

# **Collaboration on the Development of Hybrid Transportation to Support the Acceleration of Environmentally Friendly Transportation in Indonesia**

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## **ABSTRACT**

In 2022, the Indonesian government has planned to accelerate environmentally friendly transportation. This is supported by Presidential Regulation 55 of 2019, concerning the acceleration of the battery electric vehicle program for road transportation. The following year, Presidential Instruction 7 of 2022 was issued, regarding the use of battery-based electric motorized vehicles as operational service vehicles and/or individual service vehicles for central government and regional government agencies. Support is also shown from the Ministry of the Republic of Indonesia through Ministerial Regulations which have been ratified through Law. With this support, research related to environmentally friendly transportation continues to be carried out. Research related to electric motorbikes has reached the point where economic analysis is carried out to compare the price, operating period, maintenance of battery-based electric vehicles which are commonly called Battery Electric Vehicles (BEV) or Extended Range Electric Vehicles (EREV), hybrid vehicles which are commonly called Hybrids. Electric Vehicle (HEV), Plug-in Hybrid Electric Vehicle (PHEV), and fuel-cell vehicles which are commonly called Fuel-cell Electric Vehicles (FCEV). The state of the art of this research focuses on the implementation and development of vehicles with lower total costs. Emissions produced in hybrid vehicles can be reduced by managing electrical energy. The conversion process for hybrid vehicles does not require high costs, so everyone can own and operate a hybrid vehicle in every region and every road condition. Collaborative research between UNY and Poltrada Bali and Cathoda Indonesia is to develop hybrid motorbike conversion standards with optimal battery capacity. UNY has experts in the fields of transportation regulations, combustion engines, electric motors, and battery management. Together with partners from Poltrada Bali with automotive technology expertise and Cathoda Indonesia with battery manufacturing expertise, this collaborative research is developing hybrid vehicles by optimizing electricity and gasoline energy consumption. The aim of the collaborative research in the first year focused on the design of a hybrid motorbike conversion prototype. The second year of research will focus on the process of synchronizing combustion engines and electric motors on motorbikes. In the last year, there will be a test conversion standard for hybrid motorbikes with optimal battery energy consumption and according to the needs of the transportation market in Indonesia. In the 2023 activity, a hybrid motorbike conversion will be carried out to obtain a hybrid motorbike product that can be used as a reference. Of course, this has a very good impact on conversion workshops and petrol engine vehicle owners who want to convert their vehicles. The conversion process is carried out by universities, transportation training centers and industrial partners who are experts in their fields. So it is hoped that this collaborative research and activity can become a pilot in converting hybrid motorbikes. This collaborative research supports the government's program to accelerate environmentally friendly transportation and the National Research Master Plan for 2017-2045. This Collaborative Research activity will have 1 hybrid motorbike prototype product, 1 international journal publication, and 1 simple patent output in the form of a hybrid motorbike design. Final and financial reporting is the main focus of this activity as a responsibility to each agency and to collaboration partners.

Kata Kunci: *battery, energy management, combustion engine, electric motorbike, hybrid motorbike*