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The Emergent of Hydrogen Fuelling: Indonesian Youth's Knowledge and Acceptance

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Abstract

Indonesia's total primary energy supply (TPES) has doubled since 2000 while falling 7.6 percentage points below its 2019 level in 2020 due to the worldwide pandemic and concurrent reverse in national economic growth (Rahman et al., 2023). The expansion of Indonesia's energy sector over the past two decades has paralleled the country's thriving economy. Nowadays, 90% of Indonesia's energy comes from fossil fuels like oil, gas, and coal (Mujiyanto & Tiess, 2013; Šahović & Da Silva, 2016). Rising energy demand and shortages will occur if the country does not reduce its reliance on fossil fuels and maximize its usage of renewable energy sources (Yana et al., 2022). Furthermore, the overconsumption of fossil fuels endangers the environment. CO₂ emissions caused by fossil fuel consumption are regarded as one of the most significant causes of environmental damage (Caglar et al., 2022; Kartal et al., 2022; Mukhtarov, 2022). Indonesia should minimize its reliance on oil and pursue decarbonization over the long term. Following presidential decree No. 22/2017 on National Energy Planning (Rencana Umum Energi Nasional—RUEN), renewables must account for at least 23 percent of TPES in 2025 and 31 percent in 2050. Despite this, renewable energy penetration remains low in 2020, at only 11%. The primary culprits include an insufficient focus on emissions, lack of initiative, and conflicting policies toward renewables. Indonesia should balance the three equally crucial energy supply components (energy trilemma): affordability, security, and sustainability (Ardiansyah et al., 2012). Hydrogen is a renewable energy source with great promise as a substitute for fossil fuels (Ball & Wietschel, 2009). It can potentially supply clean energy for industry, transportation, and other applications while producing only water as waste. Hydrogen can be utilized as an energy source, energy storage medium, energy carrier, and for infrastructure. Compared to a gasoline-powered internal combustion engine, a hydrogen fuel cell is two to three times more efficient (Momirlan & Veziroglu, 2005). Also, renewable hydrogen is a cost-effective option for remote and sparsely populated areas, such as Indonesia's over 17,000 islands (Ball & Wietschel, 2009).

The Indonesian Ministry of Energy and Mineral Resources (ESDM) is pushing for hydrogen to become a viable energy carrier to accelerate the nation's energy transition. Nevertheless, the minister of ESDM conceded that there are challenges associated with utilizing hydrogen as an energy source, such as how to make hydrogen economically viable, financially attractive, and socially beneficial. Hydrogen as a renewable energy source is currently neither well-known nor extensively employed in Indonesia. This study explored young Indonesians' knowledge and

perceptions of this alternative energy source. Seventy-one percent of Indonesia's population comprises 15-to-64-year-olds, totaling 191 million young people. Hydrogen usage is not just for today but also for the future. It is crucial that young people, especially university students, engage in the implementation of renewable energy. In light of the fact that less than 10% of Indonesians were able to pursue higher education, it is projected that this cohort will assume leadership roles in their communities and nation. So, researching their viewpoints is essential. This study employed a qualitative phenomenological study as its method of inquiry. The data was acquired by having 98 college students compose reflective essays on using hydrogen as a renewable energy source. Thematic inductive analysis is performed on the data. Several themes were identified, indicating the need to popularize the use of hydrogen to a broader audience and to use youth as a barometer of the shift in the nation's energy source.

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