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Legal Services and the Determination of the Indonesian Standard Industrial Classification for Green Hydrogen Investment in Supporting Sustainable Investment in Indonesia

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Abstract

Indonesia has significant potential for green hydrogen investment, driven by new and renewable energy (NRE) sources such as geothermal, solar, and hydropower, with projected demand reaching 2–5 million tons per year by 2040. This sector is particularly strategic for industrial decarbonization and heavy-duty transportation, with an investment target of US$25.2 billion (Rp395.58 trillion) by 2060. This potential

presents opportunities for Indonesia to develop green hydrogen as a future energy pillar derived from renewable energy sources with zero carbon emissions, supporting the decarbonization of the heavy industry and transportation sectors. However, the realization of investment activities is intrinsically linked to licensing mechanisms and regulatory frameworks. In this context, legal certainty and the establishment of the Indonesian Standard Industrial Classification (KBLI) are crucial for facilitating business licensing and providing regulatory clarity for investors. The absence of a specific KBLI code for green hydrogen investment may engender legal uncertainty and administrative barriers that potentially impede investment realization. Therefore, determining a specific KBLI for green hydrogen investment is imperative to ensure legal certainty, strengthen the investment climate, and enhance investor confidence, thereby supporting sustainable investment in Indonesia. Establishing a clear regulatory framework through appropriate KBLI classification will not only provide legal certainty for the substantial capital injected but also create an incentive structure that attracts profit-oriented investments in this sector and enhances its economic viability. Ultimately, green hydrogen investment is not only economically beneficial but also a strategic sector for the advancement of clean, renewable, and environmentally friendly energy in Indonesia.

Keywords

Green Hydrogen; Investment; Investor; SDGs; KBLI.

A. Introduction

In a global effort to achieve the Net Zero Emission (NZE) target by 2060, Indonesia is now at a critical juncture in its energy transition, shifting from dependence on fossil fuels to cleaner, more sustainable energy sources. Leveraging its abundant renewable energy potential—including the world's second-largest geothermal resources and massive solar potential—green hydrogen is emerging as a promising strategic component for decarbonizing heavy industry, transportation, and power generation. As an archipelagic country, Indonesia has a

unique opportunity to produce green hydrogen at a competitive cost while positioning itself as a major player in the regional and global clean energy markets.

However, this vast potential requires a robust policy foundation to attract investors. One of the key challenges identified is the need for clear regulatory certainty and classification to facilitate investment. The Government of Indonesia, through the Ministry of Energy and Mineral Resources (EMR), has committed to developing a national hydrogen strategy, including establishing a dedicated Indonesian Business Field Standard Classification (KBLI) code for the low-carbon hydrogen industry by 2025. The designation of the KBLI is crucial because it serves as the legal basis for investors to obtain permits, tax incentives (such as tax holidays), and other business facilitation.

This article comprehensively analyzes the potential of green hydrogen investment in Indonesia, examining how the right industry classification (KBLI) can accelerate technology adoption and its role in creating a sustainable, integrity-driven investment ecosystem. By understanding the interplay of resources, challenges, and regulatory frameworks, investors can capitalize on strategic opportunities in Indonesia's rapidly growing energy transition.

B. The Green Hydrogen Production Industry

The green hydrogen production industry refers to industrial activities that produce hydrogen through water electrolysis using renewable energy sources.[1] Unlike fossil-based hydrogen production, this process does not generate carbon emissions, making it a key component of global decarbonization strategies.[2] The growing attention

[1] RWE AG. 2026. Hydrogen: Green Fuel for Climate Neutrality. Accessed January 27, 2026. https://www.rwe.com/en/our-energy/discover-renewables/hydrogen/

[2] Lhyfe. 2024. "Decarbonisation Strategies: Why Green Hydrogen Is a Key Player." Lhyfe. July 30, 2024. Accessed January 27, 2026. https://www.lhyfe.com/more-about-hydrogen/decarbonisation-strategies-why-green-hydrogen-is-a-key-player/

to this industry is closely linked to international commitments toward net-zero emissions and sustainable energy transitions.

Within the broader framework of energy transition, green hydrogen is positioned as an energy carrier capable of addressing the limitations of renewable energy sources which are inherently intermittent.[3] Hydrogen can be stored, transported, and reused across sectors, providing flexibility within energy systems.[4] Thus, green hydrogen production holds strategic importance beyond its technical function. As an industrial sector, green hydrogen production exhibits distinctive characteristics that differentiate it from conventional energy industries. It is capital-intensive, technology-dependent, and requires long-term planning to achieve economic viability.[5] These features position the green hydrogen production industry at the intersection of energy policy, industrial policy, environmental regulation, and investment governance.

Green hydrogen is produced through electrolysis, a process that separates water molecules into hydrogen and oxygen using electricity generated from renewable sources. The efficiency of this process depends largely on the type of electrolysis technology employed and the stability of renewable electricity supply. Consequently, technological capacity plays a central role in determining industrial competitiveness.[6] Beyond electrolysis technology, green hydrogen production requires

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3 Algburi, Sameer, Omer Al-Dulaimi, Hassan Falah Fakhruldeen, Doaa H. Khalaf, Raad Naser Hanoon, Feryal Ibrahim Jabbar, Qusay Hassan, Ali Khudhair Al-Jiboory, and Stella Kiconco. "The green hydrogen role in the global energy transformations." Renewable and Sustainable Energy Transition (2025): 100118.

4 Rolo, Inês, Vítor AF Costa, and Francisco P. Brito. "Hydrogen-based energy systems: current technology development status, opportunities and challenges." Energies 17, no. 1 (2023): 180.

5 Angelico, Ruggero, Ferruccio Giametta, Biagio Bianchi, and Pasquale Catalano. "Green hydrogen for energy transition: A critical perspective." Energies 18, no. 2 (2025): 404.

