

# **Electric Vehicles in Egypt Challenges and Opportunities; a Detailed Investigation**

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**ABSTRACT:**Electric vehicles market in Egypt started emerging since the allowance of electric powered vehicles import in early 2018, still several challenges are forming an obstacle towards any potential buyer or investor. At the same time there are several opportunities that can be used to make Egypt one of the biggest electric vehicles market in the middle east and northern Africa area. This paper presents in details the main challenges and opportunities and aim to propose recommendation that can be sought to resolve all present obstacles and utilize all opportunities in favour of expanding electric vehicles market in Egypt.

**KEYWORDS:**Electric Vehicles, Egypt, Charging Protocols,

## **I. INTRODUCTION**

In the past few years, electric vehicles market expanded dramatically all over the world [1]. This is particularly due to the numerous advantages that electric vehicles offer when compared to their counterpart fossil fuel [2,3] operated ones such as zero carbon emissions, very low operating and running cost, rare maintenance, high performance, and pleasant driving experience they offer. Countries such as the United States of America, Japan, China, and Norway are leading the electric vehicles market with highest share of non-fossil fuel-based vehicles already running in their streets as shown in Fig.1 [4,5]. The main reason is that they are already presenting a lot of incentives [6-9] for consumers to encourage them to buy electrically powered cars in favour of fossil fuel-based vehicles. With the start of year 2018, the Egyptian government represented by ministry of trade and industry, announced that Electric Vehicles can finally be officially imported to Egypt [10,11] with only one constraint; manufacturing date cannot be older than three years. This decision was the first initiative from the government in this sector allowing the presence of electric vehicles in Egypt on both personal importing and trade importing forms. In addition, the government announced that electric vehicles will not be subject to any custom duties and will only pay the added value taxes. This step was the main incentive for importers and resulted immediately in electric vehicles appearance in the Egyptian streets and market for the first time. Although there are several opportunities that increase the chances of electric vehicles success in Egyptian market, still there are a lot of challenges facing the anticipated wide spread of electric vehicles in Egypt. This paper aims on presenting challenges and opportunities of electric vehicles in Egypt along with authors recommendations to overcome all challenges.

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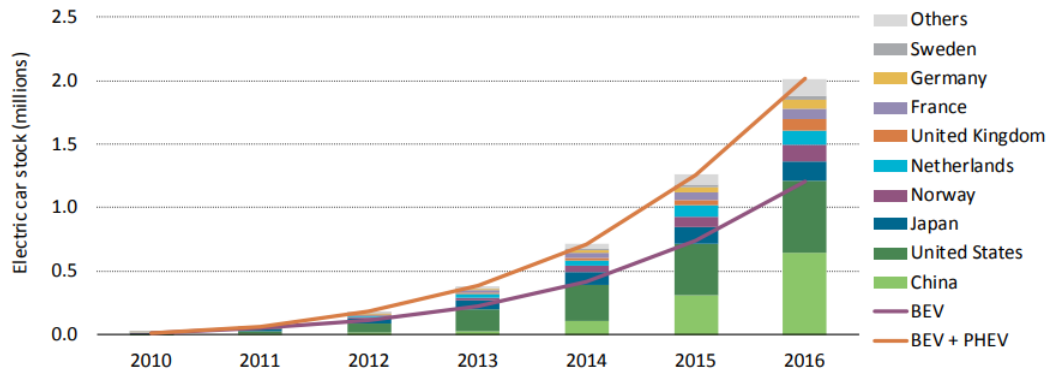


Fig.1.Global Electric Vehicles statistics 2010 – 2016.

## II. CHALLENGES

Several obstacles are currently preventing the expansion of electric vehicles market share in Egypt, in this section some of these challenges are presented.

### Absence of clear Licencing criterion:

Although the government already allowed the importing of electric vehicles in Egypt, currently users of electric cars are struggling to register their cars and issue driving licences to them as electrically powered vehicles. The only option for electric car drivers is to register their cars by comparing electric motor power to counterpart fuel powered engine. This means that electric cars are licenced as a fossil fuel-based car but with much higher registration fees as electric vehicles motors are much more powerful than conventional cars, thus they fall in high tax categories when this unfair comparison is used. The main reason of this is that the ministry of trade and industry did not have proper organization with ministry of interior which controls traffic regulations before issuing the decree of electric cars importing.

