



## NEW PRODUCT DEVELOPMENT REPORT

### ECO DIGITAL CLOCK

**Faculty** : APPLIED SCIENCES  
**Program** : BACHELOR OF SCIENCE (HONS) APPLIED CHEMISTRY  
**Program Code** : AS245  
**Course** : TECHNOLOGY ENTREPRENEURSHIP  
**Course Code** : ENT 600  
**Semester** : 5  
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*Limitation - of research  
to product*

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Submission Date

10<sup>TH</sup> MAY 2019

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## 2.0 EXECUTIVE SUMMARY

Our team has come out with an innovation which is called 'Eco Digital Clock'. This innovation is an improvement of the existing digital clock that is offered in the market nowadays. Instead of using lithium battery as the power source of the digital clock, the team proposed to use plant to generate electricity in order for the digital clock to function. This is the team's approach to reduce environmental pollution by using green technology that is friendly to the earth's ecosystem. There are numerous potential toxic risks related with emission of battery chemicals into aquatic ecosystems. Inapplicable or irresponsible management of waste batteries can proceed to spilling of corrosive liquids and dissolved metals that are lethal to plants and animals. Improper disposal of batteries in landfill sites can result in the release of toxic substances into groundwater and the environment.

By using plant, this is the latest viable source of renewable energy and it is earth abundant natural sources. Unlike biogas, which is produced by the anaerobic digestion or fermentation of biomass, the Plant-Microbial Fuel Cell (PMFC) generates electricity while the plants continue to grow. Importantly, researchers has study and conclude that the system does not affect the plant's growth or harm the environment.

The idea behind this innovation is because of attentiveness of our team towards the global pollution that is currently happening. Pollution is the primary environmental contributing factor of disease and premature death in the world, accounting for three times more deaths in 2015 than AIDS, tuberculosis and malaria combined. The report by the Lancet Commission on Pollution and Health blames pollution for an estimated nine million premature deaths. This conclude that pollution endangers the stability of the earth's support system and threatens the continuing survival of human society. Therefore, we would like to promote the team's idea in order to save the world to a better place to live.

Our team has targeted few categories of people which will specifically interest with this innovation. The groups that we aim are office workers, students and environmentalist. Nevertheless, the team would not limit to only the targeted group but it is open to people that are interested to support green technology products. By proposing and developing this product, we hope to give awareness to our customers and bring benefit to the world's condition

### **3.0 INTRODUCTION**

#### **3.1 PROBLEM STATEMENT**

Nowadays, batteries are identified as a problem material that gives harmful effect to the environment. In fact, the most rapid growing waste with its volume from 2013 to 2017 is the waste from electronic and electrical equipment (WEEE)(Boyden, Soo, & Doolan, 2016). In additionally, the lithium ion batteries usage are the most common battery type used in portable electronic devices and their use is expected to double from 2013-14 to 2019-20 (Boyden et al., 2016). Therefore, the uses of batteries should be reduced by using renewable natural resources such as Plant Microbial Fuel Cell Development (PMFC) which applied in Eco Digital Clock product.

#### **3.2 METHODOLOGY**

All information were collected through several methods which are:

##### **1. Observation**

Battery items are commonly used among people. For this project, observations were performed through the problems faced by four students that are randomly picked among UiTM's students. These students discovered that there is a liquid coming out of the alkaline batteries from their electronic device. Basically, alkaline batteries usually leaks KOH (potassium hydroxide) under conditions of misuse as white foam. However, KOH is hygroscopic and will easily form an oily like liquid which is what people might be seeing in the batteries. People should handle it with proper care since KOH is caustic and can cause tissue damage.

##### **2. Survey or questionnaire**

About 40 respondent who responded in online surveys or questionnaires method. This method was conducted to gain the opinion of the public regarding our product which is an Eco Digital Clock that uses plant as an electrical source by replacing lithium battery and the probability of the proposed product to be accepted by the market.

##### **3. Research**

Research and study has been done by analysing several articles and journal about the harmful effect of the lithium batteries usage. One of our group members also attended the seminar about Plant Microbial Fuel Cell Development and Prospective which delivered by Emilius Sudirjo, Msc at Universitas Indonesia, Kampus Depok Jawa Barat.