

Legal Protection in the Use of Electric Vehicle Batteries: Competition Law and Consumer Protection Perspectives

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Abstract

The phenomenon of rising electric vehicle battery prices in Indonesia has raised consumer concerns and sparked debate regarding the role of the state in price regulation. This study aims to analyze the authority of the National Consumer Protection Agency (BPKN) in regulating electric vehicle battery prices from the perspective of competition law and consumer protection. The research method employed is normative juridical with statutory and conceptual approaches, analyzing Law No. 8 of 1999 on Consumer Protection, Law No. 5 of 1999 on the Prohibition of Monopolistic Practices and Unfair Business Competition, as well as other related regulations. The findings indicate that BPKN has limited authority in regulating electric vehicle battery prices, with its role being more coordinative and consultative through monitoring and advocacy mechanisms directed at business actors, rather than direct price determination. The authority to set prices is more appropriately vested in the Business Competition Supervisory Commission (KPPU) in cases of monopolistic practices or unfair competition, as well as in relevant technical ministries for strategic goods. This study recommends strengthening inter-agency coordination, enhancing BPKN's capacity in monitoring the electric vehicle battery market, and drafting specific regulations governing price monitoring mechanisms for batteries as strategic components within the national electric vehicle ecosystem.

INTRODUCTION

Battery electric vehicles (BEVs) have become a central focus of the global energy transition toward sustainable mobility. Indonesia, as a country with a large population and high levels of vehicle-related pollution, has positioned electric vehicles as a priority within its national energy policy. However, the accessibility of electric vehicles in Indonesia remains constrained by several challenges, one of which is the persistently high and increasingly rising cost of batteries. The transformation of the transportation sector toward electric vehicles forms part of Indonesia's commitment to reducing carbon emissions and achieving its net-zero emissions target by 2060. The Indonesian government has introduced various policies to promote the adoption of electric vehicles, including Presidential Regulation Number 55 of 2019 on the Acceleration of the Battery-Based Electric Motor Vehicle Program for Road Transportation. Nevertheless, the upward trend in electric vehicle battery prices in recent years has raised concerns among consumers and stakeholders.¹

In response to this phenomenon, public discourse has emerged regarding the role of the National Consumer Protection Agency (Badan Perlindungan Konsumen Nasional/BPKN) in regulating or supervising electric vehicle battery prices. Established under Law Number 8 of 1999 on Consumer Protection, BPKN is mandated to safeguard consumer interests. However, BPKN's authority in the context of price regulation—particularly for high-technology products such as electric vehicle batteries—remains subject to debate, as it intersects with the competition law regime governed by Law Number 5 of 1999 on the Prohibition of Monopolistic Practices and Unfair Business Competition.²

Several previous studies have examined aspects of consumer protection and business competition within the context of electric vehicles. Wijaya (2021) analyzed consumer protection issues in electric vehicle sales transactions but did not address the regulation of component pricing. Meanwhile, Kusuma (2022) discussed electric vehicle incentive policies from the perspective of administrative law, yet did not explore the role of consumer protection institutions in market supervision. Pratama (2023) examined the authority of the Business Competition Supervisory Commission (KPPU) in overseeing monopolistic practices in the automotive industry; however, the study focused on

¹ Badan Pemeriksa Keuangan Republik Indonesia, "Peraturan Presiden Nomor 55 Tahun 2019 tentang Percepatan Program Kendaraan Bermotor Listrik Berbasis Baterai," 2019, <https://peraturan.bpk.go.id/Details/116973/perpres-no-55-tahun-2019>

² Badan Pemeriksa Keuangan Republik Indonesia, "Undang-Undang Nomor 8 Tahun 1999 tentang Perlindungan Konsumen," 1999, <https://peraturan.bpk.go.id/Details/45288/uu-no-8-tahun-1999>.

conventional vehicles and did not specifically analyze the market dynamics of electric vehicle batteries.

The research gap identified from these studies lies in the absence of a comprehensive analysis that specifically examines BPKN's authority in regulating electric vehicle battery prices while taking into account competition law considerations and institutional limitations. This study seeks to fill that gap by conducting an in-depth exploration of the legal basis, mechanisms, and limitations of BPKN's authority in the regulation of electric vehicle battery prices.

