



Trends of Policies and Programs for Decarbonizing the Road Transport

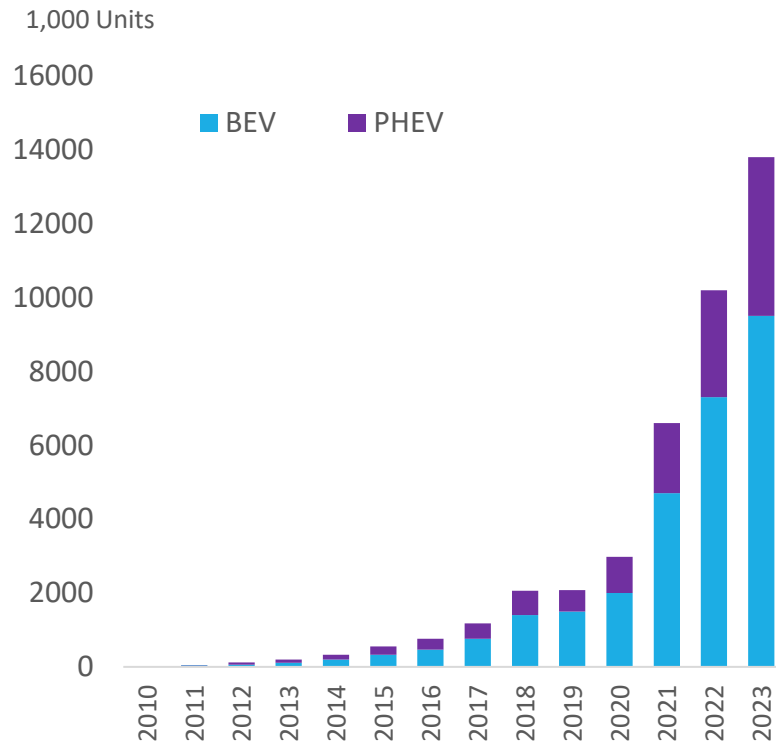
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【Outline】

- 1. Recent Trends in the EVs Sales and Factors**
- 2. Policy Trends in the Selected Countries**
- 3. Liquid Biofuel: Demand Outlook and Supply Potential**
- 4. Implications**

Recent Trends in EV Sales and Factors

BEV/PHEV Sales (2010-2023)



Trends in 2024

- **EU:** BEV's sales registered 5.9% decrease in market volume for 2024 compared to 2023.
- **USA:** BEV's sales for 2024 showed 7.3% increase compared to the previous year. The pace has slowed down from the approximately 40% increase in 2023.
- **China:** BEV/PHEV sales in 2024 saw 40% increases compared to the previous year. BEV increased by 19%, while PHEV registered 81% growth.

Factors

- **Germany :** Ended provision of subsidies for EVs (December 2023)
- **France:** As a result of Environmental Score, EVs produced in China are no longer eligible for subsidies.
- **United States:** Consumers who adopt new goods and services at an early stage, called "Early Adopters," seem to have completed their purchasing cycle.
- **China:** Trade-in program and incentives have increased the sales of EVs. However, most of the manufactures missed their target (3Q2024).

