

# POLICY DISCOURSE ON ELECTRIC MOBILITY IN NEPAL

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## ABSTRACT

In recent years, electric vehicles have become an increasingly appealing alternative due to rising fuel prices and commitment of governments from all over the world to reduce pollution and global greenhouse gas emissions. This paper intends to explore the complex network of existing policy barriers that governments at all levels must overcome in order to develop a sustainable and long-term e-mobility strategy. The study not only examines the existing gaps but also uncovers the shortcomings in policies enacted by state and provincial governments of Nepal to promote electric mobility in the country. A lack of top-level commitment, policy coherence issues, and undefined targets for addressing EV challenges are discussed in the paper. Furthermore, this research brings in a global perspective by showcasing impressive instances from nearby countries and world leaders in this field. This analysis may offer valuable insights for policymakers aiming to enhance existing policy gaps.

## KEYWORDS

Electric mobility, Electric vehicles (EV), EV policies, EV Policy Gaps, Greenhouse gases

## INTRODUCTION

The previous century was dominated by fossil fuel powered vehicles due to their ease of availability, low cost of fossil fuel, and government regulations that supported

such companies. It is one of the world's major industries, accounting for around 16 percent of global greenhouse gas (GHG) emissions (Ritchie et al., 2020). The shift to electric mode of transportation has become imperative due to the depletion of fossil fuels, surge in energy costs, environmental effect of fossil fuel powered vehicles and concerns regarding climate change. Reducing greenhouse gas emissions has become a top priority for most developed countries, and many governments have looked to electric mobility as a solution to this issue.

With the completion of mega-projects such as the Upper Tamakoshi Hydropower Project, Nepal has not only achieved self-sufficiency in electricity production, but also a significant amount of surplus electricity remains unused at night. Every day, NEA loses NRs. 40 million due to power wastage (Editorial: Surplus Power, 2021). It needs to come up with a solid plan to increase the consumption of its excess electricity within a short period of time. State policies and programs must be formulated from now on to build the necessary infrastructure for electric vehicles to consume electricity at a larger scale.

Finding a means to substantially reduce greenhouse gas emissions is a primary concern for most countries, and many governments view electric vehicles as part of the solution. Several of the world's largest automakers have already committed to going all-electric between 2025 and 2030. In this regard, the Government of Nepal (GoN), which is also experiencing a rapid increase in the number of vehicles at a pace of 16-17% per annum (DoTM, 2019), is aggressively working towards reducing carbon emissions produced by the fossil fuel vehicles. According to Nepal Rastra Bank (NRB) data, petroleum products alone account for around 15% of Nepal's total import bill. Hence, GoN intends not only to minimize air pollution and its health implications, but also to reduce the budget deficit caused by petroleum imports and to improve energy security. This research is primarily aimed at studying global EV trends as well as the current situation at the national level, along with identifying the underlying discrepancies and contradictions between policy and practice. Furthermore, it also aims to provide appropriate recommendation after analyzing EV-related programs and provisions in existing policies.

## LITERATURE REVIEW

In the past, the majority of transportation methods relied heavily on fossil fuels because they were readily accessible, fuel prices were affordable, and received government backing, leading to about 16 percent of global carbon dioxide emissions (Ritchie et al., 2020). Electric vehicles (EVs) have gained more recognition as a greener option for reducing carbon emissions in the transportation industry. The move toward electric transportation is crucial due to the exhaustion of fossil fuels, increased energy expenses, the environmental impact of fossil fuel-driven vehicles, and worries about climate change (Adhikari et al., 2020; Vassileva & Campillo, 2017). Therefore, countries have implemented a number of initiatives to encourage the use of electric vehicles in view of the urgent need to mitigate climate change. According to Adhikari et al. (2020), countries all over the world have implemented various policies to promote

electric vehicles in response to the urgent need to mitigate climate change. However, these policy approaches differ significantly across countries and lack consistency.

The GoN has issued a number of policies that include provisions related to electric mobility. Implementing these policies as well as identifying and addressing the policy gaps have always remained a challenge. The 'Right to a Clean and Healthy Environment' is one of the fundamental rights ensured by Nepal's Constitution to all its citizens. As a result, the Nepalese government is obligated to adopt relevant policies, legislation, and initiatives to ensure that no individual is deprived of this right. The Nationally Determined Contribution- 2020, is by far Nepal's most concrete policy framework for supporting electric vehicles which had a goal of 90 percent private and 60 percent public vehicle sales being electric by 2030. The Ministry of Forests and Environment (MoFE, 2021) has highlighted a few major e-mobility policies that may be broadly classified into three categories: environment and climate change policies, transportation policies, and fiscal policies.

