PERFORMANCE EVALUATION OF SOLAR POWER – DRIVEN PUMP IRRIGATION SYSTEM AT SAN JOSE CITY, NUEVA ECIJA

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in Partial Fulfillment of the Requirement
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BACHELOR OF SCIENCE IN AGRICULTUTAL AND BIOSYSTEM ENGINEERING
(AB Land and Water Resources Engineering)

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ACCEPTANCE SHEET

This undergraduate thesis entitled **"PERFORMANCE EVALUATION OF SOLAR POWER – DRIVEN PUMP IRRIGATION AT SAN JOSE CITY, NUEVA ECIJA,"** prepared and submitted by **JAYSON V. QUINTO**, in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB LAND AND WATER RESOURCES ENGINEERING)**, is hereby accepted:

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BIOGRAPHICAL SKETCH

The author, born in Science City of Muñoz on January 30, 2000. Presently residing in Barangay Maligaya, Science City of Muñoz, Nueva Ecija., eldest son of Mr. Alex Quinto, who is a baker and Mrs. Vilma Quinto, a housewife. Growing up alongside his two siblings, Alvin Jay and Lexter, the author's early education took place at Maligaya Elementary School in Barangay Maligaya, Science City of Muñoz, where he laid the groundwork for his academic achievements, completing his elementary education in 2012.

Subsequently, the author pursued his secondary education at Sto. Domingo National Trade School in Baloc Sto. Domingo, Nueva Ecija, graduating in the year 2016. Following this, he continued his academic journey by successfully completing his Senior High School degree at the same institution in 2018. These formative educational experiences have contributed to shaping the author's foundation for future endeavors and academic pursuits.

The author, eager to pursue his academic interests further, he started his higher education journey at Central Luzon State University, where he obtained a degree on Bachelor of Science in Agricultural and Biosystems Engineering majored in AB Land and Water Resources Engineering This allowed him to further explore his passion for farming and the emerging technologies associated with it.

Throughout his academic journey, the author encountered various academic challenges and personal setbacks, leading to moments of self-discovery. Despite these obstacles, he demonstrated resilience and determination, emerging from these experiences with a heightened commitment to maximize his time at the said university. Active participation in extracurricular activities played a pivotal role in his self-discovery, as he

became a member of, Society of Agricultural Engineering Students - Philippine Society of Agricultural and Biosystems Engineers (SAGES-PSABE), and later on became the vice-president for external affairs on the said organization. Additionally, he assumed the role Governor in the College of Engineering Student Government in academic year 2020-2021. Demonstrating proactive involvement in leadership roles, the author exhibited a paramount interest in acquiring practical experiences within the agricultural sector.

Through active engagement in these pursuits, he diligently honed his skills, acknowledging the crucial significance of innovative solutions to effectively tackle the dynamic challenges prevalent in both our community and the agriculture industry. This practical engagement not only showcased his dedication but also underscored his commitment to contributing valuable insights and solutions to the evolving landscape of agriculture and community development.

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ABSTRACT

QUINTO, JAYSON V., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **FEBRUARY 2024, PERFORMANCE EVALUATION OF SOLAR POWER – DRIVEN PUMP IRRIGATION SYSTEM AT SAN JOSE CITY, NUEVA ECIJA**

Adviser: JOHN PAULO C. SACDALAN, Ph.D.

This research evaluated the performance of a solar power-driven pump irrigation system in San Jose City, Nueva Ecija through three trials conducted at different times of the day. The trials, starting at 9:00 am, 12:00 pm, and 3:00 pm, involved continuous data collection for 30 minutes, including ambient conditions, PV temperature, solar array characteristics, solar input and output parameters, and discharge rates. Subsequently, pump and system efficiencies were determined, revealing that in trial 1, pump efficiency was 74.90%, and system efficiency was 18.40%. In trial 2, pump efficiency was 77.75%, and system efficiency was 15.85%, while in trial 3, pump efficiency was 76.77%, and system efficiency was 18.26%.

Water drawdown measurements were taken before and after the operation of the Solar Power-driven Pump Irrigation System (SPIS). At 8:00 am, the drawdown was 5.12 Mbgs, at 12:00 pm, it increased to 5.19 Mbgs, and at 4:00 pm, it further rose to 5.28 Mbgs, indicating a 0.16 Mbgs decline from the initial measurement over an eight-hour operational period.

Crafting a cropping calendar, using the SPIS as the main source of water or irrigating a 10-hectare field. The system employed direct water transfer through pipes to the field, aiming to eliminate or minimize losses during the irrigation process. adhering to

the guidelines of the Philippine National Standard PNS/BAFS/PAES 217:2017 ICS 65.060.35. The cropping calendar, applicable to both rice and maize, is determined based on the stages of rice growth.

To optimize irrigation scheduling, the study incorporated the Blaney-Criddle Method for meticulous computation of potential evapotranspiration (PET). Additionally, Thornthwaite's method was employed to compute PET, utilizing forecasted weather data from the PAGASA 2024 Weather Outlook. Thus, the research aimed to enhance water use efficiency and crop yield by aligning irrigation practices with the specific requirements of rice and maize crops. This systematic approach ensures sustainable agricultural practices guided by established standards and climate predictions.

Keywords: solar powered irrigation system; water table drawdown; cropping calendar

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