Based on this background, the research formulates the following questions: first, what is the scope of BPKN's authority to regulate electric vehicle battery prices under the Consumer Protection Law? Second, what are the implications of competition law for BPKN's authority in regulating electric vehicle battery prices? Accordingly, this study aims to: (1) analyze the legal foundations and scope of BPKN's authority in regulating electric vehicle battery prices; and (2) evaluate the implications of competition law for the limitations of BPKN's authority. This research is positioned within the academic discourse on consumer protection law and competition law, contributing an institutional analysis that may serve as a reference for policymakers in formulating effective price supervision mechanisms in the electric vehicle sector.

Literature Review

1. Concept of Consumer Protection

Consumer protection encompasses all efforts aimed at ensuring legal certainty in providing protection to consumers.³ In the context of Indonesian law, consumer protection is regulated under Law Number 8 of 1999 on Consumer Protection, which seeks to enhance consumer awareness, capability, and independence in safeguarding their own interests, while simultaneously fostering honest and responsible behavior among business actors. Consumer protection law has distinctive characteristics as a cross-sectoral legal framework, integrating various fields of law, including civil law, administrative law, and criminal law.⁴

Ahmadi Miru emphasizes that the principles of legal protection for consumers must strike a balance between the interests of consumers and business actors.⁵ Consumer rights as stipulated in Article 4 of the Consumer Protection Law include the right to comfort,

³ Badan Pemeriksa Keuangan Republik Indonesia, "Undang-Undang Nomor 8 Tahun 1999 tentang Perlindungan Konsumen," 1999, <https://peraturan.bpk.go.id/Details/45288/uu-no-8-tahun-1999>.

⁴ Shidarta, *Hukum Perlindungan Konsumen Indonesia*.

⁵ Ahmadi Miru, *Prinsip-Prinsip Perlindungan Hukum bagi Konsumen di Indonesia*.

security, and safety in consuming goods and/or services; the right to choose and obtain goods and/or services in accordance with the agreed value, conditions, and guarantees; as well as the right to fair and non-discriminatory treatment. In the context of price determination, consumers are entitled to fair and non-exploitative pricing.

2. Monopoly Theory and Business Competition

Fair business competition constitutes a fundamental prerequisite for the effective functioning of an efficient market mechanism. Law Number 5 of 1999 on the Prohibition of Monopolistic Practices and Unfair Business Competition regulates prohibitions against various agreements and activities that may result in monopolistic practices and unfair competition.⁶ Susanti Adi Nugroho explains that competition law aims to prevent the concentration of economic power in the hands of one or a few business actors that could harm the public interest.⁷

In the context of price setting, several forms of competition law violations are particularly relevant, including price fixing, predatory pricing, and excessive pricing. The Business Competition Supervisory Commission (Komisi Pengawas Persaingan Usaha/KPPU), as the institution mandated to oversee the enforcement of Law Number 5 of 1999, holds the authority to assess whether monopolistic practices or unfair business competition exist within a particular industry.⁸

3. Concept of Electric Vehicle Law

Battery electric vehicles (BEVs) are vehicles that utilize electrical energy stored in batteries as their primary source of propulsion.⁹ The development of the electric vehicle ecosystem in Indonesia is regulated through various legal instruments, including Presidential Regulation Number 55 of 2019 and Minister of Industry Regulation Number 27 of 2020 concerning Specifications, Development Roadmaps, and Provisions for Calculating the Domestic Component Level of Battery-Based Electric Motor Vehicles.

As the core component of electric vehicles, batteries possess distinct characteristics that differentiate them from conventional vehicle components. Dependence on global supply chains for battery raw materials has significant implications for cost structures and pricing mechanisms of electric vehicle batteries in Indonesia. Furthermore, regulations governing technical standards and battery safety constitute an essential part of the legal framework for electric vehicles, aimed at protecting consumer interests.

⁶ Indonesia, Undang-Undang tentang Larangan Praktek Monopoli dan Persaingan Usaha Tidak Sehat, UU No. 5 Tahun 1999, LN No. 33 Tahun 1999, TLN No. 3817.