Policies relating to the environment and climate change include the National Climate Change Policy, 2019, and the National Environment Policy, 2019. The National Climate Change Policy emphasizes on encouraging EVs as well as establishing and implementing a low-carbon emission strategy. It does not, however, offer deadlines or targets for implementing these strategies (Global Green Growth Institute [GGGI], 2018). Similarly, the National Environment Policy is primarily designed to control pollution, promote greenery and manage waste. It also intends to promote clean vehicles such as EVs, hybrid vehicles, and hydrogen-powered vehicles (MoFE, 2021).

Policies relating to transportation include National Transport Policy, 2001, Environment-Friendly Transport Policy, 2014 and National Action Plan for Electric Mobility, 2018. The National Transport Policy aims to make the transportation industry more environmentally friendly by fostering clean-energy-powered electric buses, trams, and mass public transit vehicles, particularly in cities. Similarly, the Environment-Friendly Transport Policy outlines more concrete e-mobility targets, with the goal of increasing the percentage of electric vehicles by 20% by the end of 2020, reducing GHG emissions, and providing finance options for EV infrastructure development (MoFE, 2021). It also argues for bringing in the private sector to invest in advanced technology to facilitate the transition to more sustainable mode of public transportation. In addition to this, National Action Plan for Electric Mobility has classified the barriers to EV promotion into four major categories: policy and governance, infrastructure and markets, financing and resources, and data and monitoring barriers (GGGI, 2018). Despite being a comprehensive plan, it lacks a clear timeline and investment strategy. The ministries that were initially involved in the plan's preparation appear unwilling formulation appear hesitant to allocate budgetary resources needed for its execution (MoFE, 2021).

Furthermore, the Fiscal policy and National budget 2021/22 have not only declared more favorable taxes with the goal of promoting EV sales, but also announced

customs duties on EVs based on battery capacity. However, it would have been far better if it had discouraged the import of expensive and luxurious EVs costing millions of rupees by imposing a higher tax rate and encouraged the use of inexpensive 2-wheelers used by majority of middle income families and large public vehicles. The fiscal policy has also decided to reduce the tariff for charging of EV, increase the loan-to-value ratio for personal electric vehicles to 80 percent and impose additional pollution tax on fossil fuel (GGGI, 2018).

### **Existing Policy Gaps**

The federal and provincial governments in Nepal have developed EV related policies, which are often reflected in sectoral policies for transportation, energy, and the environment. Furthermore, GoN has also developed Nationally Determined Contributions (NDC), National Action Plan for Electric Mobility for promotion of EV. However, its implementation is ineffective, as indicated by the sluggish deployment of EV across the country (MoFE, 2021).

Absence of directives and legislations governing E-mobility.

The Environment Friendly Transport Policy includes provisions and targets for EVs, some of which are also included in the Nationally Determined Contributions. However, the government has yet to make supportive laws, directives, and procedures for policy implementation. This clearly reflects a lack of executional clarity.

### **Lack of coordination among key stakeholders**

After reviewing different underlying policies related to E-mobility, it became obvious that EV promotion is not the responsibility of a single authority. For example, Nepal Electricity Authority (NEA) announced plans to establish charging stations in major cities and highways, but has yet to put those plans into action due to lack of coordination with other government departments. Hence, there must be effective coordination among different departments of the federal government, provincial governments as well as the private sectors. The existing policies and action plans have already advised that coordination committees be constituted at federal level (GGGI, 2018; MoFE, 2021). However, this has not yet materialized.

### **Lack of ambitious targets**

While multiple policies have been devised to promote EVs, and we still lack a specific electric mobility plan, the aims in the various policies differ and are unclear. For example, the Environment-Friendly Vehicle and Transport Policy states a target of 20% EV by 2020, yet the 2016 NDC mentions a 20% growth in EV by 2020 compared to 2010 (GGGI, 2018; MoFE, 2021). The NDC target appears to have been easily accomplished, given there were not even 2000 registered EVs in 2010 and 20% of which only accounts for 400 extra EVs on the road.

## **Absence of policy for conversion of fossil fuel vehicles to EVs**

There is absence of policy to incentivize the conversion of fossil-fuel vehicles to electric vehicles in absence of policy for conversion of fossil fuel vehicle to EVs. There is no specific policy in place to encourage the modification, adaption, or conversion of fossil fuel vehicles to electric vehicles. This mainly includes the re-registration process and underlying charges of vehicles being converted to electric; the quality, safety standards and performance parameters of such modifications or hybridization.

