REPORT

Public Policy Dialogue
"Electric Vehicles to Accelerate Green Economic Transformation"

Jakarta, Thursday, 20 February 2025

1 Background

Indonesia has outlined a green economy as a key development priority in its National Long-Term Development Plan (RPJPN) 2025–2045, with a strong emphasis on energy transition and the development of electric vehicles (EVs). This aligns with the country's commitment to reducing greenhouse gas (GHG) emissions, enhancing energy efficiency, and accelerating the shift to sustainable resources to achieve its Net Zero Emission (NZE) target by 2060 or earlier.

As part of the global movement toward a sustainable economy, the Partnership for Action on Green Economy (PAGE) Indonesia has conducted a series of studies to assess the benefits, challenges, and impacts of electric vehicle (EV) adoption across economic, environmental, and social dimensions. These studies explore key factors such as infrastructure readiness, fiscal and non-fiscal policy incentives, technological affordability, and employment impacts.

Electric vehicles hold significant potential for Indonesia, offering opportunities to reduce fossil fuel dependence, improve transportation efficiency, and foster new industries within the EV ecosystem—ranging from battery manufacturing and recycling to supply chain development. However, challenges remain, including the availability of charging infrastructure, evolving incentive policies, and the readiness of the national automotive industry to adapt to technological advancements.

To support this transition, PAGE Indonesia, in collaboration with Bappenas, organized a Public Policy Dialogue to examine global and national perspectives on EV development. The event aims to enhance stakeholder understanding of policy and regulatory frameworks essential for accelerating EV adoption. It will also analyze international experiences, highlighting lessons learned from countries that have successfully implemented widespread EV adoption. Additionally, the discussion will identify strategic recommendations for advancing Indonesia's EV policies, focusing on financing mechanisms, industry incentives, and supporting infrastructure development.

This dialogue brings together international experts, policymakers, industry leaders, and academics to provide valuable insights and strengthen Indonesia's EV implementation strategy. Through collaboration between the government, private sector, academia, and civil society, Indonesia's transition to electric mobility can become more effective, inclusive, and sustainable.

2 Objective

This activity aims to:

1. Provide global insights on electric vehicle policies in developing countries.
2. Develop policy recommendations to support the electric vehicle ecosystem in Indonesia.
3. Enhance collaboration between the government, private sector, and other stakeholders.

3 Activity Output

1. Deeper understanding of EV policies from both global and national perspectives.
2. Strategic recommendations for the Indonesian government to advance electric vehicles.
3. Enhanced cross-sector collaboration to support the transition to electric vehicles.

4 Time & Place

Day/Date : Thursday, 20 February 2025
Time : 09.00 - 17.00 WIB
Location : The Hermitage Jakarta, Jl. Cilacap No.1, Menteng, Jakarta

5 Participants

More than 115 participants attended both in person and online. They come from the following sectors:

- **Government** – Bappenas, National Research and Innovation Agency (BRIN), Ministry of Energy and Mineral Resources, Ministry of Environment, Ministry of Industry, Ministry of Transportation, Ministry of Finance, Ministry of Manpower, Ministry of State-Owned Enterprises, Coordinating Ministry for Community Development, Ministry of Forestry
- **Local Government** – Regional Development Planning Agency (of Central Java Province, West Java Province, and Palembang City), Department of Environment and Forestry of Central Java Province, Department of Environment of West Java Province, Department of Energy and Mineral Resources (of West Java Province and of Central Java Province), Department of Manpower and ESDM of Bali Province
- **UN Agencies** – UNDP, UNEP, ILO, UNIDO, UNITAR
- **Private Sector** – PT Toyota Motor Manufacturing Indonesia, LCI, PT TUV Nord Indonesia, PT Bank Syariah Indonesia, 8DR Nero, PT Wedabay, SeaCarbon
- **Associations** – Association of Indonesian Automotive Industries (Gaikindo), Indonesian Motorcycle Industry Association (AISI), Indonesia Society of Sustainability Professionals (IS2P)
- **NGOs** – International Council on Clean Transportation (ICCT), Ecological Action and People's Emancipation (AEER)
- **Academia** – Center for Sustainability and Waste Management (CSWM) University of Indonesia, Jenderal Soedirman University, Bandung Islamic University, Jakarta State University
- **Media** (Kompas.com)

6 Agenda

Time (WIB)	Agenda	Remark
08:30 – 09:00	Registration and coffee break	
09:00 – 09:20	Opening Remarks	1. Marco Kamiya UNIDO Country Representative, Sub-Regional Office Indonesia, the Philippines, and Timor Leste 2. **Amrei Horstbrink** Senior Specialist, UNITAR HQ
09:20 – 09:40	Keynote Address	**Leonardo A.A. Teguh Sambodo**