Major Vehicle OEM's EVs Target

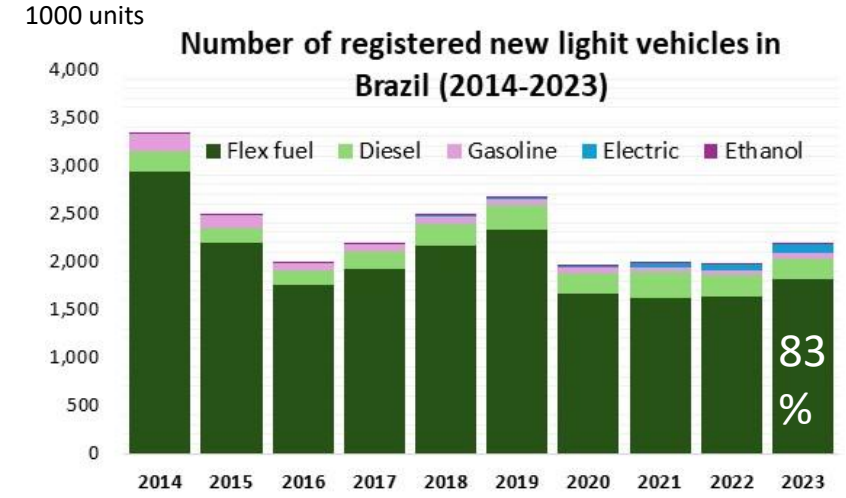
Adjusting the respective targets to accommodate the market trends

- | | |
|---------------|--|
| Mercedes Benz | <ul style="list-style-type: none"> • <u>Revised its plan to make all new car sales electric (BEV) by 2030</u>, "as long as the market allows." In the 2030s, the company will <u>continue to sell</u> electric vehicles equipped with engines, such as <u>plug-in hybrid vehicles</u>. (February 2024) |
| Ford | <ul style="list-style-type: none"> • <u>Postpone about \$12 billion in EVs investment</u> as buyers become more cautious. • The company isn't cutting back its spending on future electric vehicle models. But it now plans to <u>ramp up its EV manufacturing capacity</u>, and its spending on that capacity, <u>more gradually than previously planned</u>. (August 2024) |
| GM | <ul style="list-style-type: none"> • <u>Push back</u> the planned opening of an <u>electric pickup truck plant</u> in suburban Detroit and has <u>delayed a Buick plug-in</u> amid uncertain growth in battery-powered car sales (July 2024) |
| Toyota | <ul style="list-style-type: none"> • <u>Lower sales target</u> of BEV from 1.5 million units in 2026 to 1 million units (September 2024) |
| Volvo | <ul style="list-style-type: none"> • Volvo Cars aims for 90 to 100 % of its global sales volume by 2030 to consist of electrified cars, meaning <u>a mix of both fully electric and plug-in hybrid models</u> – in essence, all cars with a cord. (September 2024) |

Key Developments : Brazil to deploy approach for spurring fuel decarbonization as well as to diversify the type of powertrains. EU to strengthen the CO2 regulation.

Brazil

- **Mover (National Green Mobility and Innovation Program)** provides comprehensive program for the decarbonization of the automobile sector, and to stimulate investment. Brazil has introduced WtW standard for calculating CO2 emissions from automobile, and plans to introduce LCA assessment after 2027.
- **Conventional biofuel (bioethanol)** is already widely used and built in the economy (Target: E27.5 (2024) to E30 (2025), and B14 (2024) to B15 (2025)). Advanced biofuel is also being developed.



Source : Statista (2025).

EU

- **The EU has adopted CO2 fuel efficiency standards for automobile.**
 - **Cars:** 93.6 gCO2/km (2025-2029) and 49.5 g CO2/km (2030-2034)
 - **Vans:** 153.9 gCO2/km (2025-2029) and 49.5 g CO2/km (2030-2034)
 - **From 2035 onwards,** the EU fleet-wide CO2 emission target for both cars and vans is 0 g CO2/km.
 - Car makers not meeting to form a pool to meet emissions target.
- **EU's biofuel target is 29% in the final consumption of transport sector by 2030 (RED III).**
- **German government ended its subsidy to EVs in the end of 2023. Sweden ended incentives for EVs in 2022 (bonus-malus programs).**