⁷ Susanti Adi Nugroho, *Hukum Persaingan Usaha di Indonesia*

⁸ *Ibid*

⁹ Indonesia, Peraturan Presiden tentang Percepatan Program Kendaraan Bermotor Listrik Berbasis Baterai untuk Transportasi Jalan, Perpres No. 55 Tahun 2019, Pasal 1 angka 5.

METHODS

This study employs a normative juridical research method using a statutory approach and a conceptual approach. The statutory approach is applied by analyzing Law Number 8 of 1999 on Consumer Protection, Law Number 5 of 1999 on the Prohibition of Monopolistic Practices and Unfair Business Competition, Presidential Regulation Number 55 of 2019 on the Acceleration of the Battery-Based Electric Motor Vehicle Program, as well as relevant implementing regulations, in order to identify the *ratio legis* and legal construction concerning BPKN's authority in regulating electric vehicle battery prices. The conceptual approach is used to examine legal concepts such as consumer protection, fair business competition, and the authority of state institutions within the context of price regulation.

Data collection is conducted through a literature study of primary legal materials in the form of statutory regulations, secondary legal materials including books, academic journals, and previous research findings, and tertiary legal materials such as legal dictionaries and encyclopedias. Data analysis employs a deductive-prescriptive method with a legal syllogistic reasoning pattern, in which the major premise consists of legal norms contained in statutory regulations and is applied to the minor premise in the form of legal facts concerning the increase in electric vehicle battery prices, thereby producing conclusions regarding BPKN's authority. Validation of legal sources is carried out through verification of the hierarchy of laws and regulations in accordance with Law Number 12 of 2011 on the Formation of Laws and Regulations, as well as cross-checking the consistency of norms across related regulations. Legal interpretation is conducted using grammatical, systematic, and teleological methods to comprehensively understand the meaning of legal norms within the Indonesian legal system.¹⁰

RESULTS AND DISCUSSION

1. Business Competition Law Perspective on Electric Vehicle Battery Pricing

From the perspective of business competition law, price determination falls within the domain of market mechanisms that must be safeguarded from interventions capable of distorting competition. Law Number 5 of 1999 on the Prohibition of Monopolistic Practices and Unfair Business Competition stipulates that business actors are prohibited from entering into agreements with other business actors to fix the prices of goods and/or

¹⁰ P. M Marzuki, *Penelitian Hukum: Edisi Revisi* (Prenada Media, 2017).

services to be paid by consumers or customers within the same relevant market.¹¹ This provision reflects the principle adopted by Indonesian competition law that prices should be determined through market mechanisms based on the interaction of supply and demand. Price reductions in this context are driven by several factors, including advancements in battery technology, increased mass production, and intense competition among global battery manufacturers.¹²

However, intense price competition in the battery and electric vehicle markets also carries the potential for anti-competitive practices. Such risks arise particularly when price dominance or price coordination occurs among a small number of major market players, which may harm consumers and other producers. For instance, unhealthy electric vehicle "price wars" resulting from uneven government incentives that tend to favor certain manufacturers may hinder fair competition in the automotive market.¹³ The monopolization of key battery raw materials, such as lithium and nickel, also poses a risk to healthy competition in the absence of strict regulatory oversight. Therefore, close supervision of battery pricing dynamics and market practices is essential to prevent anti-competitive conduct that could undermine consumer interests and national objectives for sustainable electric vehicle development.¹⁴

These price wars have been triggered by uneven government incentives that tend to benefit certain producers, particularly large Chinese manufacturers such as BYD, Wuling, and other brands capable of offering highly competitive prices. For example, at GIIAS 2025, BYD introduced the Atto 1 model at a starting price of IDR 195,000,000 (one hundred ninety-five million rupiah), a highly aggressive pricing strategy compared to other vehicle segments. This development raised concerns among established manufacturers, such as Toyota, regarding the potential for unfair competition practices.¹⁵

¹¹ Warta Ekonomi, "Kabar Baik! Harga Baterai Kendaraan Listrik Turun Tajam, Mobil Listrik Jadi Murah Dong," 2024, <https://wartaekonomi.co.id/read569582/kabar-baik-harga-baterai-kendaraan-listrik-turun-tajam-mobi-listrik-jadi-murah-dong>.