Time (WIB)	Agenda	Remark
	"Indonesia's Policies and Strategies in Promoting Electric Vehicles for Green Economy Acceleration"	Deputy for Food, Natural Resources and Environment, Ministry of National Development Planning/Bappenas
09:50 – 10:00	Photo session	
Panel Discussion Session 1: National Policy Recommendations Towards Electric Vehicle Transition in Indonesia Moderator: Maria Dian Nurani, UNITAR Expert		
10:00 – 10:15	Topic 1: "Electric Vehicles in Energy Transition: Roadmap, Ecosystem and Acceleration"	Mohamad Priharto Dwinugroho, Director of Engineering and Environment, Ministry of Energy and Mineral Resources
10:15 – 10:30	Topic 2: "The Impact of Electric Vehicle Adoption in Indonesia: Regulatory Framework Development and Policy Recommendations"	**M. Faisal** Director, CORE Indonesia
10:30 – 10:45	Topic 3: "Electric Vehicle Transition in Indonesia: Impact on Job Creation"	**Laily Prihaningtyas** Expert, ILO
10:45 – 11:00	Topic 4: "Electric Vehicle Transition in Indonesia: Technology Readiness, Adoption Impact, and Challenges"	**Jessica Hanafi** Director, PT. Life Cycle Indonesia-LCI
11:00 – 12:30	Feedback and Discussion Session	Discussant: 1. **Nur Hygiawati Rahayu**, Director of Employment, Ministry of National Development Planning (PPN)/Bappenas 2. **Mahardi Tunggul Wicaksono**, Director of Maritime Industry, Transportation Equipment, and Defense Equipment, Ministry of Industry 3. **Moeldoko,** Chairman of the Indonesian Electric Vehicle Industry Association (Periklindo)
12:30 – 13:30	Lunch Break	
Sesi Diskusi Panel 2 ***Driving Change: A Global Policy Perspective on the Future of Electric Vehicles*** Moderator: Jessica Hanafi, UNIDO Expet		
13:30 – 14:00	Topic 1 **"Policy Recommendations for Promoting Electric Vehicles in Developing Economies"**	**Ying Zhang** Regional Energy Specialist Sustainable Energy Hub Bureau for Policy and Program Support Global Policy Network, UNDP
14:00 – 14:30	Topic 2 "Creating Green Jobs: Policy Approaches for the EV Sector and Sustainable Employment"	**Ananda Alonso Nacher** Technical Officer for Just Energy Transition, ILO
14:30 – 15:00	Topic 3 "Environmental Policies and the Role of Electric Vehicles in Achieving Climate Goals"	**Alexander Koerner** Programme Officer Sustainable Mobility Unit, UNEP
15:00 – 15:30	Topic 4	**Ozunimi Lilian Iti** Industrial Development Officer/Project Manager, UNIDO HQ

Time (WIB)	Agenda	Remark
	"Industrial Policies for a Sustainable Electric Vehicle Industry: Challenges and Opportunities"	
15:30 – 16:15	Feedback and Discussion Session	Discussant: 1. **Priyanto Rohmattullah**, Director of Environment, Ministry of National Development Planning/Bappenas 2. **Nizhar Marizi**, Director of Energy, Mineral and Mining Resources, Ministry of National Development Planning/ Bappenas 3. **M. Chalid**, Head of Center for Sustainability and Waste Management, University of Indonesia (CSWM UI)
16:15 – 17:00	Conclusion and Closing	Priyanto Rohmattullah Director of Environment, Ministry of National Development Planning/Bappenas

7 Key Questions

Panel Discussion Session 1: National Policy Recommendations Towards Electric Vehicle Transition in Indonesia Moderator: Maria Dian Nurani, UNITAR Expert	
Mohamad Priharto Dwinugroho, Director of Engineering and Environment, Ministry of Energy and Mineral Resources Represented by **Andi Hanif, S.T., M.Eng**, Sub-Coordinator of Electrical Safety, Directorate General of Electricity	Topic 1: "Electric Vehicles in Energy Transition: Roadmap, Ecosystem and Acceleration" Key Questions: • What strategies and policies have been prepared in the energy transition roadmap to accelerate the adoption of electric vehicles in Indonesia? • What are the main challenges in building a sustainable electric vehicle ecosystem, and what are the solutions to overcome them, including strategies for recycling waste from electric vehicles? • What concrete steps can be taken by the government, industry, and society
Jessica Hanafi Direktur PT. Life Cycle Indonesia-LCI	Topic 2: "Electric Vehicle Transition in Indonesia: Technology Readiness, Adoption Impact, and Challenges" Key Questions: • How is the readiness of electric vehicle technology in Indonesia currently? • What are the main challenges in developing supporting infrastructure? (such as charging stations, EV batteries, EV battery recycling) • What are the environmental and economic impacts of electric vehicle adoption in Indonesia and how is Indonesia prepared to face these impacts? • What is the best strategy to overcome the challenges in accelerating electric vehicle adoption in Indonesia?
M. Faisal Direktur CORE Indonesia	Topic 3: "The Impact of Electric Vehicle Adoption in Indonesia: Regulatory Framework Development and Policy Recommendations" Key Questions • How do existing policies and regulations support the EV transition in Indonesia?