6 Horri, Bahman Amini, and Hasan Ozcan. "Green hydrogen production by water electrolysis: Current status and challenges." Current opinion in green and sustainable chemistry 47 (2024): 100932.

substantial industrial inputs, including a reliable water supply, storage facilities, and distribution infrastructure. These requirements demonstrate that green hydrogen production is not merely an energy activity but an integrated industrial process involving multiple sectors.[7] This complexity reinforces the view that it constitutes a distinct industrial category.

Recent trends indicate a shift toward the development of industrial clusters for green hydrogen production. These clusters integrate renewable energy generation, hydrogen production facilities, and downstream industrial users within a single ecosystem. This model reflects the growing perception of green hydrogen production as a strategic industrial backbone.[8] From an economic perspective, the green hydrogen production industry offers significant value-added potential. It not only generates clean energy but also enables the development of downstream industries and technological innovation. In this sense, the industry contributes to broader structural transformation toward a green economy.[9] From an investment perspective, green hydrogen production is increasingly viewed as a strategic sector with strong long-term growth prospects. Investors recognize its role in reshaping global energy systems. Nevertheless, early-stage development remains associated with substantial uncertainty and risk.[10]

Investment in green hydrogen production is typically long-term and high-risk, particularly due to high upfront capital costs and dependence on evolving technologies and policy frameworks. As a

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7 Ma, Nan, Weihua Zhao, Wenzhong Wang, Xiangrong Li, and Haiqin Zhou. "Large scale of green hydrogen storage: Opportunities and challenges." International Journal of Hydrogen Energy 50 (2024): 379-396.

8 Osman, Siti Hasanah, Nurul Syazrah Mat Yatim, Omar Syah Jehan Elham, Norazuwana Shaari, and Zulfirdaus Zakaria. "Three decades of hydrogen energy research: a bibliometric analysis on the evolution of green hydrogen technologies." Sustainable Energy & Fuels (2025).

9 Zhao, Wenhui, Jibin Ma, Zhanyang Wang, Youting Li, and Weishi Zhang. "Potential hydrogen market: Value-added services increase economic efficiency for hydrogen energy suppliers." Sustainability 14, no. 8 (2022): 4804.

10 Biggins, Flora, Mohit Kataria, Diarmid Roberts, and Solomon Brown. "Green hydrogen investments: Investigating the option to wait." Energy 241 (2022): 122842.

result, regulatory certainty and policy stability are critical considerations for investors evaluating this sector.[11] Investment viability is also strongly influenced by access to competitively priced renewable energy. Countries with abundant renewable resources enjoy a comparative advantage in developing green hydrogen production. However, such advantages cannot be fully realized without coherent and supportive policy frameworks. In addition to technical and economic considerations, regulatory certainty plays a decisive role in industrial development. Investors require clear legal recognition of green hydrogen production, including licensing procedures, environmental standards, and incentive schemes. Regulatory ambiguity increases policy risk and discourages capital inflows.[12]

In Indonesia, a central challenge lies in the unclear positioning of the green hydrogen production industry within the national industrial classification system. Hydrogen-related activities may fall under various existing categories, none of which fully reflect the specific characteristics of green hydrogen production. This ambiguity creates legal uncertainty.[13] The Indonesian Standard Industrial Classification (KBLI) serves as a foundational instrument for determining regulatory

11 Younus, Hussein A., Rashid Al Hajri, Nazir Ahmad, Noor Al-Jammal, Francis Verpoort, and Mohamed Al Abri. "Green hydrogen production and deployment: opportunities and challenges." Discover Electrochemistry 2, no. 1 (2025): 32.

12 Dolci, Francesco, Denis Thomas, Samantha Hilliard, Carlos Fúnez Guerra, Ragnhild Hancke, Hiroshi Ito, Mathilde Jegoux et al. "Incentives and legal barriers for power-to-hydrogen pathways: An international snapshot." International Journal of Hydrogen Energy 44, no. 23 (2019): 11394-11401.

13 Aditya, Indra Ardhanayudha, Zulfa Berliana Pratiwi, Dzikri Firmansyah Hakam, and Prodia Nur Kemala. "Green Hydrogen as a Catalyst for Indonesia's Energy Transition: Challenges, Opportunities, and Policy Frameworks." International Journal of Energy Economics and Policy 15, no. 2 (2025): 182.

treatment, licensing regimes, and investment requirements.[14] Currently, the classification for hydrogen investment remains underway.[15] Classification decisions influence business risk assessment and compliance obligations. For emerging industries, accurate classification is therefore essential. Misclassification within the KBLI framework can result in administrative barriers and regulatory inconsistencies. Businesses may face uncertainty regarding applicable standards and licensing pathways. Such conditions can increase compliance costs and delay investment realization.[16] Beyond licensing, industrial classification affects access to fiscal incentives and sustainable finance mechanisms. Many green financing instruments and government incentives are tied to specific industrial categories. Clear classification is thus a prerequisite for effective policy support.[17]

For investors, industrial classification functions as a signal of government policy direction and commitment. A clear and consistent classification framework enhances investor confidence, while ambiguity

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14 Badan Pusat Statistik [Indonesian Statistics Agency]. (2025). *Klasifikasi Baku Lapangan Usaha Indonesia (KBLI) 2025* [Indonesian Standard Industrial Classification (KBLI) 2025]. Accessed January 27, 2026, from https://www.bps.go.id/id/publication/2025/12/24/a9b2f130776c7bea36008556/klasifikasi-baku-lapangan-usaha-indonesia-kbli-2025-.html. https://www.bps.go.id/id/publication/2025/12/24/a9b2f130776c7bea36008556/klasifikasi-baku-lapangan-usaha-indonesia-kbli-2025-.html