¹² Kompas.com, "Harga Baterai Mahal Jadi Kendala Mobil Listrik Berkembang di Indonesia," 14 September 2022, <https://otomotif.kompas.com/read/2022/09/14/081200115/harga-baterai-mahal-jadi-kendala-mobil-listrik-berkembang-di-indonesia>.

¹³ Kompas.com, "Perang Harga Mobil Baru Tekan Pasar Mobil Listrik Bekas," 27 September 2025, <https://otomotif.kompas.com/read/2025/09/27/100200615/perang-harga-mobil-baru-tekan-pasar-mobil-listrik-bekas>.

¹⁴ CNBC Indonesia, "Membedah Skenario Praktik Monopoli Kendaraan Listrik di RI," 29 Maret 2023, <https://www.cnbcindonesia.com/opini/20230329173428-14-425586/membedah-skenario-praktik-monopoli-kendaraan-listrik-di-ri>.

¹⁵ CNBC Indonesia, "Perang Mobil Listrik China di GIIAS 2025, Cek Harga BYD Bikin Heboh," 25 Juli 2025, <https://www.cnbcindonesia.com/news/20250725151603-4-652299/perang-mobil-listrik-china-di-giias-2025-cek-harga-byd-bikin-heboh>

Monopolies or dominant control over the supply of key battery raw materials, including lithium and nickel, also risk undermining healthy competition. If only a limited number of companies control these raw materials, they may influence battery prices and indirectly increase electric vehicle prices, thereby constraining productivity and investment in the sector. These concerns are reflected in apprehensions that intense battery price competition may be politicized for the benefit of a few major players, ultimately disadvantaging local producers and consumers.¹⁶

The negative impact of such price wars is also evident in the used electric vehicle market. Sharp declines in resale values due to battery depreciation have made the second-hand electric vehicle market difficult to develop and have generated uncertainty among consumers, adversely affecting long-term trust and investment in Indonesia's electric vehicle sector.¹⁷ Furthermore, the Chief Economist of Permata Bank has noted that while price wars may benefit consumers in the short term, they can compel manufacturers in the long term to reduce product quality or cut features in order to maintain profitability. This may lower resale values and diminish innovation and investment in the electric automotive sector, ultimately harming both consumers and the industry as a whole.¹⁸

In early 2025, the prices of electric motorcycle batteries increased significantly, with lithium-ion batteries for electric motorcycles priced at approximately IDR 9,000,000 (nine million rupiah) for batteries weighing 11–13 kilograms, accounting for around 40 percent of the total cost of an electric motorcycle. This increase in battery prices has affected electric motorcycle sales following the termination of government subsidy programs in 2024, which had previously helped suppress retail prices. As a result, consumers have become more cautious, with many postponing purchases due to subsidy uncertainty and relatively high battery prices. This situation has also influenced the strategies of both manufacturers and the government to promote the development of domestic battery production in order to reduce costs and stabilize electric vehicle prices in the future.¹⁹

¹⁶ Yap Suci Kuswardani, "Dinamika Persaingan dan Prospek Industri Mobil Listrik di Indonesia: Analisis Tren dan Implikasi," *Syntax Idea* 6, no. 10 (Oktober 2024): 6340-6353, <https://doi.org/10.46799/syntax-idea.v6i10.8041>.

¹⁷ Kompas.com, "Perang Harga Mobil Baru Tekan Pasar Mobil Listrik Bekas," 27 September 2025, <https://otomotif.kompas.com/read/2025/09/27/100200615/perang-harga-mobil-baru-tekan-pasar-mobil-listrik-bekas>.

¹⁸ Katadata.co.id, "Perang Harga Mobil Listrik Bisa Bikin Kepercayaan Konsumen Turun," 2024, <https://otomotif.katadata.co.id/mobil/perang-harga-mobil-listrik-bisa-bikin-kepercayaan-konsumen-turun-16670>.

¹⁹ Maka Motors, "Harga Baterai Motor Listrik Naik, Pasar Otomotif Indonesia Bereaksi," 2024, <https://maka-motors.com/article/harga-baterai-motor-listrik-naik-pasar-otomotif-indonesia-bereaksi>.

