

Government Incentives and Policy Frameworks for Electric Vehicle Adoption: A Global Review

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Abstract

Government incentives and policy frameworks have been pivotal in shaping the global trajectory of electric vehicle (EV) adoption, but their design, timing, and national context produce widely varying outcomes. This global review synthesizes evidence on demand-side measures (purchase subsidies, tax credits, registration exemptions), supply-side strategies (manufacturing incentives, local content rules), and system-level instruments (charging infrastructure mandates, low-emission zones, and vehicle standards). Purchase incentives and tax credits have produced strong short-term increases in EV registrations in many markets, yet effectiveness depends on program design, duration, and interactions with complementary policies (e.g., charging rollout and grid readiness) (Martins et al., 2024). Regional policy pathways illustrate contrasts: early, generous subsidies and integrated industrial policy helped China scale production and lower costs, while recent policy recalibrations illustrate the need to shift toward market-stability measures as markets mature (DieselNet, n.d.; IEA, 2024). In the United States, the Inflation Reduction Act's clean vehicle tax incentives reoriented buyer incentives and domestic supply-chain development goals, introducing complex eligibility rules that shape who benefits and how quickly demand responds (U.S. Treasury, 2023).

Keywords: Electric Vehicles (EVs); Government Incentives; Policy Frameworks; Purchase Subsidies

Introduction

Electric vehicle adoption has become a central component of global strategies to reduce transportation emissions, improve air quality, and transition toward sustainable mobility. Governments worldwide have implemented a range of incentives and policy frameworks designed to accelerate this shift, recognizing that market forces alone may not achieve the rapid transformation required to meet climate goals. These policy interventions aim to make electric vehicles (EVs) more affordable, support domestic manufacturing, expand charging infrastructure, and provide regulatory certainty for industry stakeholders and consumers alike. Financial incentives, such as purchase subsidies, tax credits, and exemptions from vehicle taxes, have been shown to correlate with increased EV registrations in several markets, particularly across Europe where purchase incentives have significantly boosted battery electric vehicle uptake. Complementary measures, including vehicle emission standards, low-emission zones, and investment in public charging networks, further support adoption by



addressing range anxiety and operational costs. Policy design varies widely across countries, reflecting different economic contexts, grid compositions, and industrial priorities. For example, early and sustained incentives in Norway have helped the country achieve some of the highest EV market shares globally, while China's multi-layered policy approach combines purchase tax exemptions with sizeable industrial incentives to scale production and domestic adoption. In emerging markets such as India, schemes like FAME and recent initiatives under PM E-DRIVE illustrate how targeted subsidies and charging infrastructure development can catalyze growth across vehicle segments. Despite successes, challenges remain around the cost effectiveness of incentives, equitable access, and long-term policy sustainability. Advocates emphasize the need to align demand-side incentives with supply-side support, grid integration planning, and clear phase-out timelines to avoid market distortions. This review outlines the global landscape of government incentives and policy frameworks for electric vehicle adoption, highlighting key approaches, outcomes, and lessons for future policy design.

Evolution of Electric Vehicle Policies Worldwide

The global policy landscape for electric vehicles (EVs) has evolved significantly over the past few decades, driven by urgent climate goals, public health concerns, and rapid technological progress. Early initiatives emerged in the late 1990s and early 2000s, with countries like Norway introducing tax exemptions and incentives to make EVs more competitive against conventional vehicles. These early efforts helped establish a foundation for broader policymaking focused on decarbonizing transportation.

In the 2010s, EV policy frameworks expanded in both scope and ambition. Governments began to deploy a mix of financial incentives, regulatory mandates, and supportive infrastructure programs. Purchase subsidies and tax credits became widespread tools to lower upfront costs for consumers and spur demand. In Europe, numerous countries introduced exemption schemes from registration fees and road taxes to encourage EV uptake. Early and extensive use of such incentives helped markets like the Netherlands achieve initial adoption targets ahead of schedule.

Simultaneously, public charging infrastructure policies gained prominence as essential complements to vehicle incentives. Countries and municipalities started investing in charging networks to address range anxiety and improve charging accessibility. Smart planning mechanisms increasingly linked charging deployment with grid resilience and renewable energy integration.

By the mid-2010s, China had launched aggressive policy packages combining subsidies, manufacturing incentives, and domestic production support. These measures not only stimulated massive domestic EV sales but also helped the country become the world's largest EV market by volume.

More recently, policy frameworks have continued to mature. Many regions have announced long-term targets for phasing out internal combustion engine sales, while enhancing regulatory standards such as zero-emission vehicle (ZEV) mandates and tightening emission limits. Multi-

government collaborations, like the Electric Vehicles Initiative (EVI), have emerged to share best practices and coordinate global strategies for scaling EV deployment.