	• What are the impacts of EV policies on the industrial, transportation, and environmental sectors in Indonesia? • What policy recommendations are needed to accelerate the EV transition in Indonesia? • What policy recommendations are needed to address potential environmental impacts, especially related to potential EV battery waste?
Laily Prihaningtyas Expert, ILO	Topic 4: "Electric Vehicle Transition in Indonesia: Impact on Job Creation" Key Questions • How does the transition to electric vehicles affect job creation and transformation in Indonesia • What are the main challenges in preparing a workforce ready for change in the electric vehicle sector? • What are the best strategies to maximize the job creation benefits of the electric vehicle transition?
Sesi Diskusi Panel 2 ***Driving Change: A Global Policy Perspective on the Future of Electric Vehicles*** Moderator: Jessica Hanafi, UNIDO Expet	
Ying Zhang Regional Energy Specialist Sustainable Energy Hub Bureau for Policy and Program Support Global Policy Network UNDP	Topic 1 "Policy Recommendations for Promoting Electric Vehicles in Developing Economies" Key Questions: • What are the most effective policy measures for accelerating EV adoption in developing economies? • What are the biggest challenges developing economies face in transitioning to electric mobility, and how can policies address them? • How can international cooperation and private sector engagement enhance EV adoption in developing economies?
Ananda Alonso Nacher Technical Officer for Just Energy Transition ILO	Topic 2 "Creating Green Jobs: Policy Approaches for the EV Sector and Sustainable Employment" Key Questions: • How can policies ensure the transition to electric vehicles (EVs) leads to sustainable and inclusive job creation? • What are the key challenges in developing a skilled workforce for the EV sector, and how can they be addressed? • How can developing economies leverage EV-related policies to maximize employment opportunities while ensuring sustainability?
Alexander Koerner Programme Officer Sustainable Mobility Unit, UNEP	Topic 3 "Environmental Policies and the Role of Electric Vehicles in Achieving Climate Goals" Key Questions: • What are the key environmental benefits and challenges of large-scale EV deployment, especially on EV battery recycling? • How can environmental policies and international cooperation effectively accelerate the adoption of electric vehicles (EVs) to meet global climate targets? • What are the best practices of EV battery recycling technologies and policies? What are the key factors to successfully implement the EV battery recycling policy?
Ozunimi Lilian Iti	Topic 4

Industrial Development Officer/Project Manager, UNIDO HQ Represented by: **Yoshinari Suzuki, Industrial Development Officer**	"Industrial Policies for a Sustainable Electric Vehicle Industry: Challenges and Opportunities" Key Questions: • What are the global trends shaping the future of a sustainable electric vehicle (EV) industry, and how do they influence industrial policies? • What policy frameworks are essential to build a resilient and sustainable EV supply chain globally and nationally? • How can industrial policies drive green innovation and long-term economic benefits in the EV sector?

8 Key points within the Panel Discussion

8.1 Opening Remarks

Marco Kamiya, UNIDO Country Representative for Indonesia, Timor-Leste, and the Philippines, emphasized UNIDO's commitment to promoting inclusive and sustainable industrial development in Indonesia. Through collaborations with organizations like UNEP, ILO, UNITAR, and UNDP, UNIDO supports infrastructure development, capacity building, and sustainable economic initiatives. A key focus is strengthening the electric vehicle (EV) value chain by providing policy recommendations on infrastructure development and circular economy integration in the automotive sector. Today's discussions will feature insights from various stakeholders on EV resource assessment and development goals in Indonesia. Kamiya expressed hope that the dialogue would offer global perspectives and contribute to more effective EV policies.

Amrei Horstbrink, Senior Specialist at UNITAR HQ, emphasized UNITAR's commitment to supporting sustainable development through training and evidence-based policy research. Collaborating with international organizations like UNEP, UNIDO, ILO, and UNDP, UNITAR helps countries, including Indonesia, build institutional capacity and adopt sustainable policies. In the electric vehicle (EV) sector, UNITAR supports science-based policy strategies to accelerate the transition to sustainable mobility, focusing on circular economy integration and inclusive infrastructure development. Today's discussions will explore the opportunities and challenges of EV adoption in Indonesia, aiming to provide global insights and contribute to more effective green economy policies.

8.2 Keynote Address

Leonardo A.A. Teguh Sambodo, Deputy for Food, Natural Resources, and Environment at the Ministry of National Development Planning (Bappenas), highlighted that the green economy provides economic and social benefits, particularly through sustainable job creation. The adoption of electric vehicles (EVs) contributes to economic growth, with projections indicating a GNI per capita increase of USD 46,275 by 2060, benefiting the manufacturing sector. EVs are expected to create 1 million jobs by 2030 and up to 3 million by 2045 across various fields. Environmentally, cumulative GHG emissions could decrease by 63.8% by 2060, with EVs contributing 14.8%. Ensuring a sustainable supply chain, including renewable energy use for battery production, is crucial. EVs are integral to Indonesia's green and circular economy strategy, as reflected in the RPJPN 2025-2045 and RPJMN 2025-2029. Challenges such as battery waste management require circular economy approaches. Policies for EV transition include incentives, public transport electrification, infrastructure development, and alternative energy exploration. Indonesia's EV market is rapidly expanding, with 116,000 units recorded in 2023—a 179% increase from 2022. By 2035,

EV adoption could save 12.5 million barrels of fuel and reduce CO2 emissions by 4.6 million tons. Effective cross-ministerial and international collaboration is essential to accelerate this transition and ensure its long-term success.