For electric cars, batteries such as those used in the BYD Atto 3 – equipped with a 60.4 kWh lithium-ion battery – are estimated to cost between IDR 150,000,000 (one hundred fifty million rupiah) and IDR 200,000,000 (two hundred million rupiah), representing approximately 30–40 percent of the vehicle's total price. Fluctuations in battery prices therefore have a direct impact on electric vehicle retail prices in Indonesia, which in 2025 ranged from approximately IDR 184,000,000 (one hundred eighty-four million rupiah) to more than IDR 3,300,000,000 (three billion three hundred million rupiah), depending on the brand and vehicle class. Consequently, manufacturers are required to optimize battery efficiency and cost structures in order to remain competitive in Indonesia's rapidly expanding electric vehicle market.²⁰

2. Consumer Protection Perspective on the Increase in Battery Prices

In Indonesia, the legal framework governing the development and utilization of battery-based electric vehicles emphasizes responsibilities related to safety, roadworthiness, and environmental management. Presidential Regulation Number 55 of 2019 serves as the primary policy foundation for accelerating the adoption of battery-based electric motor vehicles and was subsequently refined through Presidential Regulation Number 79 of 2023.²¹ These regulations govern incentives, production obligations, and the management of charging infrastructure and battery waste. Further technical regulations have been issued by relevant ministries, including provisions on charging infrastructure by the Ministry of Energy and Mineral Resources, domestic component level (TKDN) requirements and component specifications by the Ministry of Industry, as well as type approval testing and roadworthiness requirements under regulations issued by the Ministry of Transportation. All of these measures aim to ensure that products circulating in the market are safe, properly tested, and environmentally responsible.²²

To ensure that electric vehicle batteries may be lawfully and safely used by consumers, a series of technical and administrative requirements must be fulfilled. First, batteries and vehicles as a whole must pass type approval and certification tests assessing safety, Battery Management System (BMS) protection, safeguards against overcharging

²⁰ Setirakanan.co.id, "Lengkap! Ini Daftar Harga Baterai Mobil Listrik di Indonesia," 2024, <https://setirakanan.co.id/article/lengkap-ini-daftar-harga-baterai-mobil-listrik-di-indonesia>

²¹ Emmanuel Ariananto Waluyo Adi, "Optimalisasi Kendaraan Bermotor Listrik Berbasis Baterai di Indonesia," *Majalah Hukum Nasional* 54, no. 1 (2024): 50–69, <https://mhn.bphn.go.id/index.php/MHN/article/download/368/120/>.

²² Hukumonline, "Pemerintah Akhirnya Mengeluarkan Aturan tentang Kendaraan Listrik," 16 Agustus 2019, <https://pro.hukumonline.com/a/lt5d565d1bc7e83/pemerintah-akhirnya-mengeluarkan-aturan-tentang-kendaraan-listrik/>.

and over-discharging, and thermal resilience. Second, vehicles are required to undergo periodic inspections to ensure ongoing roadworthiness and battery functionality. Third, minimum technical specifications—including capacity, voltage, lifecycle, and cooling systems where necessary—must comply with national standards or adopted international benchmarks. Fourth, the availability of reliable charging infrastructure and/or battery-swapping mechanisms constitutes an operational prerequisite for consumers. Fifth, manufacturers or business actors must provide after-sales guarantees and end-of-life battery management mechanisms, such as recycling or controlled disposal. Finally, compliance with TKDN requirements and vehicle type registration completes the administrative prerequisites necessary for market acceptance and policy support. Collectively, these requirements reflect an integrated emphasis on technical safety, consumer protection, and environmental responsibility as essential conditions for the public use of electric vehicle batteries.²³