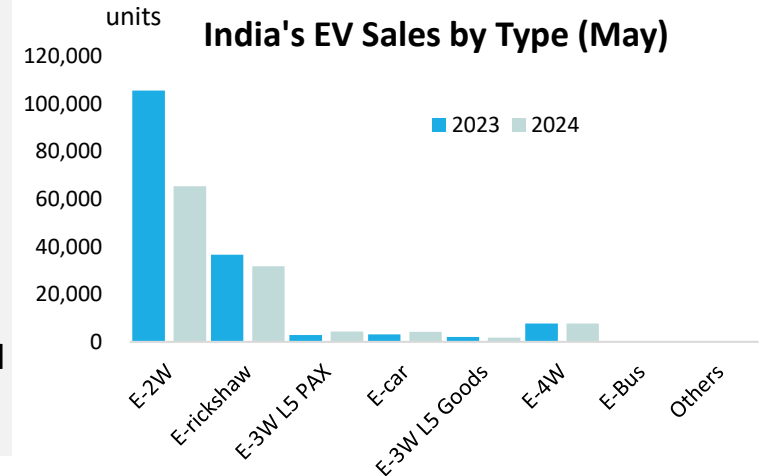


Source : VDA
Note : 2024 figure is VDA's projection.

Key Developments : India's EV sales growth coming from two-wheelers, and Indonesia's xEVs' sales growth from hybrid vehicles.

India

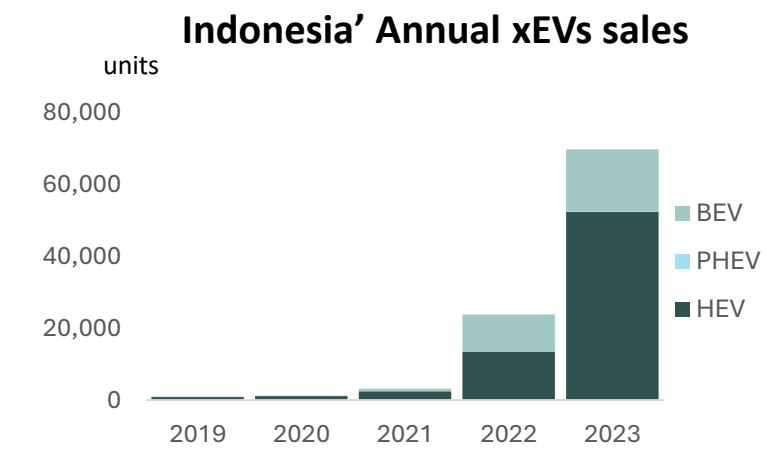
- Indian government has set a goal of increasing the penetration rate of electric vehicles to 30% by 2030. Various incentives are provided under the scheme called FAME II (Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India), spurring the growth trends of both two-wheelers, and three-wheelers.
- The government is taking steps to promote ethanol blending, with the target of blending 20% ethanol with petrol by 2025-26. India established guaranteed pricing, long-term ethanol contracts, and technical standards and codes. Financial support for building new facilities and upgrading existing ones was also provided.



Source : Vahan Dashboard.

Indonesia

- Indonesia has set a target to abandon the sale of gasoline-powered two-wheelers by 2040 and internal combustion engine (ICE) vehicles by 2050.
- Indonesia's biofuel blending targets are: E5/E10(2024) to E20(2025), and B35 (2024) to B40 (2025). The Government of Indonesia (GOI) regulates the prices for both biodiesel and bioethanol through a market price index (HIP), and subsidize the gap between the HIP and the price of diesel or gasoline.