8.3 Panel Discussion Session 1

Andi Hanif, S.T., M.Eng, Sub-Coordinator of Electrical Safety, Directorate General of Electricity, Ministry of Energy and Mineral Resources, as the representative of the Director of Engineering and Environment, Ministry of Energy and Mineral Resources , highlighted Indonesia's commitment to accelerating the adoption of battery electric vehicles (KBLBB) as part of its green economic transformation. Supported by Presidential Regulation No. 55/2019 and Ministerial Regulation No. 1/2023, the government provides incentives for battery leasing, charging infrastructure, and private charging installations. By December 2024, 3,202 public charging stations (SPKLU) and 1,902 battery swap stations (SPBKLU) had been built to facilitate EV adoption. The transition to EVs aims to reduce greenhouse gas emissions by replacing imported fossil fuels with domestically generated electricity. However, high EV prices and infrastructure readiness remain challenges, as a Deloitte study found that 61% of Indonesian consumers would consider EVs only if priced similarly to conventional vehicles. To address these barriers, the government is focusing on local battery production, component manufacturing, and battery recycling, while also developing a Single Gateway System (CSMS) to streamline EV charging access and improve user convenience.

Mr. Faisal, Director of CORE Indonesia highlighted the government's ambitious 2030 targets for electric vehicle (EV) adoption, aiming for a 44% market share in both four-wheeled and two-wheeled segments, though current adoption rates remain significantly below target. Key barriers include limited EV charging infrastructure (mainly concentrated in Jakarta and West Java), inadequate local component supply, and short-term incentives that create uncertainty for consumers and producers. Challenges span market and infrastructure development, manufacturing capabilities, skilled workforce availability, environmental considerations, and regulatory frameworks. He emphasized that the biggest impact on the Green Economy Index (GEI) would come from fostering a domestic EV industry. His policy recommendations include economic strategies for market and industrial development, social measures for workforce transition and certification, environmental actions such as clean energy integration and circular economy principles for EV batteries, and a structured transition roadmap.

Jessica Hanafi, **Director of PT. Life Cycle Indonesia-LCI** highlighted that Indonesia's EV transition could drive economic benefits, especially by leveraging its nickel reserves for battery production, though emerging low-nickel battery technologies necessitate policies to prioritize domestic nickel use. Local EV production for exports could generate up to IDR 100 trillion in added value across the supply chain, but replacing the domestic ICEV market requires reskilling programs to prevent job losses and ensure a just transition. From a cradle-to-grave perspective, battery electric vehicles (BEVs) emit 17% less CO_2 per kilometre than ICEVs but have significantly higher acidification and eutrophication impacts due to Indonesia's coal-dominated electricity mix. However, between 2024 and 2060, EV-related GHG emissions per kilometre are expected to drop by 65%, with acidification and eutrophication impacts decreasing by 52% and 83%, respectively, due to grid decarbonization. Emerging battery technologies, such as solid-state and sodium-ion batteries, could further reduce environmental impacts by about 1%. Extending battery life through secondary applications could enhance economic value by 36%, while recycling through pyrometallurgical processes could cut GHG emissions by 25%.

Lailly Prihatiningtyas ILO's expert, focused on the crucial role of EVs in accelerating the transition to a green economy. The study assesses job transformations and skill needs within the EV value chain,

identifying opportunities for green job creation while recognizing the challenges posed by inconsistent policies, high manufacturing costs, and the necessity for domestic component supply chains. The report underscores the importance of developing a robust industrial policy and strategic partnerships to facilitate midstream industry development, ensuring a just transition for affected workers. Additionally, the study highlights the essential skills required for the evolving job roles in the EV sector, advocating for improved skill transferability through better standardization and certification. It calls for proactive workforce planning and lifelong learning opportunities to enable workers to adapt to new industry demands and ensure decent work throughout the transition process.

Discussant

Mariska from the Directorate of Manpower at Bappenas representing the director, discussed several key points regarding the workforce transition to the electric vehicle (EV) industry. She emphasized the importance of ensuring job gains in the EV sector to offset potential job losses, especially as the transition to green jobs progresses. Bappenas is working on a green jobs roadmap up to 2045, but faces challenges in determining which sectors should be prioritized for workforce development, given the complexity of the transition and the readiness of sectors like circular economy, energy, and land. She acknowledged the capital- and technology-intensive nature of the EV industry, which may require fewer workers but highlighted the importance of policies that ensure human workers are still needed in the sector, rather than relying solely on automation and AI. Mariska also stressed the need for collaboration between the government, employers, and workers to align training and workforce planning with emerging industry needs, including identifying necessary occupations, designing training programs, and ensuring certification standards. Lastly, she called for collaboration with SMEs to support the EV sector and invited technical assistance to help the government effectively plan for this transition.

Patia J. Monangdo from from the Directorate of IMATAP at the Ministry of Industry (Kemenperin) highlighted key points regarding the development of Indonesia's electric vehicle (EV) industry. He discussed the ministry's regulations supporting low-carbon emission vehicles (LCEV), including electric, hybrid, flex engine, and hydrogen vehicles. He mentioned government incentives such as PPN DTP for electric cars and buses and subsidies for electric motorcycle purchases. He also addressed the two main battery technologies in use: NMC (nickel) and lithium. The Ministry of Industry aims to encourage the use of nickel-based batteries in EVs, particularly from Chinese manufacturers, to take advantage of Indonesia's abundant nickel resources. Regarding local content, he noted that the current minimum local content requirement is 40%, which can be met through assembling, but by 2027, this will increase to 60%, pushing for greater development of the domestic EV component industry, especially batteries. Patia also emphasized the importance of hybrid vehicles in reducing carbon emissions, noting that the government has been promoting hybrid technologies alongside battery electric vehicles.

