of household appliances format to reduce significant energy wastage, including maintaining thermal comfort processes to mitigate unnecessary cooling effort that can significantly impact more energy wastage. Throughout this project, passive cooling methods will also be looked into because it is one of the biggest consumptions of energy from the electricity used to maintain the surrounding temperature to an ideal condition. Additionally, the implementation of renewable energy technologies like solar panels and hydroelectric turbines helped supply sufficient energy for the massive energy consumption from the home's daily activities.

During the modelling and simulation, it is observed that human behaviour, which includes the types of appliances they prefer to use, will cause a significant impact on the massive surge of energy consumption outcome. Furthermore, it's difficult for a democratic government to manipulate the lifestyle or control the lifestyle of every human being obliged by law, policy or morals. Therefore, even with the aid and supplementation of all kinds of renewable energy technologies, the supply to help cope with the heavy energy usage will still not be enough in the long term. Nonetheless, the importance of finding ways to help save energy wastage and coming up with ideas for a circular economy in energy methods will significantly contribute to a more sustainable plan for a net zero energy home [1] .

References

[1] gov.sg, "Reducing waste and adopting a circular economy approach will benefit the environment and create economic opportunities.," February 2022. [Online]. Available: <https://www.towardszerowaste.gov.sg/circular-economy/>