
Educating for Sustainability: Achieving Methane Free Campus

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Abstract

Methane, a harmful greenhouse gas, is primarily released during the burning of fossil fuels for electricity generation. In Malaysia, the growing population has led to a rise in electricity demand, expected to increase by 4.7% annually. This growing demand contributes to higher methane emissions, as Malaysia relies heavily on fossil fuels rather than renewable energy. To address this rising issue, a Smart Solar-Powered Methane Detector was developed using Arduino technology to detect methane gas leakage, especially in school classrooms. The system uses an Arduino Uno R3 microcontroller, a high-sensitivity methane sensor, and powered by 5W, 12V solar panel with a battery bank for power storage. A buzzer provides real-time alerts, and the design focuses on cost-effectiveness and ease of implementation. The system's reliability was tested at an empty car park near Sekolah Kebangsaan Marian Convent, Ipoh, Perak, proving its effectiveness in detecting methane in outdoor environments. The analysis of various substances, including burning camphor, empty fruit bunches, used papers, old newspapers, straws, and rubbish bags, revealed consistent high voltage outputs and methane concentrations, with values ranging from 430 ppm to 490 ppm, as detected by the Arduino-based methane sensor. However, this research faces challenges like sensor sensitivity and scalability in larger environments were identified. Factors such as humidity, temperature and other gases may affect sensor performance, however future improvements will address these issues and could provide more reliability to the system. This prototype can benefit schools, promoting a healthier environment and supporting the United Nations Sustainable Development Goal 3: Good Health and Well-being.

Keywords : *Methane, Pollution, Solar Powered Arduino, Smart Detector*