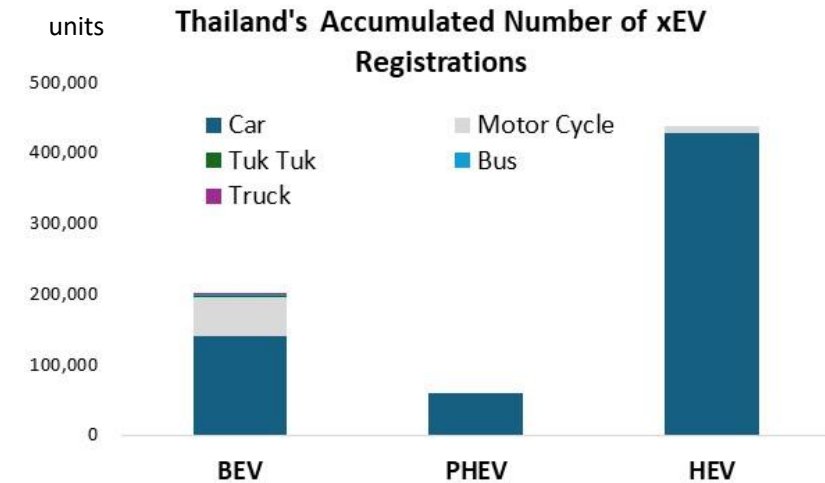


Source : Gaikindo

Key Developments : Thailand’s EV 3.5 program has spurred the BEV sales growth, and Executive order was announced in the USA to terminate the Green New Deal.

Thailand

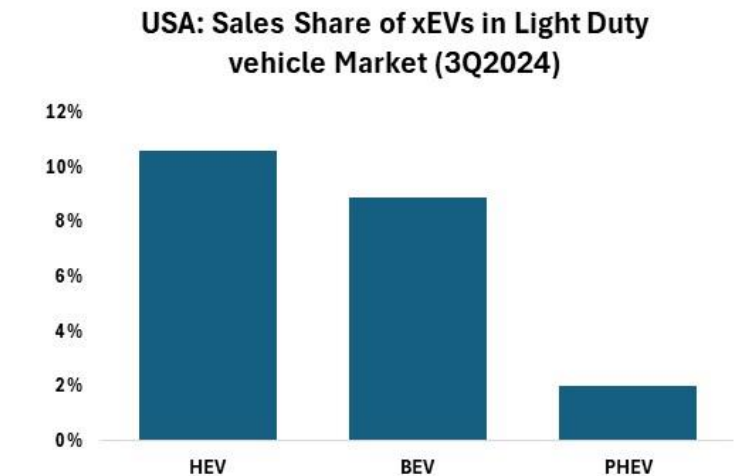
- Thai government aims to become the **hub for EVs manufacturing**, with the **goal of having at least 30% of domestic vehicle production be EVs by 2030 (EV 30@30 Policy)**. **EV 3.5 program provides subsidies, excise tax reductions, and import tariff reductions** to manufactures on conditions that they are required to produce at least twice the number of completed EVs imported with the subsidy from 2026, and if production begins in 2027, the manufactures are required to produce at least three times that number.
- The government **has promoted ethanol through the use of generous subsidies** and increased availability of higher blends (E10, E20 and E85) at petrol stations.



Source : Electric Vehicle Association in Thailand "Thailand Electric Vehicle Current Status"

USA

- On January 20, 2025, Executive Order was announced to “Unleashing American Energy”, which is **to eliminate the “electric vehicle mandate” and promote true consumer choice**.
- Executive Order was announced:
 - **Terminating the Green New Deal.** (a) All agencies shall immediately pause the disbursement of funds appropriated through the Inflation Reduction Act of 2022 (Public Law 117-169) or the Infrastructure Investment and Jobs Act (Public Law 117-58), and shall review their processes, policies, and programs for issuing grants, loans, contracts, or any other financial disbursements of such appropriated funds for consistency.

