ABSTRACT

FELIX, JOMEL C. Mariano Marcos State University. June 2025. **ENERGY PROFILING AND EFFICIENCY ENHANCEMENT OF SELECTED MICRO-SMALL-MEDIUM ENTERPRISES IN ILOCOS NORTE, PHILIPPINES.**
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Businesses are under more pressure to improve operational efficiency as energy costs rise and demand for sustainability grows. Navigating limited resources while striving for more efficient energy use presents a challenge for micro, small, and medium-sized enterprises (MSMEs) in maintaining their competitiveness and resilience. This study investigated the daily operational energy consumption patterns of MSMEs in Ilocos Norte. It also assessed the energy awareness of corporate operators within these businesses. Based on these insights, the research proposed doable plans aimed at cutting energy use and improving energy efficiency for the MSMEs in the region.

Using a mixed-methods approach, the study collected equipment-level energy data and conducted pre- and post-awareness surveys. The study gathered operational practices recorded inside businesses as well as directly from energy consumption data. Either through guided conversations in person or through independent reading in digital formats, participants engaged with an educational brochure outlining basic energy-saving techniques. To determine the efficacy of the intervention, awareness levels were measured both before and after material exposure.

Results show that refrigeration, lighting, and cooling were the most energy-intensive categories. Microenterprises, which comprised 87.6% of respondents, mostly fell under the lowest energy intensity band (<20 kWh). Following the awareness

intervention, the mean awareness score significantly increased by 21.3%—from 19.71 to 23.91 ($p < 0.001$). Participants showed more awareness of energy management and more openness to applying energy-saving techniques after the intervention. A total of 118 MSMEs expressed interest in solar PV system recommendations. Customized solar PV system recommendations ranged from 1 kWp to 96 kWp, with 61.02% of respondents suited for 1 kWp setups. Projected monthly energy savings ranged from PHP 1,426.70 to PHP 136,963.53, depending on system size. A total of 94.57% of MSMEs indicated interest in renewable energy adoption.

By not only identifying areas in need of improvement but also arming MSMEs with the required knowledge to adopt sustainable practices inside their operations, the study successfully addressed its main objectives. The study demonstrates that with the right knowledge and tools, MSMEs can significantly reduce operational costs and enhance sustainability. Findings support the formulation of localized energy interventions and policies that empower MSMEs to contribute to broader renewable energy and climate goals.