15 Direktorat Jenderal Energi Baru, Terbarukan, dan Konservasi Energi [Directorate General of New, Renewable Energy and Energy Conservation]. (2024, September 24). *Penyusunan KBLI dorong percepatan pengembangan hidrogen sebagai energi masa depan* [Drafting KBLI to accelerate hydrogen development as future energy]. Kementerian Energi dan Sumber Daya Mineral Republik Indonesia [Ministry of Energy and Mineral Resources of the Republic of Indonesia]. Accessed January 27, 2026, from https://ebtke.esdm.go.id/artikel/berita/penyusunan-kbli-dorong-percepatan-pengembangan-hidrogen-sebagai-energi-masa-depan

16 EasyLegal. (n.d.). *Mengapa KBLI penting* [Why KBLI is important]. Accessed January 27, 2026, from https://easylegal.id/glossary/mengapa-kbli-penting

17 Masoud, Najeb. "Driving green innovation: assessing the impact of environmental tax policies and green finance on heavily polluting industries." Social Transformations in Chinese Societies 21, no. 2 (2025): 111-139.

undermines the perceived credibility of the investment environment.[18] At the same time, the green hydrogen production industry contributes directly to sustainable development objectives. It plays a significant role in reducing greenhouse gas emissions and supporting clean energy transitions. These contributions align with national and international climate commitments.

Despite its potential, the development of the green hydrogen production industry in Indonesia faces substantial challenges. These include fragmented policy frameworks, limited infrastructure, and high production costs. Such challenges necessitate proactive state intervention.[19] The absence of specific regulations governing green hydrogen further exacerbates uncertainty. Without a dedicated regulatory framework, businesses and investors lack clear legal guidance. This condition may inhibit innovation and slow industrial growth.[20] Another critical challenge is weak intersectoral coordination. Green hydrogen production spans energy, industrial, and investment policy domains. Without effective coordination, existing policies may overlap or conflict. Accordingly, the development of the green hydrogen production industry requires a clear and integrated policy direction. Explicit recognition of the industry as a strategic sector would provide a strong policy signal. Such recognition should be accompanied by

18 Alam, Shahrukh Nawaj, Zaira Khalid, Bhaskar Singh, and Abhishek Guldhe. "Integration of government policies on the global level for green hydrogen production." In *Green Hydrogen Economy for Environmental Sustainability. Volume 1: Fundamentals and Feedstocks*, pp. 1-28. American Chemical Society, 2024.

19 Manullang, Efrando, and Nazaruddin Sinaga. "Potential and challenges of hydrogen development as new renewable energy in Indonesia." REM (Rekayasa Energi Manufaktur) Jurnal 7, no. 2 (2022): 55-62.

20 Aditya, Indra A., Tito Wijayanto, and Dzikri F. Hakam. "Advancing Renewable Energy in Indonesia: A Comprehensive Analysis of Challenges, Opportunities, and Strategic Solutions." Sustainability 17, no. 5 (2025): 2216.

regulatory and institutional reforms.[21] Adjusting or establishing a specific industrial classification for green hydrogen production within the KBLI framework represents an important step forward. A responsive classification system can enhance legal certainty and promote sustainable investment. It also reflects policy adaptability to global industrial developments.[22]

Looking ahead, the green hydrogen production industry has the potential to become a cornerstone of Indonesia's green economy. With appropriate policy support, it can attract sustainable investment and enhance national competitiveness. For this reason, green hydrogen production warrants focused attention within investment and industrial policy research. In the long term, the success of the green hydrogen production industry depends on the coherence of policy instruments across multiple domains. Industrial classification, investment regulation, energy policy, and environmental governance must function in a complementary manner. Fragmented or inconsistent policies risk undermining industrial viability. Ultimately, the green hydrogen production industry transcends mere technological innovation; it embodies a shift in how energy, industry, and sustainability are conceptualized within economic governance. Recognizing this shift requires adaptive legal and policy frameworks capable of accommodating emerging industries. In this sense, the development of the green hydrogen production industry serves as a test case for the responsiveness of contemporary regulatory systems to the demands of sustainable development.

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21 Halimatussadiah, Alin, Muhammad Adriansyah, Fachry Abdul Razak Afifi, Muhammad Yudha Pratama, Teuku Riefky, and Jiehong Lou. *Indonesia's Decarbonization Plans Diagnostic: A Policy Paper*. Institute for Economic and Social Research, Faculty of Economics and Business, Universitas Indonesia, 2024.

22 Wong, Hon Leung Curtis, Nan Zhou, Farid Wijaya, Faricha Hidayati, and Dwi Cahyo Husodo. "Industry decarbonization roadmaps for Indonesia." Jakarta, Indonesia: Institute for equity Essential Services Reform (IESR) (2024).

C. Exploring The Possibility of Leveraging Green Hydrogen to Diversify The Mining Industry

1. *Mining Industry Decarbonization: Legal Obligations and Normative Foundations*

Recognizing this shift requires adaptive legal and policy frameworks capable of accommodating emerging industries. In this sense, the development of the green hydrogen production industry serves as a test case for the responsiveness of contemporary regulatory systems to the demands of sustainable development. The mining industry holds a strategic position in the national economy; concurrently, it remains one of the most carbon-intensive sectors. From a legal perspective, the obligation to decarbonise mining activities is driven not solely by policy directives but is intrinsically anchored in binding legal norms. The mining industry is normatively subject to a legal framework that requires the application of principles of sustainability and environmental protection. This obligation stems not only from environmental policy, but is also explicitly codified in national mining legislation.

Law No. 3 of 2020 on Minerals and Coal Mining stipulates in Article 2 that mining management must be carried out based on principles of sustainability and foresight. This provision provides a normative basis for the obligation of mining companies to progressively adopt low-carbon technologies in their operations. Articles 95-96 require IUP and IUPK holders to implement environmental management, reclamation, and post-mining activities. This obligation can be interpreted dynamically to include the use of clean energy sources, including green hydrogen, provided that the technology demonstrably contributes to reducing greenhouse gas emissions.