Questions and Answers

Participants raised several key questions regarding Indonesia's EV development, particularly the gap between charging infrastructure targets and actual progress, seeking new strategies to accelerate deployment. They also highlighted the need to expand discussions beyond battery electric vehicles (BEVs) to include hybrid, plug-in hybrid (PHEV), and hydrogen technologies, requesting a more comprehensive assessment of their role in the green economy. The role of research and academia was another concern, especially regarding the shift from NMC to LFP battery technology and how Indonesia's abundant nickel resources will be utilized. Questions were also raised about the existence of a national roadmap involving universities in EV innovation. Additionally, participants inquired about Indonesia's stance on hydrogen as an alternative energy source for heavy-duty transport like buses and trucks. Benchmarking with other

countries, particularly ASEAN nations and Australia, was suggested to accelerate development by learning from established EV policies. Lastly, they emphasized the importance of prioritizing public transportation electrification over private EVs, as it has a greater impact on reducing emissions and benefits lower-income communities, questioning Indonesia's specific regulations and strategies for electric public transport like buses and microbuses.

Answer:

Andi Hanif Ministry of Energy and Mineral Resources addressed several issues regarding electric public transport in Indonesia. He emphasized that the Ministry of Transportation is primarily responsible for electric public vehicles, but it works closely with the Ministry of Energy and Mineral Resources (ESDM) and other agencies to ensure the proper implementation of electric buses, which require adequate charging stations. Charging stations must provide at least 150 kW to ensure efficient operation, as slower charging times would require buses to park for long periods. Andi highlighted the limited infrastructure for electric vehicle batteries and the need for regulatory interventions, such as mandating that charging station developers build facilities in at least two provinces. He also mentioned that electricity tariffs for charging stations are not yet rigidly regulated and called for affordable service costs to make EVs more accessible. Additionally, he noted that electrification is an inevitable trend, which will lead to a revolution in the automotive industry. Regarding government policies, he pointed out the vision behind Presidential Regulation 55/2019, which aims to accelerate the adoption of battery electric vehicles (KBLBB) in Indonesia, recognizing the country's abundance of coal and nickel, which are critical to the EV battery industry. He clarified that while hydrogen and hybrid vehicles contribute to emission reductions, the primary focus remains on battery electric vehicles due to Indonesia's resource advantages.

Faisal from CORE Indonesia discussed several key points related to Indonesia's transition to electric vehicles (EVs). He emphasized the need to prioritize sectors based on their contribution to GDP, employment, and greenhouse gas emissions. The automotive industry, particularly electric vehicles, tends to be more capital and technology-intensive, but Faisal highlighted that the EV ecosystem, including mining, battery production, and charging infrastructure, involves many labor-intensive sectors, especially in trade and services. He also mentioned the importance of incentives for hybrid vehicles as a transitional step towards full electrification, as seen in countries like Japan, Korea, and China. Regarding public transport, Faisal noted that EV adoption is limited in some regions due to fiscal capacity, with Jakarta leading the way due to its stronger financial resources. He also pointed out the significant subsidies for electric buses in Jakarta and raised the challenge of replicating such incentives in other regions with lower fiscal capacities. Faisal concluded by acknowledging that while new technologies like hydrogen may disrupt the industry, it's important to keep moving forward with current strategies and adapt to future technological developments.

Jessica from LCI Indonesia discussed several key points in response to previous discussions. She highlighted the importance of aligning research and development in recycling technologies with circular economy goals, mentioning that increasing patents and scientific publications related to recycling is a target in the roadmap. Jessica also addressed the challenge of workforce training, noting that while vocational education for green jobs is essential, there is a lack of focus on technical fields in Indonesia, which leads to difficulties in adapting to new industries. She suggested the need for more emphasis on technical education to ensure flexibility in the workforce. Regarding public transport, Jessica explained that while buses contribute to emissions, their numbers are much smaller compared to private cars and motorcycles in Indonesia, making private vehicles a larger source of pollution. She emphasized that public transport, especially BUMD-operated vehicles, is easier to regulate compared to private vehicles. On

hydrogen fuel stations, she pointed out that while there are existing stations, transitioning to hydrogen would require significant infrastructure development for logistics, making electric vehicle charging a more feasible option in the short term. She also noted that the priority for EV adoption in Indonesia currently focuses on two- and four-wheel vehicles, with a special mention of online mobility services like Grab and Gojek.

Lailly Prihatiningtyas from ILO emphasized the importance of gradual transition and workforce planning in the shift to electric vehicles (EVs). She noted that Indonesia's automotive industry has experience with structural changes, particularly automation, making it better equipped to manage the transition to EVs if done gradually and with proper planning. Lailly stressed the need for sectoral dialogue, as the impact on labor and the adoption of EVs depends on factors like production targets and the regulatory environment. Regarding research, she highlighted the importance of innovation, especially for the two-wheeler sector in Indonesia, where many companies lack the capacity for in-house research and development. She also discussed the significant role of researchers in supporting policy-making with quality data and evidence. Lailly pointed out that universities and academic institutions play a crucial role in upskilling the workforce, particularly in basic skills such as analytical thinking and project management, which are essential for adapting to rapidly changing technologies. She suggested creating a sectoral skill council to bridge the gap between industry, academia, and government to ensure skills development aligns with industrial and policy needs.