Battery safety within the consumer protection framework involves several key standards, including safety assurance, warranty regulation, rigorous testing, and the implementation of safe operational practices to prevent accidents such as fires, explosions, and performance failures. Indonesia's National Consumer Protection Agency (BPKN) has emphasized the importance of strict battery regulation, including attention to battery lifespan, electromagnetic radiation risks, and the provision of adequate sales services. Manufacturers are also encouraged to maintain transparency in battery warranty handling and to conduct product recalls when necessary, in order to protect consumers' rights against unsafe or defective products. In addition, compliance with national and international battery safety testing standards is a prerequisite prior to market entry, aimed at minimizing the risk of failure and safety incidents. Proper battery storage and charging practices are likewise crucial to ensuring safe and durable operation, particularly for lithium-ion batteries, which are vulnerable to overcharging and exposure to extreme temperatures.²⁴

Furthermore, consumer protection regulations impose strict obligations related to national safety standards, warranties, after-sales services, and manufacturers' duties to provide service networks and transparent information regarding warranties, guarantees,

²³ Republik Indonesia, Peraturan Presiden Republik Indonesia Nomor 55 Tahun 2019 tentang Percepatan Program Kendaraan Bermotor Listrik Berbasis Baterai untuk Transportasi Jalan, 2019, <https://policy.thinkbluedata.com/node/4175>.

²⁴ Suara Merdeka Surabaya, "Risiko Baterai Mobil Listrik: BPKN RI Ingatkan Konsumen Perlu Perlindungan Maksimal," 11 Januari 2024, <https://surabaya.suaramerdeka.com/surabaya/amp/106115951598/risiko-baterai-mobil-listrik-bpkn-ri-ingat-konsumen-perlu-perlindungan-maksimal>.

and battery safety, especially for electric vehicles utilizing advanced battery technologies. Consumers are also encouraged to report operational issues or safety concerns to enhance protection mechanisms. Battery safety thus represents a fundamental aspect of maintaining consumer comfort, security, and trust in battery-dependent products.²⁵

From the consumer perspective, batteries offer several practical and functional advantages. Modern battery technologies, such as lithium-based cells, feature high energy density, enabling longer driving ranges and improved vehicle performance within relatively compact designs. This enhances everyday usability without significantly increasing vehicle size or weight.²⁶ The ability to recharge batteries multiple times reduces reliance on disposable replacements, thereby lowering long-term operational costs for vehicle owners.²⁷ Moreover, when energy supply and charging systems are managed effectively, battery usage contributes to reduced local emissions during operation and, when accompanied by adequate recycling systems, has the potential to reduce chemical waste compared to single-use battery consumption.²⁸

Empirical studies further demonstrate that electric vehicle energy conversion efficiency can reach 70–90 percent, significantly exceeding that of internal combustion engines, which typically operate at only 20–30 percent efficiency. This makes battery-based vehicles more energy-efficient for daily consumers. Additionally, regenerative braking technology allows a portion of kinetic energy lost during braking to be recovered and stored in the battery, further enhancing energy efficiency. From an economic standpoint, electric vehicle operating costs are generally lower due to reduced electricity costs per kilometer compared to fossil fuels, particularly in developing countries such as Indonesia.²⁹ Local studies also suggest that as renewable energy sources become more prevalent within the national electricity mix, consumers may experience dual benefits in

²⁵ Badan Standardisasi Nasional, "BSN dan NBRI Dorong Standar Keamanan Baterai Kendaraan Listrik," 9 November 2023, <https://www.bsn.go.id/main/berita/detail/25454/bsn-nbri-dorong-standar-keamanan-baterai-kendaraan-listrik>.

²⁶ VOI.id, "Kelebihan dan Kekurangan Baterai Lithium Nikel," 2024, <https://voi.id/otoinfo/352591/kelebihan-dan-kekurangan-baterai-lithium-nikel>.

²⁷ □ Versusbeda.com, "Kelebihan dan Kekurangan Baterai Isi Ulang," 2024, <https://versusbeda.com/kelebihan-dan-kekurangan-baterai-isi-ulang>.

²⁸ KSP Law, "Dasar Hukum Kendaraan Bermotor Listrik Berbasis Baterai (Battery Electric Vehicle) di Indonesia," 2023, <https://www.ksplaw.co.id/Publication/KSP-Legal-Alert/dasar-hukum-kendaraan-bermotor-listrik-berbasis-baterai-i-battery-electric-vehicle-i-di-indonesia.html>.