The provisions on downstreaming and value addition stipulated in Articles 102 and 103 of the Minerba Law reinforce the premise that employing decarbonisation technologies, such as green hydrogen, is not only relevant from an environmental perspective but also in line with the objective of increasing the economic value of mining activities. In this context, the use of green hydrogen as a low-carbon energy source in

mining and mineral processing activities can be construed both as an instrument for fulfilling environmental obligations and a legal means to strengthen the agenda of downstreaming based on clean technology (green value-added mining).

This obligation is reinforced by Law No. 32 of 2009 concerning Environmental Protection and Management, specifically Articles 3 and 15. Article 3 of the Environmental Protection and Management Law establishes sustainable development as the primary objective of environmental management, while Article 15 mandates the implementation of Strategic Environmental Assessments (SEA) in the formulation of policies and development plans. In EIA practice, the adoption of green hydrogen can be qualified as a mitigation measure to curtail greenhouse gas emissions from the mining sector, which has been categorised as a hard-to-abate sector[2324].

2. *Green Hydrogen as a Legal Instrument for Diversification of Mining Activities*

With the rapid transition to renewable energy and the demand for low-carbon industries, the legal aspects of green hydrogen have become a crucial new issue in the mining world. Terminologically, green hydrogen refers to hydrogen produced through the electrolysis of water using renewable energy without carbon emissions. However, in Indonesia's positive legal framework, green hydrogen has not yet received an explicit legal definition in either energy or mining law. This situation creates a regulatory ambiguity that has the potential to affect legal certainty, particularly for investors seeking to integrate green hydrogen technology into mining activities.

In terms of sectoral legislation, current regulations are still oriented towards conventional energy commodities and mining

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23 OECD. 2022. *Equitable Framework and Finance for Extractive-based Countries in Transition (EFFECT)*. Paris: OECD Publishing. https://doi.org/10.1787/7871c0ad-en

24 World Bank. 2020. "*Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition*". Washington, DC: World Bank. https://www.worldbank.org/en/topic/extractiveindustries/publication/minerals-for-climate-action

minerals. Law No. 30 of 2007 on Energy and Law No. 3 of 2020 on Mineral and Coal Mining do not explicitly classify hydrogen as a separate energy source or as part of sustainable mining activities. As a result, the use of green hydrogen in mining activities, for example as fuel for heavy equipment or as an input in the mineral purification process, must be construed through a systemic and functional approach.

Within the framework of administrative and investment law, a functional approach can be used as the basis for legal characterisation. This functional approach is important because Indonesian jurisprudence fundamentally evaluates a business activity based on its economic function and legal impact, rather than solely on the technological nomenclature used. In this context, green hydrogen can be characterised as an ancillary mining support activity oriented towards energy efficiency and emission reduction. Such characterisation is in line with the policy of mineral downstreaming and added value enhancement, which is the underlying objective of the Minerba Law, while also opening up space for the integration of sustainable development principles into the mining sector.

Globally, the need to integrate clean energy technologies into the mining sector has become a concern for international institutions. The World Bank (2020) asserts that the clean energy transition will increase dependence on the mining sector, because it notes that "the clean energy transition will be significantly more mineral intensive than the fossil fuel-based energy supply system"[25]. This statement indicates that mining cannot be separated from the energy transition agenda, but must instead transform through the adoption of low-carbon technologies, including green hydrogen. In this context, green hydrogen serves as a bridge between the energy needs of the mining industry and global demands to reduce greenhouse gas emissions.

Furthermore, the OECD emphasises that resource-rich countries need to develop fair and adaptive policy frameworks to support the transition to a low-carbon economy. The OECD states that "extractive-based economies face specific challenges in aligning climate

[25] World Bank. 2020.

objectives with development goals" [26]. This statement is relevant to Indonesia, as it shows that the legal characterisation of green hydrogen cannot be separated from national development interests, investment, and the sustainability of the mining sector.

In efforts to decarbonise the mining industry, green hydrogen plays a functional role in facilitating business expansion. This diversification is not a complete replacement of mining activities, but rather a strategic reconfiguration of the industry's value chain to be more environmentally friendly, energy efficient and low in emissions. Green hydrogen is a means of achieving decarbonisation in the mining sector. According to IESR, green hydrogen has a crucial role in replacing fossil fuels in sectors that are difficult to switch to clean energy (hard-to-abate), including mining[27].

From the perspective of mining and investment law, the use of green hydrogen creates legal opportunities for business diversification. Technically, green hydrogen acts as a substitute energy source for heavy equipment operations and mineral purification facilities, supporting the acceleration of low-carbon downstreaming. Consequently, the mining paradigm is shifting from mere resource extraction to an industrial ecosystem integrated with renewable energy technology. This is in line with the government's roadmap, which positions green hydrogen as a pillar of energy transition and an instrument for attracting sustainable investment[28].

