ABSTRACT

The viability and sustainability of solar energy have grown substantially, particularly with the declining costs of photovoltaic (PV) systems making building rooftops ideal for local power generation. In New Zealand, the surge in solar power adoption has been marked, with a notable increase in total installed capacity in recent years. Solar energy is becoming more and more accessible for educational institutions, which are leading the way in energy efficiency and renewable energy efforts. This study focuses on assessing the feasibility of PV system installations at Lincoln University in Christchurch, New Zealand, by analyzing solar potential and estimating electricity generation capacity. The 143-acre campus's solar potential was assessed using openly available geospatial data and GIS (geographical information system) techniques. A digital surface model (DSM) was created using airborne light detection and ranging (LiDAR) data, which offered comprehensive information on aspect and slope. Based on factors including aspect, slope, and solar radiation exposure, the area and total solar radiation of campus buildings were evaluated to determine which ones would be best suited for PV systems. The findings show that 71 buildings, with a predicted yearly electricity generation of 2,986,288.92 kWh, are ideal candidates for solar arrays. This study illustrates that Lincoln University can significantly enhance its sustainability through rooftop solar installations, potentially fulfilling more than the campus buildings' annual electricity needs. The methodologies and findings of this research advocate for the widespread implementation of similar assessments across New Zealand's educational institutions, supporting broader national renewable energy objectives and advancing campus sustainability efforts.

Keywords: GIS; LiDAR; Rooftop suitability; Solar PV; Electricity overview; Financial assessment