8.4 Panel Discussion Session 2

Ying Zhang, Regional Energy Specialist at UNDP, highlighted Indonesia's strong political commitment to EV development, with projections indicating that by 2035, one in two vehicles sold in the country will be electric. EV adoption offers significant economic and environmental benefits, including a 15% reduction in emissions, 2% GDP growth by 2060, improved air quality, and economic diversification by shifting from raw material exports to high-value industries. Indonesia's 42% share of global nickel reserves provides a strategic advantage in battery production. Key policy instruments for accelerating EV adoption include fiscal incentives, regulations, infrastructure development, investment facilitation, and innovative financing. However, challenges remain, such as technological dependency, institutional capacity gaps, skilled labor shortages, grid stability, and limited funding. Strategies to overcome these include increasing private sector involvement, expanding financial access for SMEs and startups, and ensuring social inclusion in EV policies. Ying emphasized that EVs should serve as a tool for inclusive development, not just decarbonization, and reaffirmed UNDP's commitment to supporting Indonesia with policy design and international collaboration to ensure a smooth and equitable EV transition.

Yoshinari Suzuki, Industrial Development Officer at UNIDO, highlighted both the challenges and opportunities in transitioning to electric vehicles (EVs) in developing countries. Key challenges include limited local manufacturing capabilities, high dependence on imported batteries and technology, uneven charging infrastructure distribution, and the need for standardized regulations. However, Indonesia has significant potential in the global EV supply chain, particularly due to its vast nickel reserves for battery production. UNIDO's recommended strategies include strengthening local industry through R&D investment, workforce training, and fostering collaboration between industry, academia, and government. Sustainable infrastructure development, renewable energy integration, and fiscal incentives are also crucial to accelerating EV adoption. Drawing lessons from China, India, and Brazil, Suzuki emphasized the need for Indonesia to enhance domestic value creation, implement strong investment incentives, align regulations with international standards, and leverage global partnerships for technology transfer. He concluded that the EV transition should not only focus on replacing fossil-fuel vehicles but

also on building a sustainable and innovative industrial ecosystem, with UNIDO committed to supporting Indonesia in this transformation.

Ananda Alonso Nacher, Technical Officer for Just Energy Transition at ILO, emphasized that while the green transition has the potential to create jobs and improve welfare, its benefits are not automatic and require the right policies to prevent job losses and inequality. She stressed the importance of a Just Transition approach to ensure equitable economic opportunities for all, including women, people with disabilities, and rural communities. Key challenges include gender disparities in new job opportunities, labor conditions in the mining sector amid rising battery production, and skill gaps in the workforce. Strategies for a fair transition include cross-sector policy coordination, social protection for affected workers, reskilling and upskilling programs, and inclusive social dialogue among stakeholders. Drawing lessons from Germany, Thailand, and India, she highlighted the role of worker engagement, skill development, and strong policy frameworks in facilitating a smooth transition. She concluded that Indonesia's skilled workforce provides a competitive edge, but reskilling efforts must be prioritized to align with evolving industry needs, ensuring responsible business practices that balance economic growth with environmental and social considerations.

Alexander Koerner, Program Officer at the Sustainable Mobility Unit, UNEP, highlighted the rapid growth of the global vehicle fleet, which is expected to double by 2050, with most growth occurring in non-OECD countries. The transport sector currently contributes 25% of global greenhouse gas emissions, projected to rise to 33%, making EV adoption crucial for emission reduction. In 2023, EVs accounted for 20% of global new vehicle registrations, with China leading at 40%, followed by Europe and the U.S., while adoption in Asia-Pacific is growing in Thailand (9%), India (3%), and Indonesia (nearly 3%). Developing countries face challenges such as limited charging infrastructure, the need for comprehensive policies, and managing used EVs and battery waste. Key strategies include financial incentives, investments in charging networks, harmonization of regulations, and circular economy policies for battery recycling. UNEP supports 60 countries with $130 million in funding to develop EV policies, infrastructure, and financing models. Koerner emphasized that the EV transition is not just about emissions reduction but also about creating a sustainable and inclusive transportation ecosystem, positioning developing nations like Indonesia to build a competitive EV industry.

Discussant

Dedi Rustandi from the Directorate of SDEMP, Bappenas, highlighted key points regarding Indonesia's energy transition, emphasizing that the transportation sector is crucial, as it accounts for about one-third of total energy consumption. He stressed the need to accelerate EV infrastructure development to maintain market growth momentum and address the infrastructure gap outside major cities like Jakarta. Dedi also pointed to the potential for monetizing EVs through carbon trading and other incentives, which could reduce reliance on government subsidies. He emphasized the importance of workforce readiness, noting the significant potential of the younger generation to adapt to EV technology. However, he stressed the need for training and skill development to meet the demands of the emerging industry. Additionally, Dedi underscored the importance of sustainability in the EV transition, advocating for circular economy principles and policies like Extended Producer Responsibility (EPR) to ensure proper management of products post-consumption. He concluded by emphasizing the need for operators to provide green job training to support the sustainable development of the sector.