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26 OECD. 2022, "*Equitable Framework and Finance for Extractive-based Countries in Transition (EFFECT)*"

27 Institute for Essential Services Reform (IESR). (2025). *Mengakselerasi pemanfaatan hidrogen hijau melalui penyusunan peta jalan hidrogen nasional yang komprehensif* [Accelerating green hydrogen utilization through a comprehensive national hydrogen roadmap]. Accessed January 27, 2026, from https://iesr.or.id/mengakselerasi-pemanfaatan-hidrogen-hijau-melalui-penyusunan-peta-jalan-hidrogen-nasional-yang-komprehensif

28 Kementerian Energi dan Sumber Daya Mineral [Ministry of Energy and Mineral Resources]. (2023). *Kementerian ESDM dukung pengembangan hidrogen hijau* [Ministry supports green hydrogen development]. Accessed January 20, 2026, from https://www.esdm.go.id/id/media-center/arsip-berita/kementerian-esdm-dukung-pengembangan-hidrogen-hijau

Furthermore, the government is working to formulate a specific business classification for hydrogen. This reflects the country's commitment to providing legal certainty for this sector. According to the Ministry of Energy and Mineral Resources, the establishment of the Standard Industrial Classification (KBLI) for hydrogen is designed to ensure clarity in licensing procedures and strengthen the investment ecosystem[5]. In the extractive industry, this classification serves as the legal basis for integrating green hydrogen as a supporting activity or a legitimate derivative business line within the mining framework.

3. *Regulatory Gaps and Legal Barriers in Integrating Green Hydrogen into Mining*

The existence of this specific KBLI is legally important because it serves as a foundational mechanism for business licensing, fiscal facilitation, and administrative supervision, including when green hydrogen is used in mining activities. From an investment law perspective, clarity on the legal classification of green hydrogen is crucial in determining the degree of certainty and protection for investors. The absence of clear normative boundaries risks regulatory overlap, jurisdictional ambiguity, and impediments to securing sustainable financing in the mining sector. However, strengthening the legal status of green hydrogen within the framework of decarbonisation will facilitate access to green finance and transition finance instruments, which are now a priority for global capital markets.

The lack of clarity in the characterisation of green hydrogen has been highlighted in legal literature on energy and investment. For example, a comparative study in the ASEAN region shows that one of the main obstacles to attracting investment in green hydrogen is policy disparities and a lack of legal certainty regarding the classification of activities in different jurisdictions. There is a need for harmonisation of the legal framework and a clear classification approach for this sector so that investment can develop more effectively[29].

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[29] Rahayu, Sang Ayu Putu, Dina Silvia Puteri, Rahayu Fery Anitasari, dan Asrul Ibrahim Nur. 2025. "Green Hydrogen Management in ASEAN Countries

Therefore, delineating the legal status of green hydrogen in the mining industry transcends mere technical aspects, as it involves strategic links between energy, mining and investment laws. The establishment of regulations that explicitly recognise the role of green hydrogen in sustainable mining transformation will be crucial in ensuring legal certainty, protecting investment and achieving sustainable development targets in Indonesia.

To date, green hydrogen does not yet have a comprehensive regulatory framework in Indonesian positive law; its provisions remain scattered across disparate policy documents. Binding legal norms are still in the process of being drafted. The government has confirmed that incentives, taxation, and carbon trading mechanisms for green hydrogen will be regulated in the New and Renewable Energy Bill (EBET), which is currently pending enactment[2]. This situation directly impacts the lack of legal certainty for investors planning to implement green hydrogen in the mining sector. Without adequate regulatory support, the integration of green hydrogen risks becoming only a limited initiative that does not have a significant impact on the structural transformation of the mining sector. In fact, international experience shows that energy transition in the heavy industry sector requires a legal framework that actively encourages behavioural change through a combination of normative obligations and economic incentives[30].

In addition to licensing issues, another major legal obstacle is institutional fragmentation in regulation. Mining, energy, environmental and investment regulations still operate independently without strong coordination, even though green hydrogen requires a cross-sectoral approach. This lack of harmonisation ultimately undermines the efficacy of law (as a means of social engineering) towards low-emission mining practices. The importance of harmonisation between government agencies is another practical step that strengthens the legal framework. Green energy and cross-sector investment require coordination between

from Investment Law Perspective." *Indonesian Journal of Environmental Law and Sustainable Development* 4 (1). https://doi.org/10.15294/ijel.v4i1.25457

30 World Bank, loc.cit

the Ministry of Energy and Mineral Resources, the Ministry of Investment/BKPM, the Ministry of Trade, and environmental and industrial stakeholders. For example, a statement from the Deputy Minister of Trade emphasises the strategic role of hydrogen not only as an energy commodity, but also as a tool for economic and environmental diplomacy that can open up global market opportunities for Indonesian green products[31].

D. The Potential of Green Hydrogen Investment For Investors, Based on the Indonesia Standard Industrial Classification

Indonesia has significant potential for green hydrogen investment, driven by renewable energy (NRE) sources such as geothermal, solar, and hydropower, with projected demand reaching 2-5 million tons per year by 2040.[32] The sector is particularly strategic for industrial decarbonization and heavy transportation, with an investment target of US$25.2 billion (Rp395.58 trillion) by 2060.[33] This potential will open up investment opportunities in Indonesia, enabling it to gain several advantages, including the fact that green hydrogen, a crucial future

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31 Dyah Roro Esti Widya Putri. (2025, April 17). *Wamendag tegaskan peran strategis hidrogen dalam diplomasi perdagangan RI* [Deputy Trade Minister emphasizes the strategic role of hydrogen in trade diplomacy]. Kementerian Perdagangan Republik Indonesia [Ministry of Trade of the Republic of Indonesia]. Accessed January 27, 2026, from https://www.kemendag.go.id/berita/pojok-media/wamendag-tegaskan-peran-strategis-hidrogen-dalam-diplomasi-perdagangan-ri

32 Surya Energi Indotama. (2025, June 16). *Mengenal hidrogen hijau dan potensi besar Indonesia* [Getting to know green hydrogen and Indonesia's great potential]. Accessed January 20, 2026, from https://suryaenergi.co.id/mengenal-hidrogen-hijau-dan-potensi-besar-indonesia/.