It has been seen that the US government has been providing upto 10% of conversion cost up to a maximum of USD 4000 for converting a fossil fuel powered vehicle to plug-in hybrid or electric vehicle. Similarly, the Indian government intends to introduce Hybrid Electric Vehicles (HEV) retro fitment kits, which might greatly increase the fuel efficiency of gas-guzzling old fossil-fuel vehicles by converting them to EV, a greener option. For this purpose, it is going to select a particular type of vehicle fleet (say 3-wheeler autos) and encourage them to convert themselves to electric by providing required incentives.

## **Absence of dedicated electric mobility plan**

While several policies have been developed to promote E-mobility, none of them have been designed solely to solve the majority of the underlying challenges associated with electric mobility. A policy similar to FAME, proposed by the Indian government, is required. Such a policy should be aimed towards at initiating and implementing programs and activities including necessary subsidies or schemes, as well as offering concrete action for achieving policy goals and targets.

## **Reluctance of the relevant authorities to develop regulatory mechanism for pricing of EV**

Despite significant reductions in customs duty and exemption from other taxes, electric car prices in Nepal are significantly higher. EVs in Nepal are priced two to three times higher than in neighboring countries. Because of their high price, electric vehicles are often regarded as luxury items and is beyond the imagination of middle class customer. Hence, reducing consumption undermines a greater goal of developing electric transportation. Development of pricing framework and governance of EV retailers by appropriate authorities is required.

## **Inadequate political commitment**

Transforming policy into action necessitates a consistent political and legislative effort. However, Nepal's unstable government and political structure has resulted in poor political commitment. It is often noticed that the urgency and necessity for E-mobility legislation is recognized only in emergency situations such as fuel supply shortage, embargo, and increased air pollution in major cities (GGGI, 2018).

## **Theoretical framework underlying adoption of electric vehicles**

This paper tries to examine the consumer adoption of EVs through the lens of

Rational Choice Theory. According to this theoretical framework, human activities and behaviors are motivated by a desire to maximize benefits and utility, as individuals make decisions based on their self-interest in order to achieve optimal outcomes (Bobeth & Kastner, 2020). This perspective provides valuable insights into the motivations underlying consumer decisions to adopt EVs, as it assumes that individuals are rational actors who carefully consider the costs and benefits of their actions, taking into account factors like preferences, constraints, and information availability.

Zhang et al. (2011) asserted that the adoption of EVs by consumers can be largely interpreted as a rational behavior guided by the principles of Rational Choice Theory. This perspective suggests that consumers engage in thorough evaluation of the potential benefits and drawbacks associated with adopting EVs when compared to conventional fossil fuel vehicles. Zhang further stated that while making decisions, consumers take into consideration various factors, including the potential cost savings over time, the environmental implications of their choice, and the technological advancements that EVs offer. By carefully weighing these factors, consumers aim to make informed decisions that align with their individual preferences and overall well-being.

Furthermore, Rezvani et al. (2015) extend this view by highlighting key factors that influence consumers' attitudes towards electric cars. One significant factor is the impact of government-provided tax incentives and financial rewards. These incentives can sway consumers' decisions by reducing the initial cost barrier associated with purchasing EVs. Moreover, the technological aspects of EVs, including their range and speed capabilities, play a crucial role in shaping consumer perceptions. Consumers often assess whether EVs meet their practical needs and lifestyle preferences. Additionally, the cost-effectiveness of EVs compared to their fossil fuel counterparts, in terms of maintenance and fuel expenses, is a pivotal consideration for prospective adopters.

## METHODOLOGY

The methodology for this research involved a systematic approach that commenced with an extensive literature review covering journal articles, reports, government policies, and newspaper articles relevant to electric mobility in Nepal. Database searches were carried out on platforms such as Google Scholar, Nepjol, and MDPI, using keywords such as "electric mobility and/or EV policy." These keywords were chosen to generate a broad spectrum of information. Data screening focused on materials directly related to barriers against EV use and policies related to electric mobility. Only resources directly related to electric mobility, as well as those referring to Nepal, India, China, and the European Union, were included. Similarly, government policies, papers, and reports pertaining to transportation, climate change, Nationally Determined Contributions, and financial policies were reviewed. Newspaper articles were also analyzed to gain an understanding of the overall discourse surrounding electric mobility in Nepal. Furthermore, the Nepal Public Policy Review was examined as it plays a pivotal role in understanding the influence of government policy on Nepal's electric mobility environment. Finally, ethical standards were maintained by following

copyright and ethical guidelines throughout the research.