²⁹ Zaizafun Lathifah, Terra Afandaniarto, dan Salma Syahirah Firli, "Analisis Kebijakan Program Kendaraan Bermotor Listrik (KBL) Berbasis Baterai Indonesia," *Jurnal Ilmu Hukum, Humaniora dan Politik* 5, no. 2 (Desember 2024): 1288-1297, <https://doi.org/10.38035/jihhp.v5i2.3183>.

the form of cost savings and reduced greenhouse gas emissions.³⁰ Research further indicates that modern Battery Management Systems (BMS) can extend battery lifespan through adaptive thermal and current regulation. Looking toward future technological developments, solid-state batteries are considered a promising alternative, as they replace liquid electrolytes with solid materials that are theoretically safer and more stable, while also offering the potential for increased energy density if material and interface challenges can be addressed.³¹

Conversely, several battery-related disadvantages are particularly relevant from a consumer protection standpoint. Initial manufacturing costs and market prices for high-capacity batteries remain relatively high due to the need for raw materials such as lithium, nickel, and cobalt, as well as complex manufacturing processes. These factors directly affect the retail prices of electric vehicles and related devices. Batteries also experience capacity degradation over repeated charge cycles, leading to reduced performance and driving range over time; eventual replacement or end-of-life handling imposes additional financial and logistical burdens on consumers.³² Technical safety risks are likewise significant: batteries that are improperly designed, installed, or managed may experience thermal failure, including fire hazards, making electronic protection systems and temperature control indispensable. Moreover, vulnerabilities in raw material supply chains and challenges related to industrial waste management introduce broader economic and environmental dimensions that must be addressed systematically.³³

In addition, studies such as *Lithium-Ion Battery Fast Charging: A Review* indicate that physical phenomena—including localized heating, ionic resistance, and side reactions (such as barrier layer formation)—can limit charging speeds and accelerate cell degradation. The article *Effect of Fast Charging on Degradation and Safety* finds that fast charging under extreme thermal conditions can accelerate degradation pathways in LFP

³⁰ Patrice Estellé, Leonor Hernández López, dan Matthias H. Buschmann, "Special Issue of the 1st International Conference on Nanofluids (ICNf19)," *Energies* 13, no. 9 (Mei 2020): 2290, <https://doi.org/10.3390/en13092290>

³¹ Jürgen Janek dan Wolfgang G. Zeier, "Challenges in Speeding Up Solid-State Battery Development," *Nature Energy* 8, no. 3 (Februari 2023): 230-240, <https://doi.org/10.1038/s41560-023-01208-9>.

³² BatteryPKCell, "What Are the Disadvantages of Li-ion Battery?," 7 Juli 2023, <https://www.batterypkcell.com/id/news/what-are-the-disadvantages-of-li-ion-battery>.

³³ Maria Natasha Rudijanto dan Amad Sudiro, "Legality and Safety Regulations of Electric Vehicle Batteries in Indonesia: Challenges and Implementation of National Standards," *Journal of Law, Politic and Humanities* 5, no. 2 (Desember 2024): 901-908, <https://doi.org/10.38035/jlph.v5i2.1065>.

cells and pose safety challenges.³⁴ Further research, including *Study on Lithium-Ion Battery Degradation Caused by Side Reactions*, warns that lithium plating processes and solid electrolyte interphase (SEI) layer growth resulting from high current loads can damage anode structures and reduce long-term capacity.³⁵ In the Indonesian context, a key barrier to electric vehicle adoption remains the limited availability of public charging infrastructure and uneven electricity distribution. Studies published by MDPI highlight insufficient charging infrastructure and immature regulatory frameworks as major obstacles to the widespread adoption of electric vehicles in Indonesia.

