

# Comparison of Activities for the Wider Implementation and Development of Electromobility in Iran and Poland

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**Abstract** - One of the directions of change in the current transport systems is to reduce dependence on fossil fuels. The transformation process is long-term and requires a number of actions to encourage change, both at the infrastructure and organizational level. The article deals with the problem of the development of electromobility in cities. The analyzes concerned two selected countries - Iran and Poland. In both cases, a list of actions taken at the national level was made. Finally, the main barriers related to the implementation of mobility on a larger scale were identified.

**Keywords:** electric vehicles, electromobility, charging stations, policy

## 1. Introduction

Electrification has been widely considered as a viable strategy for reducing oil dependency and decreasing the negative environmental impacts of road transportation. The above lead to the advent of new areas of research in Transportation Engineering as of which the study of Electric Vehicles (EVs) is one of them. EVs are being seen as one of the most effective tools in reducing air pollution resulting from the transport sector [1]. These vehicles are said to be capable of reducing emissions; hence, improving public health, reducing ecological damages generated from the transport sector, and helping towards achieving sustainable mobility. EVs can also help increase energy security, improve fuel economy, and lower fuel costs on the transport fleet. However, the environmental impacts of the introduction of EVs are yet to be identified.

The article presents the results of a study of the review of strategic documents and actions taken in two selected countries - Iran and Poland.

## 2. Discussion

### 2.1. Electromobility and Iranian Policy

Despite advancements in the science and technology of transportation, the vast majority of the cars still rely on fossil fuels and which results in releasing a significant amount of emissions to the air. A feasible solution to this conundrum would be facilitating the adoption of renewable energies that produce near-to-zero emissions. In this regard, the life-cycle analysis of the CO<sub>2</sub> emission for EVs demonstrates that these vehicles, on average, emit less CO<sub>2</sub> over their lifetime than the diesel cars [2]. Therefore, EVs could be considered as a viable option for replacing the old oil-reliant technologies of the motor industry with zero-emission emerging technologies; hence a number of investigations have been conducted in this regard.

Several models of hybrid passenger cars (most prominently from Toyota, Lexus and Hyundai) have been cleared for import into the Iran. There is no exact figure of all hybrid cars that have been registered to date. However, the overall share of imported vehicles has not been significant, with 5,500 announced as having been imported in the period between March and December 2017, equalling 0.05% of the total number of imports. Often cars that have been brought into the country have not been registered.

Electric motorcycles are slowly making their way into cities like Tehran and Esfahan following incentives offered by municipalities. In this case too, the exact number of registered vehicles is unclear. In some of these cities, pilot projects for electric vans and mini buses have also been launched. Plans to introduce EV taxis and buses have been announced, but are still not implemented. Also, MAPNA Group launches Iran's first electric vehicle charging station at Tehran's iconic Milad Tower, in an area of 700 square meters. The station includes a 43-kW AC charger - applicable to standard electric vehicles- and a fast charger working under CHAdeMO protocol which suits Japanese and Korean EVs such as KIA, Nissan, and Mitsubishi [3].

Several pieces of legislation and directives contain provisions that directly or indirectly impact the importing, manufacturing and use of EVs, but there is no legislation that specifically deals with them. Because EVs are still a novel concept in the Iranian market. In addition to the common global challenges of the EV market, i.e. the need to develop diverse technologies in power equipment, electric motors, control system, and batteries, development of the required infrastructure for recharging these automobiles is a key concern.

The Cabinet of Ministers has requested the Ministry of Industry (MoI) to prepare an action plan for manufacturing and importing EVs. The MoI subsequently introduced a plan for manufacturing EVs that prioritised the public transport fleet, and set a three-phase project for passenger vehicles to be manufactured on new and existing platforms. But, EV import tariffs – are a significant factor as they are among the few incentives available – they are also set by the Cabinet [4].