## **Best Practices in Other Countries**

### **India**

The Indian government has come up with a comprehensive program for electrification of transportation through FAME I & FAME II schemes (Faster Adoption and Manufacturing of Hybrid & Electric Vehicles I and II). Besides, it has also provided financial incentives like reduction of 5% Goods and Services Tax (GST) on EVs, and tax exemption on interest payments on bank loans for EVs (Kanuri et al., 2021). FAME I focused mainly on technological development, demand creation, pilot projects, and charging infrastructure installation. Similarly, FAME II, which was launched in 2019 with a budget of INR 100 billion, had clearer and more defined targets. The majority of the budget was allocated for demand incentives for EV purchase, mostly for public vehicles, while the remaining budget was for installation of charging infrastructure (Press Trust of India, 2021). The Indian government intends to provide incentives based on the battery capacity and nature of the vehicles, which means that larger public buses will receive more financial incentives than private two-wheelers.

Apart from the Central government, the State governments have also implemented ambitious policies and programs to accelerate the adoption of electric mobility in their states including electrification of entire fleet of government owned vehicles and building of charging infrastructures along the major highways (Kumar & Singh, n.d.). In addition to this, Kanuri et al. (2021) further state that, these schemes, incentives are provided to encourage the usage of electric vehicles and can be broadly classified into three categories; customer demand incentives, charging infrastructure incentives, and industry incentives.

### **China**

China, which intends to phase out conventional fossil-fuel vehicles by 2035 and replace them with eco-friendly vehicles, has the largest market share of around 45 percent of all EVs (Virta Global, 2021). China is by far the greatest producer and buyer of electric vehicles. Its dominance in the EV market is primarily due to the Chinese government's substantial support for this industry in the past decade. To meet its ambitious objective of 5 million EVs by 2020, China has imposed EV quotas on vehicle manufacturers and importers, provided subsidies and tax incentives to manufacturers and customers, and promoted the installation of EV charging stations. Furthermore, the Chinese government mandated in 2016 that half of all new vehicles purchased by China's Central government be electric vehicles within five years (Erdenebileg, 2016). Public procurement can be considered as a crucial step in encouraging the general people to switch to electric vehicles.

### **European Union**

The European Union has set an ambitious goal of becoming a carbon-neutral continent by 2050. The EU aims to have at least 30 million electric vehicles on the road

by the end of this decade, indicating a significant increase from the current 1.4 million EVs on European roads. To meet this goal, it will issue several new legislatives related to electric mobility in the coming years (Virta, 2021). According to Biresselioglu et al. (2018), the EU intends to boost electric mobility by forcing car makers to produce low-emission vehicles and to build extensive charging infrastructure. Additionally, its unique 750 billion euro stimulus package, intends to spend 20 billion euros to stimulate EV sales and the installation of one million charging stations by 2025. Ortar and Ryghaug (2019) further emphasized that aside from financial incentives and tax exemptions, EU countries such as France, Sweden, and Norway have implemented a tax scheme in which polluting vehicles pay a surcharge based on their CO<sub>2</sub> emissions level, while clean vehicles receive rebates. It seems that these nations have taken a proactive stance by implementing a tax structure which not only penalizes vehicles emitting higher levels of CO<sub>2</sub>, aligning with the principle of discouraging pollution, but also rewards environmentally friendly choices through rebates for clean vehicles.

### **Takeaways from International EV Policies**

The international landscape of electric vehicle (EV) policies offers some valuable insights that can be employed in determining effective strategies for promoting sustainable mobility worldwide. Firstly, public procurement or electrification of government-owned cars within a specified time frame, as successfully implemented by China and the Delhi state government, sets a valuable example for the wider market and highlights the significance of government leadership in promoting EV adoption.

Additionally, governments aiming to achieve ambitious EV adoption targets should consider imposing EV quotas on vehicle manufacturers and importers, emulating the Chinese model. This strategy, when combined with manufacturing subsidies and tax exemptions, incentivizes the industry to transition towards electric transportation (Zhang et al., 2011).

Moreover, it is apparent that the general public's adoption of electric vehicles has fallen short of expectations due to insufficient charging infrastructure and the range anxiety (Adhikari et al., 2020). To overcome these obstacles, governments may consider implementing specific program to build a dependable and robust charging infrastructure ecosystem, drawing inspiration from China, India and various European countries.