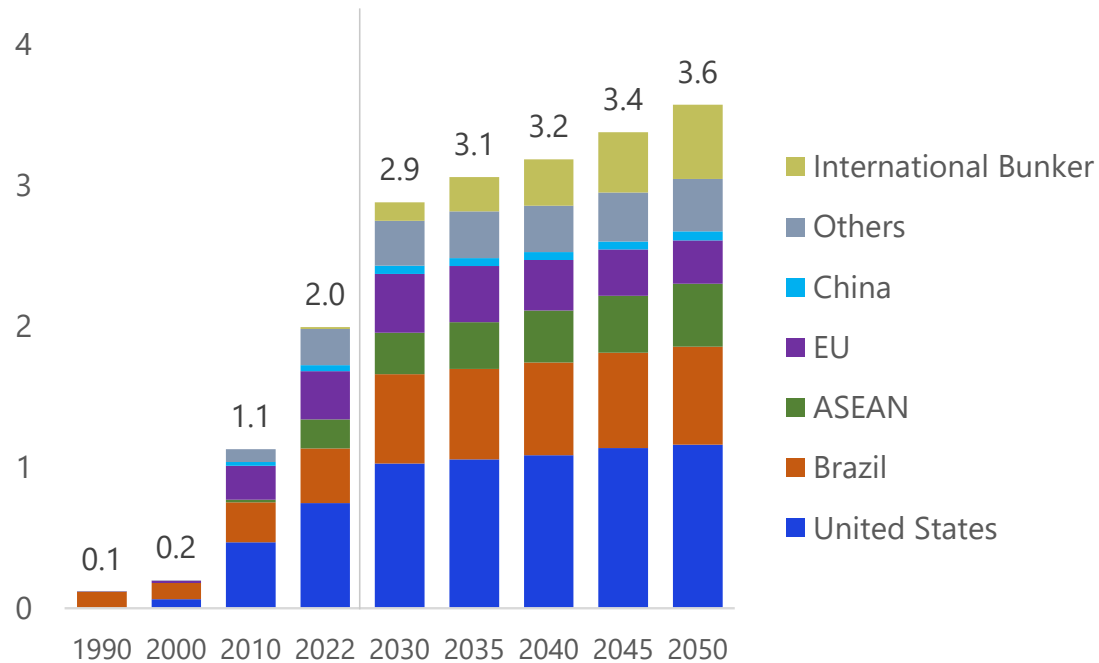


Source : Wards Intelligence.