M. Chalid from CSWM UI emphasized the importance of considering regional and state-level principles in the transition from conventional vehicles to EVs, highlighting the need to harmonize regulations by

addressing gaps between existing policies. Given Indonesia's cultural diversity, he stressed the importance of tailored approaches to promote green jobs across different regions. He also underscored the need for strategic actions to ensure consistency in sustainable vehicle consumption post-transition. Additionally, he highlighted the circular economy as a key concept for achieving sustainability in the EV transition and emphasized the necessity of firm policies and regulations on Extended Producer Responsibility (EPR) to manage end-of-life EV components effectively. Proper operators with the right skills will be crucial in leveraging green job opportunities within this framework.

Priyanto Rohmattullah, Director of Environmental Affairs at Bappenas, acknowledged the growth of Indonesia's EV industry but emphasized the need to address important issues, particularly the lack of clear regulations on EV battery recycling. He highlighted concerns about hazardous materials and the safe management of EV batteries, stressing the ongoing challenge of regulating battery disposal and recycling. While recognizing the job creation potential of the EV industry, he called for collaboration with organizations like UNEP to develop solutions for battery recycling, which would contribute to improving environmental quality and waste management. He pointed out that both the Ministry of Environment and Ministry of Industry are concerned, but concrete actions have yet to be taken. He suggested that the concept of Extended Producer Responsibility (EPR) could help address these issues as the EV industry continues to grow.

Questions and Answers

Participants raised a range of questions focused on various challenges in the EV sector. They inquired about how to harmonize regulations across Indonesia's diverse sectors and regions, given the differences in policies. They also expressed concern about ensuring safety for workers handling EV batteries, particularly in relation to fire risks and hazardous materials. There was discussion on the importance of localization in EV solutions, drawing from Australian perspectives, including the use of tools like the "Better Fleet" software to measure energy and emissions. Participants also questioned how Indonesia could better utilize renewable energy certificates and improve EV battery recycling, drawing comparisons with past experiences in mobile phone battery management. Another key issue raised was the challenge of tackling climate change amidst rising self-centered national policies, and how global cooperation could still be achieved. Additionally, participants emphasized the need to involve consumers more actively in decision-making processes and asked about strategies to improve EV adoption and battery waste management in Indonesia.

Answer

Alex from UNEP emphasized the importance of carbon trading systems, such as carbon credits, to generate additional funding for EV infrastructure development. He highlighted Indonesia's potential in battery recycling due to its mineral resources and suggested that Extended Producer Responsibility (EPR) policies could ensure producers are accountable for recycling used batteries. He also discussed the benefits of battery swapping systems, where battery ownership remains with the company, facilitating easier battery retrieval at the end of its life. Alex further explained the need to consider where in the battery value chain Indonesia wants to position itself, as this decision impacts recycling strategies. He mentioned that Indonesia's ban on importing used vehicles is a good condition for EPR policies to be effective. Regarding the NTREF project, Alex noted that funds are already allocated for addressing battery end-of-life issues and encouraged further collaboration and resource mobilization to tackle this challenge. He concluded by emphasizing the importance of using government funds efficiently and fostering cooperation among agencies to avoid duplication and ensure long-term investments.

Ying Zhang from UNDP emphasized the importance of integrating data-driven approaches in planning the EV transition, particularly for remote and island areas, and highlighted the need for a comprehensive strategy to manage electricity demand, distribution networks, and appropriate incentives. She agreed with Alex and Abu on the need for cross-sectoral regulatory harmonization involving trade, industry, and environmental concerns, with ASEAN working to align automotive standards with global markets. Zhang stressed the importance of connecting the trade and environmental sectors, as they often operate with different priorities and incentives, especially in developing countries. She advocated for a life cycle approach, considering all segments of the value chain, from mining to disposal, to ensure sustainability and unlock new business opportunities. Zhang also emphasized the need for global collaboration on climate action, noting that the impact of climate change is felt worldwide. She concluded by acknowledging the value of collaboration between international, national, and regional organizations to address urgent issues, citing Indonesia's competitive advantages and potential to set an example for other developing nations.

Ananda from ILO emphasized the importance of social justice in the transition to electric vehicles (EVs), stressing that workers in the automotive sector should have access to retraining and upskilling opportunities, especially vulnerable groups like informal workers and rural communities. She called for stronger workplace safety certifications for those handling EV batteries, citing examples from Australia, where unions have developed specialized training programs for such workers. She also advocated for early education on green jobs, starting in schools, and the need for standardized, accessible certifications to help people across regions gain skills for new green technologies. Ananda further highlighted the role of entrepreneurship training in fostering sustainable small and medium-sized enterprises (SMEs) to drive Indonesia's green economy, reducing reliance on foreign investments. He also underscored the value of social dialogue between the private sector, government, and other stakeholders to address challenges in the transition. Regarding the issue of growing self-centered policies, she encouraged focusing on evidence-based research and long-term investment for the collective good, urging continued collaboration to ensure a clear path toward sustainability.