33 BioEnergy Times, Indonesia aims to secure $25.2 billion in private sector investment for green hydrogen development by 2060, 17 Agustus 2024, https://bioenergytimes.com/indonesia-aims-to-secure-25-2-billion-in-private-sector-investment-for-green-hydrogen-development-by-2060/, accessed January 20, 2026.

energy pillar for the decarbonization of the heavy industry and transportation sectors, can be produced from renewable energy with zero carbon emissions.[34] As a clean-energy carrier, green hydrogen offers long-term energy storage and flexibility of use, making Indonesia a potential global hub for geothermal and solar energy production. Green Hydrogen in the Future Energy can replace fossil fuels in hard-to-abate sectors.[35]

Green hydrogen is projected to become one of Indonesia's primary assets in the energy transition to Net Zero Emission (NZE) by 2060. With the abundant potential of new and renewable energy resources (NRE), Indonesia has a competitive advantage to become a producer and exporter of green hydrogen, reduce dependence on fossil fuels, and strengthen national energy security. Several reasons why hydrogen can be a strength for Indonesia, including:

a. Abundant NRE Potential: Indonesia has a renewable energy potential of 3,687 Gigawatts (GW), which is the main capital for green hydrogen production, including geothermal, solar power, and hydro.[36]
b. Geothermal-Based Green Hydrogen Development: Indonesia has pioneered advancements by developing the world's first geothermal-based green hydrogen using AEM electrolyzer technology at the Ulubelu PLTP, Lampung.[37]

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34 Algburi et al., *The green hydrogen role in the global energy transformations*, Renewable and Sustainable Energy Transition 8 (2025) 100118, https://doi.org/10.1016/j.rset.2025.100118.

35 Amir Hossein Azadnia et al., Green hydrogen supply chain risk analysis: A european hard-to-abate sectors perspective, Renewable and Sustainable Energy Reviews 182 (2023) 113371, https://doi.org/10.1016/j.rser.2023.113371.

36 Agung Pribadi. (2023, February 4). *Miliki potensi EBT 3.686 GW, Sekjen Rida: Modal utama jalankan transisi energi Indonesia* [Possessing 3,686 GW of renewable energy potential, Secretary General Rida: Main capital to drive Indonesia's energy transition]. Kementerian Energi dan Sumber Daya Mineral [Ministry of Energy and Mineral Resources]. Accessed January 20, 2026, from https://www.esdm.go.id/id/media-center/arsip-berita/miliki-potensi-ebt-3686-gw-sekjen-rida-modal-utama-jalankan-transisi-energi-indonesia.

37 Muhdi Qorib. (2025, September 9). *Pertamina resmikan groundbreaking pilot plant green hydrogen di Ulubelu* [Pertamina inaugurates groundbreaking of

c. National Strategy & Roadmap: The government, through the Ministry of Energy and Mineral Resources, published the National Hydrogen Strategy (SHN) in 2023 and compiled a National Hydrogen and Ammonia Roadmap to accelerate the utilization of green hydrogen.[38]
d. Future Export Commodities: In addition to domestic needs, green hydrogen is projected as an export commodity, with infrastructure being prepared, including a pipeline connecting Sumatra to Singapore.
e. Decarbonization of the Industrial Sector: Hydrogen will replace fossil fuels in sectors that are difficult to decarbonize, such as heavy transportation and industry.[39]

Although the potential of green hydrogen is huge, its development still faces technical and economic challenges, yet it is projected to be used on a large scale in Indonesia by 2027. Hydrogen, especially green hydrogen, has been designated as a strategic sector in Indonesia's national strategy to achieve the Net Zero Emission (NZE) target by 2060. This strategy is designed to reduce dependence on fossil fuels, improve energy security, and position Indonesia as a clean hydrogen exporter.

Hydrogen development is still in its early stages and requires accelerated infrastructure and regulatory development. Indonesia has massive renewable energy potential (around 3,687 GW) as a basic

green hydrogen pilot plant]. *Ruang Energi*. Accessed January 21, 2026, from https://www.ruangenergi.com/pertamina-resmikan-groundbreaking-pilot-plant-green-hydrogen-di-ulubelu/.

38 Muhamad Alhaqurahman Isa, et al. (2025). *Peta jalan (roadmap) hidrogen dan amonia nasional* [National hydrogen and ammonia roadmap]. Kementerian Energi dan Sumber Daya Mineral Republik Indonesia [Ministry of Energy and Mineral Resources of the Republic of Indonesia], Direktorat Jenderal Energi Baru, Terbarukan, dan Konservasi Energi [Directorate General of New, Renewable Energy and Energy Conservation]. Jakarta.

39 Ajsa Habibic, Sembcorp and PT PLN move forward with green hydrogen project in Indonesia, Offshore-Energy.biz, 23 Oktober 2024, https://www.offshore-energy.biz/sembcorp-and-pt-pln-move-forward-with-green-hydrogen-project-in-indonesia/, accessed January 20, 2026.

capital.[40] Green hydrogen investment is still in its early stages but faces significant structural challenges. The need to accelerate infrastructure and regulation stems from the fact that, although the development of green hydrogen in Indonesia is supported by the National Hydrogen Strategy (SHN), which has been published, it still requires accelerating the business ecosystem and a more comprehensive roadmap. Key challenges include a lack of shared infrastructure for hydrogen storage and transportation, as well as the need to increase the capacity of renewable energy (solar, wind, geothermal) to produce hydrogen efficiently. Investors need strong regulatory signals, including carbon pricing policies, the elimination of fossil fuel subsidies, and clear technical standards to guarantee investment certainty. Green hydrogen is seen as a crucial solution for decarbonizing heavy industry and transportation, but it still faces higher production costs than conventional energy sources. Starting in 2025, crucial steps have been taken to build a green hydrogen ecosystem, including the inauguration of a pilot project to produce green hydrogen from renewable energy.