There are several entities that play a role in the deployment of EVs in Iran:

- Department of Environment – the organisation with the general mandate to promote environmental-friendly technology and improve air quality. It is responsible for setting emissions standards and for proposing and implementing financial incentives for EVs.
- The MoI – plays a key role in regulating both the importing and manufacturing of EVs, including supporting and incentivising the major manufacturers.
- The Ministry of Energy – along with its affiliates, is responsible for supplying and regulating the supply of power to EVs. Current projects include providing the infrastructure for charging stations.
- Municipalities and city councils – can and in some cases have used their authorities and funds to offer incentives for EVs. They also play a role in increasing the use of EVs in the public transport fleet of urban areas.
- Universities and research institutes – have been active in research and design projects for EVs. The Power Research Institute (overseen by the MoI) has established a department dedicated to EVs. The institute conducts and supports research, and has been working on standard guides for EVs and their parts – the lack of which is a contributing factor for not registering EVs – and charging stations. The institute introduced a 10-year projection that foresees 2,500 charging stations, 1.2m electric cars and 600,000 electric vehicles to be in use by 2025.
- Local manufacturers – play a role by taking steps to design and manufacture EVs.

In addition, some committees and working groups have been established to facilitate coordination among various ministries and governmental organisations.

## **2.2. Electromobility and Polish Policy**

Also in Poland, actions are taken to facilitate and accelerate the implementation of electromobility in urban areas. Selected of main policy documents related to electromobility in Poland are listed below:

- Electromobility and Alternative Fuels Act of 11th January 2018 (JoL of 2018 item 317)
- Electromobility Development Plan in Poland
- National Policy Framework for Alternative Fuel Infrastructure

In particular, the law act on electromobility and alternative fuels had a significant impact on the development of electromobility. From one side this document clear described requirements for cities related to develop plans for charging stations. The city authorities have been obliged to install a certain minimum number of charging points by the end of 2020 (Act 60.1) [5]:

- 1) 1000 – in municipalities of more than 1,000,000 inhabitants and at least 600,000 cars registered and at least 700 cars per 1000 inhabitants;

- 2) 210 – in municipalities of more than 300,000 inhabitants and at least 200,000 cars registered and at least 500 cars per 1000 inhabitants;
- 3) 100 – in municipalities of more than 150,000 inhabitants and at least 95,000 cars registered and at least 400 cars per 1000 inhabitants;
- 4) 60 – in municipalities of more than 100,000 inhabitants and at least 60,000 cars registered and at least 400 cars per 1000 inhabitants.

The act also specifies the minimum share of electric vehicles in the public transport fleet for the following years. This resulted in significant changes in the fleets of public transport operators. The remaining documents contain reports on the current state and a vision of the future in this regard [6]. There were also, among others, simple algorithms that facilitate the local authority to estimate the minimum number of charging stations [7].

Currently, 1,425 charging stations are installed in Poland, which gives 2,780 charging points [8]. Although there has been a significant increase compared to a few years ago, this is still a shortage.

In the first quarter of 2019, a total of 4,987 electric passenger cars were registered in Poland. A year later, 11,132 such vehicles were already registered. In turn, in the first quarter of 2021, 22,291 electric passenger cars are registered in Poland [8]. This is a clear signal that the actions taken are working.

### 2.3. Identified problems

In the case of both countries (Iran and Poland), similar barriers can be identified, due to which the development of electromobility is not happening fast enough. The barriers include, among others:

- Lack or insufficient infrastructure in the form of charging stations. This causes difficulties in making longer travels
- High price of electric vehicles. In the case of Poland, subsidies are introduced, but they are small in relation to the total amount
- Lack of tools to facilitate travel planning with the use of an electric passenger car.

### 3. Conclusion

The Iranian government has been working on developing and implementing plans to facilitate and encourage the use of EVs in the country for several years. With air pollution in larger cities increasingly becoming a national crisis, the motivation to speed up these plans has increased. However, numerous challenges have meant that, with very few exceptions, plans to increase the share of EVs in the market or in the public transport fleet remain unrealised.

The specific implementation dates for specific actions, including the location of the basic charging station system in large cities, or the share of electric car buses in the operator's fleet, have made electric cars increasingly visible on Polish roads. However, the article highlights several barriers that still need to be overcome in order to achieve a faster pace of changes in the field of electromobility development.

This study aims to display facilities, infrastructures and developments of EVs in Iran and Poland, especially in large cities with high traffic density and population. Using a proven pattern and identifying the required of EVs on the street, the study could minimise the amount of air pollution, costs, and traffic congestion. The results of this study would also encourage public individuals, and the related legislators and government agencies to shift from personal transportation to electromobility while creating a positive impact on the environment and society.

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