Abu Saieed from UNIDO emphasized the need for developing domestic battery recycling facilities and for the government to provide incentives to companies investing in battery waste management. He stressed the importance of harmonizing policies across various sectors and stakeholders, as it is essential for driving forward EV adoption and circular economy initiatives. He advocated for Extended Producer Responsibility (EPR) policies, which would hold manufacturers accountable for managing the recycling of used batteries. Additionally, he called for establishing recycling facilities, funding, and creating second-life options for batteries. From a regulatory standpoint, he recommended developing standards for manufacturers to follow, along with a monitoring system to ensure the policies are effectively implemented. Abu also highlighted the need for international cooperation in technology, finance, policy, and trade, acknowledging that self-centered policies can still be connected to global value chains. He concluded by stressing the importance of a coordinated roadmap for the EV sector, covering everything from mining to end-of-life vehicle management, and offered UNIDO's expertise to support Indonesia in this journey.

9 Conclusion and Recommendation

From this public policy dialogue, it can be concluded that there are opportunities and challenges in adopting EVs in Indonesia, and the dialogue provides several policy recommendations. The opportunities, challenges, and policy recommendations are as follows.

Opportunities:

1. **Indonesia's potential to lead in the global EV industry**, especially in hybrid and battery technologies, with an emphasis on using local resources like nickel.
2. **Technological innovations** and **cross-sector collaboration** can drive the circular economy and sustainable development, offering opportunities for new businesses, green jobs, and entrepreneurial ventures, especially in the EV and recycling sectors.
3. **Recycling** is crucial for the sustainability of the electric vehicle (EV) industry. Although Indonesia has abundant mineral resources like nickel, it ensures a stable raw material supply, reduces environmental impact from mining, lowers production costs, and supports efficient use of mineral reserves for long-term economic growth.
4. **Battery swapping systems** offer easier solutions for managing end-of-life batteries and could create new business opportunities.
5. **Carbon trading systems** like carbon credits can help generate additional funding for EV infrastructure development.

Challenges:

1. **Nickel-based batteries** present both an opportunity and challenge. While Indonesia is rich in nickel, which is essential for EV batteries, there is a need to develop and encourage the use of nickel-based batteries over lithium-based alternatives. There are concerns about the lack of local production capacity for battery manufacturing and potential dependency on foreign technology.
2. **Emerging low-nickel batteries**: With the global trend shifting toward low-nickel and lithium iron phosphate (LFP) batteries, which are seen as a more sustainable and cost-effective option, Indonesia may face challenges in adapting its abundant nickel resources to meet the growing demand for these newer battery technologies. This shift could affect the country's role in the battery value chain if it cannot effectively transition to producing or utilizing these emerging battery technologies.
3. **Infrastructure gaps**, particularly in charging stations outside major cities, hinder the widespread adoption of EVs.
4. **High upfront costs** of EVs and the lack of robust policies to make them affordable for the broader population.
5. **Limited R&D capacity** in Indonesia's domestic EV and two-wheeler sectors, necessitating support for innovation and local research.
6. **Workforce readiness** remains a challenge, with significant skills gaps in green technologies, and the sector's capital- and technology-intensive nature may reduce overall employment in the EV industry.
7. **Regulatory fragmentation**, with a need for better harmonization across sectors and regions, especially regarding safety, standards, and recycling, to ensure a smooth transition.

Policy Recommendations:

1. **Carefully define the direction of battery technology**, with the government setting clear policies on whether to prioritize **nickel-based** or **non-nickel-based** batteries. This decision is critical in aligning with global trends, ensuring the optimization of local resources, and maintaining Indonesia's competitive advantage in the battery supply chain.
2. **Develop a comprehensive EV infrastructure plan**, including incentives for charging stations and ensuring they are available across multiple regions, not just in large cities.
3. **Promote Extended Producer Responsibility (EPR)** for battery recycling, with clear policies and incentives for manufacturers to manage the lifecycle of batteries.

4. **Support domestic innovation** in the EV and battery sectors, particularly in developing nickel-based and low-nickel battery technologies, including offering incentives for research and development and encouraging the use of local resources like nickel in battery production.
5. **Incentivize hybrid technologies** as a transitional step towards full electrification, to bridge the gap between current technologies and future EV capabilities.
6. **Ensure inclusive access** to training and certifications for green jobs, especially for vulnerable groups like informal workers and those in rural areas.
7. **Foster collaboration** between government, industry, workers, and academia to address workforce skill gaps and ensure a steady transition to green jobs, particularly through upskilling and reskilling programs.
8. **Harmonize regulations** across sectors (e.g., industry, trade, environment) and regions to ensure consistency in the adoption and implementation of EV policies, including the integration of ASEAN standards and global markets.

10 Documentation



Opening Remarks

Speakers & Moderator – Panel Discussion 1

Speakers – Panel Discussion 2


Speakers & Offline Participants


Offline Participants


Registration

e-poster

Virtual background

11 Appendix

- Speakers' presentation https://drive.google.com/drive/folders/1qKnP4IuF4lyUG2h9hpB-Fuepbf21oHpJ
- Documentation https://drive.google.com/drive/folders/1wL6BZ10xoalN-IPcCS7g7I-4yJdLgOE2
- List of attendees https://drive.google.com/drive/folders/1OWkIGRNSb5y18SfenXZaw7w1BCaZtRQv

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