Indonesia has secured a green investment commitment of IDR 278 trillion through the signing of 13 agreements at the International Sustainability Forum (ISF) 2025. These investments include strategic partnerships and new commitments to support sustainable development. Based on the National Hydrogen and Ammonia Roadmap, Indonesia has the potential to produce up to 17.5 million tons of clean hydrogen per year. This figure exceeds the projected domestic demand of 12.1 million tons in 2060, thus opening major export opportunities. Green hydrogen is positioned as a key pillar of Indonesia's energy transition to achieve zero carbon emissions by 2060 or sooner. The government continues to accelerate this ecosystem through new regulations, such as the Minister of Energy and Mineral Resources Regulation No. 10/2025. Real implementation has begun

[40] Verda Nano Setiawan. (2025, October 9). *RI punya potensi energi terbarukan 3.687 GW, baru dipakai 0,4%!* [RI has 3,687 GW renewable energy potential, only 0.4% used!]. *CNBC Indonesia*. Accessed January 20, 2026, from https://www.cnbcindonesia.com/news/20251009102239-4-674266/ri-punya-potensi-energi-terbarukan-3687-gw-baru-dipakai-04.

with pilot projects, such as the construction of Pertamina's first geothermal-based green hydrogen plant in Ulubelu, Lampung, scheduled to break ground in September 2025.

The implementation of investment activities is inseparable from licensing issues, which, in this case, are also related to the Standard Classification of Business Fields (KBLI) for obtaining business licenses or conducting business activities. The Government of Indonesia has actively established the Business Field Standard Classification (KBLI) to accelerate the development of the hydrogen ecosystem, providing legal certainty and attracting global investors. The Government of Indonesia, through the Ministry of Energy and Mineral Resources (EMR), is actively preparing a Standard Classification of Indonesian Business Fields (KBLI) specifically for the hydrogen sector. The preparation of this special KBLI code aims to provide legal and regulatory certainty for business actors, improve product safety, and attract global investment to accelerate the national hydrogen ecosystem.

The Ministry of Energy and Mineral Resources is working on a special KBLI for hydrogen production, to separate it from the general industry classification and make it easier to license in the OSS system. Before this special KBLI was introduced, hydrogen introduction activities were often still classified under KBLI for the basic chemical industry or industrial gas. The development of KBLI is seen as strategic, considering the large potential of the hydrogen market in Indonesia, projected to reach Rp167 quadrillion (around USD 70 billion) by 2060. This step is expected to accelerate the Net Zero Emission (NZE) target by 2060 by using green hydrogen as a clean energy source. In addition to providing legal certainty, this KBLI aims to make it easier for global investors who will enter the downstream and hydrogen production industries, especially those integrated with new and renewable energy (NRE) power plants. This step is also supported by a roadmap for the development of hydrogen and ammonia as alternative energy in the future.

The establishment of KBLI (Indonesian Business Field Standard Classification) specifically for the hydrogen sector is a crucial step taken

by the Indonesian government, led by the Ministry of Energy and Mineral Resources, to ensure legal certainty, simplify licensing, and accelerate investment in the clean energy ecosystem. KBLI will specifically provide a clear legal umbrella for industry players. This is important, as hydrogen is a new commodity in the energy transition and requires a legal framework to ensure investors do not hesitate to invest in Indonesia.

The existence of a specific KBLI code (projected to be integrated into the OSS - Online Single Submission system) simplifies the business licensing process, from company registration to field operations. With a clear business code, the potential of the hydrogen market, estimated at Rp 167 quadrillion, can be more effectively targeted and attract both domestic and foreign capital.[41] Specific development in the hydrogen sector (including green hydrogen) is key to achieving Indonesia's Net Zero Emission (NZE) target by 2060. KBLI is specifically intended to cover the entire supply chain, from production and storage to hydrogen transportation, which was previously scattered across the KBLI code for the general gas industry. The main obstacle in the establishment of the Indonesian Business Field Standard Classification (KBLI) specifically for hydrogen in Indonesia, which is actually very important for investment legal certainty, is rooted in the absence of a specific legal umbrella that distinguishes hydrogen as a new and renewable energy (NRE) compared to conventional industrial gas (basic chemistry).

Currently, the hydrogen industry is often categorized into KBLI 20112 (Manufacture of Basic Inorganic Chemicals and Industrial Gases). This category does not reflect the characteristics of hydrogen production, storage, and distribution as clean energy (green/blue), making it difficult to identify specific incentives. The lack of detailed technical standards regarding production, distribution, and utilization as a fuel creates uncertainty for investors.

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[41] Maulandy Rizki Bayu Kencana. (2024, September 25). *Kejar potensi pasar Rp 167 kuadriliun, pemerintah bentuk KBLI khusus hidrogen* [Pursuing Rp 167 quadrillion market potential, government establishes specific KBLI for hydrogen]. *Liputan 6*. Accessed January 21, 2026, from https://www.liputan6.com/bisnis/read/5711049/kejar-potensi-pasar-rp-167-kuadriliun-pemerintah-bentuk-kbli-khusus-hidrogen.

The Ministry of Energy and Mineral Resources is still in the process of compiling an academic paper and coordinating with other ministries to separate KBLI hydrogen from the pure chemical industry to the energy industry.[42] The absence of a special KBLI hinders the government in providing targeted fiscal and non-fiscal incentives, which are key factors for investors to start projects.[43] The establishment of a hydrogen-specific KBLI is considered crucial to provide legal certainty, encourage innovation, facilitate licensing, and attract investment to achieve the Net Zero Emission (NZE) 2060 target.

The determination of the Special KBLI will provide certainty for investors, enabling the special KBLI to separate green technology from fossil fuels, facilitating licensing and cross-sector collaboration. KBLI specifically ensures that investors get the right incentives for sustainable projects. The government specifically monitors green hydrogen business activities to encourage innovation and foreign investment. The government is also exploring incentives in the New Energy and Renewable Energy Bill (EBET Bill) and related derivatives for infrastructure developers and green hydrogen producers, as well as special support for hydrogen-fuelled incentive mechanisms for industries that decarbonize through clean energy.