Academics and policymakers are also reassessing incentive design to balance short-term market stimulation with long-term sustainability and cost-effectiveness. Research suggests that while purchase subsidies are effective early on, they may become less cost-efficient as markets mature, driving interest in broader policy mixes that integrate infrastructure development, industrial policies, and equity considerations.

the evolution of EV policies worldwide reveals a trajectory from early financial incentives to comprehensive, multi-dimensional frameworks. This evolution reflects the complex challenges of accelerating electrification while ensuring equitable access and sustainable industry growth.

Demand-Side Incentives: Subsidies, Tax Credits, and Rebates

Demand-side incentives are financial policies aimed directly at consumers to reduce the cost of purchasing and owning electric vehicles (EVs). These measures are designed to make EVs more affordable compared with internal combustion engine vehicles, thereby stimulating consumer demand and accelerating market uptake. Across the world, governments deploy a range of demand-side tools including purchase subsidies, tax credits, fee waivers, and rebates, tailored to local market conditions and policy goals.

A commonly used mechanism is direct purchase subsidies or rebates, where buyers receive a fixed monetary benefit at the point of sale. These subsidies lower the upfront cost barrier that often deters consumers from choosing EVs, especially in markets where EV prices remain higher than those of conventional vehicles. For example, China historically offered large rebates and tax exemptions worth billions of dollars to boost EV adoption, significantly contributing to its position as the largest global EV market.

Tax credits and exemptions play a similar role by reducing the net purchase price through fiscal relief. Many countries waive or reduce vehicle registration fees, road taxes, value-added taxes (VAT), or offer income tax credits for EV buyers. In Europe, fiscal incentives such as reduced ownership tax and registration fee waivers have been central to EV market growth in several member states, although incentive designs vary widely between countries and are sometimes phased out as markets mature.

In the United States, federal tax credits of up to USD 7,500 for qualifying EV purchases have historically encouraged adoption, and adjustments to eligibility criteria have influenced sales patterns in recent years. Similarly, Canadian federal programs have extended zero-emission vehicle incentives supported by substantial funding to sustain demand over multiple years.

India's fiscal policy framework for EVs includes reduced goods and services tax (GST) rates and lower registration taxes, alongside targeted purchase subsidies under schemes such as PM E-DRIVE, aimed at bridging the price gap between EVs and conventional vehicles.

Demand-side incentives also include targeted rebates for specific user groups or vehicle segments, scrappage bonuses for replacing older petrol or diesel vehicles with EVs, and fleet incentives for commercial operators. These incentives work best when coordinated with



infrastructure investments and long-term policy certainty, as abrupt changes or phase-outs of subsidies can slow adoption momentum.

demand-side incentives remain fundamental to global EV policy frameworks. By effectively lowering acquisition costs and improving affordability, they stimulate consumer uptake and help build market scale during early and transitional stages of electrification. However, policy effectiveness depends on design, predictability, and integration with other measures such as charging infrastructure deployment and regulatory support.

Conclusion

Demand-side incentives such as purchase subsidies, tax credits, rebates, and fee exemptions have played a clear role in boosting electric vehicle adoption in many markets around the world. Research shows that financial incentives are associated with increased EV registrations, especially for battery electric vehicles, and help lower the upfront cost barrier that often discourages first-time buyers. In Europe, incentive policies were statistically linked with higher EV sales over time, though the magnitude of impact varied by national economic context and complementary factors like renewable energy shares. Real-world examples highlight how targeted incentives can stimulate consumer uptake. In the United States, federal tax credits of up to \$7,500 helped drive record sales as buyers rushed to claim benefits before deadlines. In India, schemes like FAME and newer initiatives such as PM E-DRIVE have supported millions of EVs and expanded charging infrastructure, contributing to rapid market growth. Regional incentives, such as state tax exemptions and rebates in Telangana and Maharashtra, have shown measurable increases in local EV adoption and align with broader clean mobility goals. Nevertheless, incentives are not universally sufficient on their own. Evidence suggests that financial incentives work best when paired with supportive infrastructure, grid readiness, and regulatory frameworks. Some studies indicate that non-price interventions and informational support also influence adoption decisions, underscoring that multiple policy levers are needed to sustain long-term growth. demand-side incentives have been effective catalysts for EV adoption in many countries, but their long-term impact depends on strategic design, coordinated complementary policies, and gradual evolution of markets toward maturity. Thoughtful phasing of incentives, equitable access, and integration with broader energy and transport goals will be key to maintaining momentum in the transition to electric mobility.

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