Liquid Biofuel: Demand Outlook and Supply Potential

Liquid Biofuel Demand Outlook

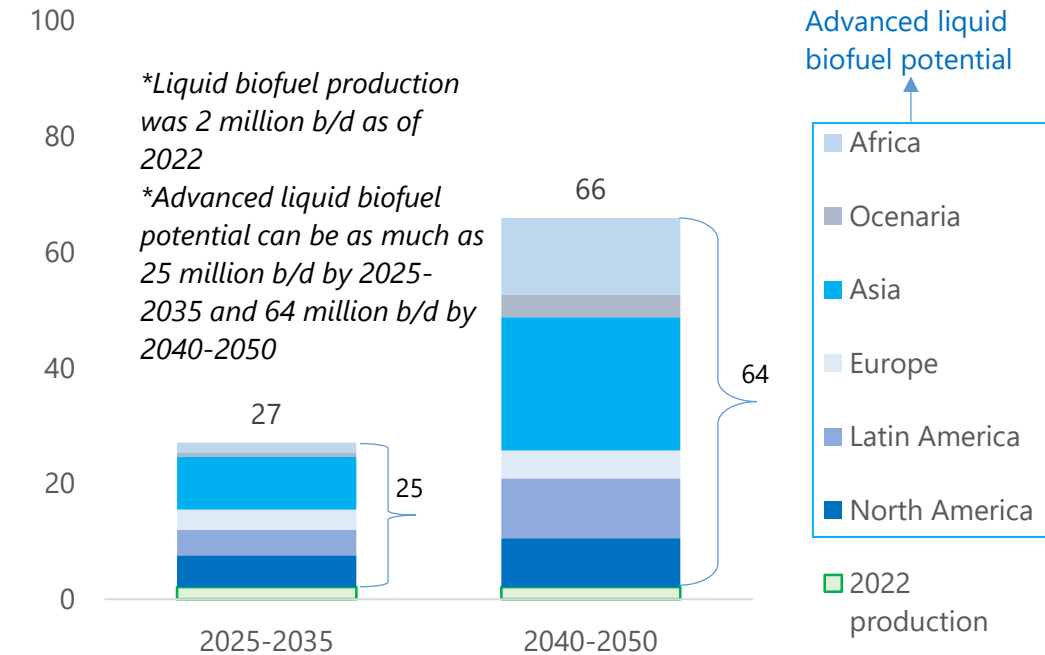
Mil. b/d



*Reference scenario (BAU scenario)
 *Biofuel demand including road transport and others; International Bunker including international aviation and navigation
 *Share of current liquid fuel consumption (2022): road, 78.4%; aviation, 10.2%; navigation, 9.9%; others, 1.4%.

Liquid biofuel supply potential (Second Generation/Third Generation Biofuel)

Mil. b/d



*feedstock for advanced biofuel: solid biogenic residues and waste, agricultural residues, forest residues, non-food energy crops, algae

Issues and Hurdles for Bioethanol/Biodiesel Production

Bioethanol

	First Generation Bioethanol	Second Generation Bioethanol
Feedstock and Production Process	<ul style="list-style-type: none"> Made from biomass that is often used for food, such as corn, sugar cane, and soybeans. Converting the sugars, oils, and starches in the biomass into liquid fuels through fermentation or chemical processes. 	<ul style="list-style-type: none"> A sustainable fuel alternative produced from non-edible plant materials, such as agricultural and forest residues, and industrial wastes. Converting the feedstock into liquid fuels through fermentation or chemical process.
Costs	<ul style="list-style-type: none"> \$0.5 per liter (Production Cost) 	<ul style="list-style-type: none"> \$0.60–\$1.30 per liter (Production Cost)
Hurdles	<ul style="list-style-type: none"> High-concentration direct blending of ethanol poses fuel quality challenges Uneven distribution of raw materials, reduction of collection and transportation costs Use for food as priority Land use changes due to deforestation, etc. 	<ul style="list-style-type: none"> High-concentration direct mixing of ethanol poses issues in terms of fuel quality. Manufacturing costs are high because the development of technologies such as pre-treatment of raw materials and sugar fermentation enzymes is not progressing as expected.

Biodiesel

	First Generation Biodiesel	Second Generation Biodiesel
Feedstock and Production Process	<ul style="list-style-type: none"> Biodiesel feedstocks can come from a variety of sources, including edible oils, non-edible oils, waste vegetable oil, algae, and genetically modified plants. Converting the oils, sugars, and starches in biomass into biodiesel using chemical processes or fermentation 	<ul style="list-style-type: none"> Inedible energy crops, Cultivated inedible oils, Agricultural and municipal wastes, Waste oils, Algae, Lignocellulosic biomass, Field crop residues, and Forest product residues Converting the oils, sugars, and starches in biomass into biodiesel using chemical processes or fermentation
Costs	<ul style="list-style-type: none"> \$0.5 per liter (Production Cost) 	<ul style="list-style-type: none"> \$0.50–\$0.9 per liter (Production Cost)
Hurdles	<ul style="list-style-type: none"> Reducing waste cooking oil recovery costs Clogged filters and piping when using B100 Competition with food Land use changes due to deforestation, etc. How to process glycerin 	<ul style="list-style-type: none"> Securing sustainable raw materials High manufacturing costs

Implications

- ✓ **There is no one size fits all approach in the selection of power train for the decarbonization of the road transport sector.**
 - ✓ Differences in energy resources endowment
 - ✓ Differences in economic development level
 - ✓ Differences in the consumers' choice for travel mode
- ✓ **Various pathways for achieving the carbon neutrality need to be in place to accommodate the changing situations surrounding the road transport sector.**
- ✓ **International cooperation continues to be important to promote the use of biofuels and synthetic fuels.**
 - ✓ Facilitation of dialogue between producers/consumers
 - ✓ Long-term contract between suppliers and consumers
 - ✓ Standardization of carbon accounting methodologies