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42 Direktorat Jenderal Energi Baru, Terbarukan, dan Konservasi Energi [Directorate General of New, Renewable Energy and Energy Conservation]. (2024, September 24). *Penyusunan KBLI dorong percepatan pengembangan hidrogen sebagai energi masa depan* [Drafting KBLI to accelerate hydrogen development as future energy]. Kementerian Energi dan Sumber Daya Mineral Republik Indonesia [Ministry of Energy and Mineral Resources of the Republic of Indonesia]. Accessed January 15, 2026, from https://ebtke.esdm.go.id/artikel/berita/penyusunan-kbli-dorong-percepatan-pengembangan-hidrogen-sebagai-energi-masa-depan.

43 Dinas Pekerjaan Umum, Penataan Ruang, Perumahan dan Kawasan Permukiman Provinsi Bali [Department of Public Works, Housing, and Spatial Planning of Bali Province]. (2024, April 12). *KBLI 2020 sebagai langkah pertama perizinan berusaha* [KBLI 2020 as the first step for business licensing]. Accessed January 15, 2026, from https://tarubali.baliprov.go.id/kbli-2020-sebagai-langkah-pertama-perizinan-berusaha/.

Green hydrogen complies with Environmental, Social, and Governance (ESG) standards, attracting global investors focused on sustainability. The use of hydrogen has great potential to supply clean energy for heavy industry and transportation in Indonesia, replacing diesel. It needs to be emphasized again that there is global investment in the development of green industrial estates in Indonesia. The determination of this special KBLI is a regulatory catalyst that will facilitate capital flows into the new and renewable energy (NRE) sector and accelerate the commercialization of green hydrogen in Indonesia.

The determination of the Indonesian Business Field Standard Classification (KBLI) for green hydrogen transcends administrative formality and acts as a vital foundation for creating a healthy and attractive investment climate for profit-oriented investors. With the existence of KBLI, this industry gains legal certainty and access to crucial fiscal incentives to overcome high production costs. The determination of green hydrogen KBLI is very crucial; there are at least several reasons, including:

a. Investment Driving Factors (Profit-Oriented): Investors need clear legality (KBLI) to operate in the business licensing system (OSS). Hydrogen-specific KBLI simplifies business classification, allowing investors to project profits amid fierce competition for alternative energy technologies.
b. Fiscal Incentive Entrance: The determination of KBLI is the main requirement for the government in drafting incentive regulations, such as tax credits or tax relief, to cover high investment costs and production costs. The government promised to prepare further incentives after KBLI and potential investors entered.
c. Mitigating Capital Expenditures: Producing green hydrogen (via electrolysis powered by renewable energy) requires substantial capital investment. KBLI-based incentives (such as tax allowances or tax holidays) can lower operating costs, making green hydrogen more competitive than fossil fuels.
d. Alignment with the Net Zero Emission (NZE) Target: This step supports Indonesia's commitment towards 2060, where hydrogen

demand is projected to grow rapidly (reaching 9.9 million tons per year by 2060).

Overall, the KBLI specifically for hydrogen provides the legal certainty required by large capital, while offering an incentive structure that invests in this sector in a profit-oriented, more economically feasible manner. Although in certain business activities, such as mining, for example, hydrogen is present as a by-product, the business still has great potential, but the business is still not optimal, one of which is due to regulatory and legality constraints, including the adjustment of the Indonesian Business Field Standard Classification (KBLI). However, this situation is starting to change as the government pushes to accelerate the energy transition.

In addition to KBLI's constraints, the utilization of by-product hydrogen from the oil and gas sector is still not optimal due to infrastructure, cost, and market factors, as outlined in the National Hydrogen and Ammonia Roadmap. The suboptimal utilization of oil and gas by-product hydrogen is also due to inadequate hydrogen storage and transportation infrastructure; the cost of converting and processing it into clean hydrogen remains high. The domestic market has also not been fully developed, despite its great future potential.

D. Conclusion

Green hydrogen offers a strategic investment opportunity as the global transition to low-carbon energy accelerates. Indonesia's robust commitment to achieving Net Zero Emissions by 2060, combined with its abundant renewable energy resources and strategic geographic positioning, positions the country well to become a major player in the green hydrogen value chain. These factors create long-term market potential while aligning investment objectives with global sustainability goals.

The precise designation and application of the Indonesian Standard Industrial Classification (KBLI) are crucial to strengthening the investment ecosystem for green hydrogen. By providing legal certainty, streamlining risk-based licensing processes through the Online

Single Submission (OSS) system, and serving as a key reference for fiscal and non-fiscal incentives, KBLI enhances regulatory clarity and reduces investment risk. This regulatory framework increases investor confidence and supports the development of sustainable business models.

In this context, legal services play a significant role in ensuring the determination and implementation of the appropriate KBLI classification for green hydrogen investment. Legal practitioners contribute by interpreting regulatory frameworks, advising investors on compliance with investment and licensing regulations, and facilitating the alignment between business activities and the relevant industrial classification. Through legal due diligence, regulatory analysis, and strategic legal guidance, legal services help investors navigate intricate regulatory architectures and preempt potential legal uncertainties in emerging sectors such as green hydrogen.

Green hydrogen investment is not only economically profitable but also serves as a vector for clean, renewable, and environmentally friendly energy. The integration of Indonesia's renewable energy potential with a structured and transparent industrial classification system, supported by effective legal services, creates a conducive environment for sustainable green hydrogen investment. For investors, aligning business activities with the appropriate KBLI not only ensures regulatory compliance but also maximizes access to government support mechanisms, reinforcing green hydrogen as a viable and attractive long-term investment in Indonesia.

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