Furthermore, the government should prioritize financial incentives for affordable modes of transportation, such as mass transit and two-wheelers favored by the working class. Implementing a subsidy scheme, similar to India's FAME II scheme, with direct payments to customers' bank accounts after vehicle purchase is recommended.

Finally, leadership commitment remains pivotal for policy implementation. The incorporation of EV policy in Norway's Climate Agreement by political parties demonstrates how high-level support can bring about substantial change. Similarly, China and India also demonstrate a high degree of top-level commitment to EV promotion (MoFE, 2021). These key findings highlight the importance of an integrated



approach that combines legislative measures, infrastructure development, financial incentives, and constant political support to successfully transition towards a sustainable EV future.

## **POLICY OPTIONS AND RECOMMENDATIONS**

### **Development of human resources**

In Nepal, there are only a few technical people who are proficient at servicing and repairing electric vehicles. As a result, the extent of EV adoption and business investment is limited. Periodic manpower projection is required by defining the skills required for electric vehicle maintenance and producing workforce accordingly. This requires CTEVT capacity enhancement via strategic planning, new curriculum creation, and trainings for people needed for EV maintenance.

### **Designing EV specific curriculum**

GGGI (2018) mentions that the curricula designed by most of the Nepalese universities for their engineering schools and colleges do not include EV engineering. There are also no specialized programs or training courses available for EVs. This has reduced chances for future engineers looking to learn new skills, while also being a possible barrier to EV adoption.

### **Imposing EV quotas**

The government should set specific EV quotas on vehicle manufacturers and importers, specifying what percent of their overall imports should be comprised of EVs. In addition, a framework should be developed to penalize fossil fuel vehicle manufacturers and importers if they fail to reach their quota. This had effectively brought into action by the Chinese government since 2010.

### **Development of a specific electric mobility plan**

While several policies have been devised to encourage E-mobility, none have been designed specifically to address the majority of the underlying issues related with electric mobility. A concrete policy should be developed that incorporates the majority of the unresolved aspects of E-mobility challenges. A policy similar to that proposed by the Indian government, FAME I and II, would be pertinent in Nepal as well. Such a policy should aim to initiate and implement programs and activities that include providing subsidies or schemes for EV manufacturers, for developing EV infrastructure and monetary subsidies to EV customers.

### **Legislation for the development of a robust ecosystem of charging stations**

Infrastructure for charging in public spaces, large cities, and roads is vital for EV promotion. Along with government efforts, it demands the involvement of the private sector to build infrastructures at such a massive scale. To attract private investors, it is critical to develop supportive policies, directives, and procedures pertaining to investment mechanisms as well as EV charging rates in private charging stations.

## CONCLUSION

The paper provides a comprehensive analysis of the policy discourse surrounding electric mobility (EV) in Nepal. It highlights various policies related to EVs and categorizes them into environment and climate change policies, transportation policies, and fiscal policies. Despite the presence of these policies, this paper identifies significant gaps in their implementation and design, hindering the effective promotion of electric mobility. These gaps include the absence of supportive laws, lack of coordination among stakeholders, inadequate target setting, absence of policies for converting fossil fuel vehicles to EVs, lack of a dedicated electric mobility plan, reluctance to develop pricing mechanisms, and inadequate political commitment.

As the initial stages of policy formulation are navigated, a substantial need emerges for the development of policies at all levels of government. The present moment calls for the initiation of a concrete EV policy that not only addresses current needs but also aligns with the government's long-term objectives. It is important to acknowledge that challenges have been encountered by both developed countries and neighboring nations during the implementation of their existing policies. For instance, the Indian government faced criticism for its inability to fully achieve the targets set by FAME I, leading to an extension of deadlines for FAME II to demonstrate progress. In light of such experiences, maintaining a positive outlook towards evolving policies and the government's commitment to addressing EV adoption challenges remains crucial.

Moving forward, it is essential to retain a positive attitude on the availability of dedicated policies and a certain amount of government commitment aimed at overcoming the barriers to EV adoption. However, the way forward does not only involve providing financial incentives to purchase electric vehicles. Instead, the emphasis should be on developing a comprehensive and long-term investment strategy that considers future possibilities and developments. Similarly, the government should also undertake essential initiatives, including the electrification of all school buses and mass transportation in major cities, the transition of government office vehicles to electric, and even the initiation of an ambitious project aimed at establishing an electric train network. By prioritizing effective policy implementation and taking inspiration from successful global models, Nepal can position itself for a cleaner, greener transportation future.

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