3. Battery Price Limits as an Implementation of the Consumer Protection Law

The author refers to the views of the Chairperson of the National Consumer Protection Agency (Badan Perlindungan Konsumen Nasional/BPKN) concerning battery pricing. Mufti Barok has stated that electric vehicle consumers in Indonesia continue to experience inadequate consumer protection. He argues that consumer protection has been overlooked amid the government's efforts to accelerate the adoption of electric vehicles (EVs). Many consumers encounter various issues, such as sudden vehicle breakdowns or malfunctioning batteries, and often face difficulties in obtaining adequate after-sales services. In addition, he has highlighted the very low resale value of electric vehicles as a major concern for consumers, primarily due to the high cost of electric vehicle batteries and the lack of sufficient quality guarantees. In response to these issues, BPKN has urged the government to strengthen regulations on battery warranties and after-sales services for electric vehicles.³⁶

To date, the Indonesian government has not established an official price ceiling for any variant of electric vehicle batteries. As part of its consumer protection strategy, the government has instead prioritized tax incentives aimed at reducing the overall cost of electric vehicles, thereby improving affordability for consumers. These incentives are regulated under Minister of Finance Regulation Number 12 of 2025 concerning general provisions and types of tax incentives related to electric vehicles. The incentives are applicable until the end of 2025 and are intended to stimulate the growth of the electric

³⁴ Hanwei Zhou et al., "Effect of Fast Charging on Degradation and Safety Characteristics of Lithium-Ion Batteries with LiFePO₄ Cathodes," *Applied Energy* 377 (Januari 2025): 124465, <https://doi.org/10.1016/j.apenergy.2024.124465>.

³⁵ Zhenhai Gao et al., "Study on Lithium-Ion Battery Degradation Caused by Side Reactions in Fast-Charging Process," *Frontiers in Energy Research* 10 (Mei 2022), <https://doi.org/10.3389/fenrg.2022.905710>.

³⁶ Suara Merdeka Surabaya, "Risiko Baterai Mobil Listrik: BPKN RI Ingatkan Konsumen Perlu Perlindungan Maksimal," 11 Januari 2024, <https://surabaya.suaramerdeka.com/surabaya/amp/106115951598/risiko-baterai-mobil-listrik-bpkn-ringat-konsumen-perlu-perlindungan-maksimal>.

vehicle industry while simultaneously facilitating consumer access to battery-based vehicles.³⁷

Thus far, electric vehicle battery pricing has largely followed market and technological dynamics. However, battery costs remain significantly high, reaching hundreds of millions of rupiah for high-end electric vehicles. Rather than directly regulating battery price ceilings, the government has focused on taxation and incentive policies as a means of consumer protection. Consequently, price limits have not yet been regulated under consumer protection frameworks, with current policy measures instead emphasizing tax incentives and battery quality assurance.³⁸

CONCLUSION

Based on the analysis conducted, this study concludes that BPKN's authority in regulating electric vehicle battery prices is limited and does not extend to direct price determination. Under Law Number 8 of 1999 on Consumer Protection, BPKN's mandate is primarily coordinative and consultative, exercised through market supervision, consumer advocacy, and the provision of recommendations to business actors and the government. Allegations of battery price setting that involve monopolistic practices or unfair business competition fall within the jurisdiction of the Business Competition Supervisory Commission (KPPU) pursuant to Law Number 5 of 1999, while price regulation for strategic goods remains the responsibility of relevant technical ministries.

From a competition law perspective, these findings highlight the need for a clear separation between consumer protection functions and competition supervision. The oligopolistic structure of the electric vehicle battery market requires a comprehensive oversight approach based on inter-agency coordination. Within this framework, BPKN can play an optimal role by enhancing consumer education, facilitating dispute resolution, and providing policy input to KPPU and relevant ministries regarding the consumer impacts of battery pricing. Academically, this study contributes to the development of consumer protection and competition law literature in the context of emerging technologies, enriches scholarly discourse on institutional authority boundaries within Indonesia's legal system, and demonstrates that consumer protection and competition law are complementary legal regimes that require distinct yet coordinated institutional mechanisms to effectively address market challenges.

³⁷ Kementerian Keuangan Republik Indonesia, "Insentif Dicabut, Impor Mobil Listrik Bakal Kena Tarif Normal Mulai 2026," Metro TV News, 2025, <https://www.metrotvnews.com/read/NxGCG772-insentif-dicabut-import-mobil-listrik-bakal-kena-tarif-normal-mulai-2026>.

³⁸ Pajak.go.id, "Kebijakan Insentif Pajak Kendaraan Listrik," 2024, <https://pajak.go.id/en/node/114078>.

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