### Legalization and Transfer of ownership:

In a similar manner, almost one year passed on electric vehicles importing ability in Egypt with absence of legalization or transfer of ownership ability. This means that any owner of electric car can not sell or transfer his ownership to another person, and this clearly affects the market of electric vehicles in Egypt. Further coordination between the ministry of trade and industry and the ministry of justice should have been carried out before allowing cars importing.

### Absence of strong charging network :

Although hundreds of electric cars are flowing in Egyptian streets today, still no clear steps taken by the government to expand the very limited electric cars chargers' network currently available. Surprisingly, the electric charger's sector is handled completely by one single private company with limited resources. Such obstacle discourages people from owning electric cars as their driving range anxiety will increase. The government should have arranged with Egyptian Ministry of electricity and renewable energy ahead to have at least an announced plan of where and when chargers are being installed.

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### Charging protocols and standards:

Currently, most of electric vehicles in Egypt are imported from the United states of America, this is due to the fact that used electric vehicles market prices are significantly low in comparison to other markets such as Europe. Another fact is that American market offers famous and well trusted car brands in compared to other Asian markets. These cars are built according to the j1772 American electric vehicles standard [12]. On the other hand, available electric vehicles chargers in Egypt are built to European standards IEC 62196. As a result, most of car owners are struggling to charge their vehicles in the available DC fast charging network as type2 combo (CCS2) plugs are available which does not fit their cars as they are manufactured for type1 combo plugs (CCS1). Fig.2 shows difference between the two standards.

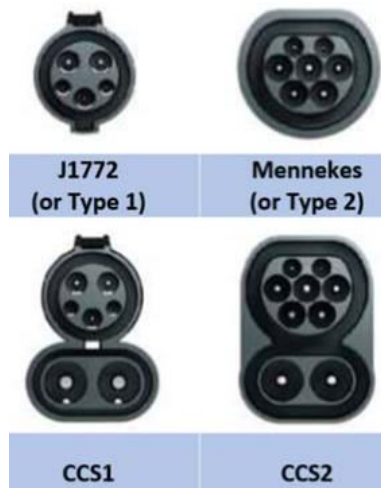


Fig.2.Charger plugs US J1772 standard vs EU 62196 standard.

In addition, other charging standards are available such as Chinese GB/T and Japanese CHAdeMO. Which means with the expansion of the importing market many more obstacles may appear in the electric vehicles charging process.

### Maintenance and spare parts:

As electric vehicles are new to Egyptian market, still maintenance and repairing expertise is missing. Vehicle's owners depend mainly on the fact that most currently available electric vehicles have similar models running on fuel, which means that the need of any spare part aside from the drive train and battery may be covered easily. However, the fear of breakdowns due to malfunction in the battery or powertrain systems, that may not be easily repaired repel potential buyers from taking this step.

### III. OPPORTUNITIES

There are many important factors that need instant attention from the government, as they may form excellent opportunities to increase the electric vehicle market dramatically in Egypt. This will be discussed in detail in this section.

### Awareness:

Until now most of the population does not know that electric vehicles importing, and ownership is allowed. Furthermore, most of the population is ignorant with all electric vehicles environmental and economic advantages when

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compared to their fuel-based counterpart. Increasing electric vehicles awareness will directly influence the size and share of electric vehicles market in Egypt.

### Electricity reserve:

Egypt is currently producing electricity more than its needs with a significant amount of electrical reserve. Expanding the electric vehicles market will save a lot of fossil fuel and make use of such wasted electrical reserve. Ministry of electricity and renewable energy should take into consideration the electric vehicles market in current and future load forecast plans.

### Incentives:

The only available incentive is zero customs duty presented by ministry of trade and industry. This does not offer enough encouragement to population to own the new technology. The government should present more incentives to attract both direct buyers, investors and car dealers to purchase electric vehicles.

The successful trials of leading market countries should be used as a reference when it comes to incentives to encourage future buyers. [7-9]

### Weather:

Electric vehicles suffer from short battery lifetime in extreme high temperatures and suffer from low driving ranges in extreme low temperatures. Fortunately, Egypt has an all year long moderate weather which in turn eliminate electric vehicles temperature problems and encourage population to buy it if they are educated. Fig.3 show that average temperature has remained between 20 to 30 degrees Celsius for more than 100 years in Cairo, Egypt.

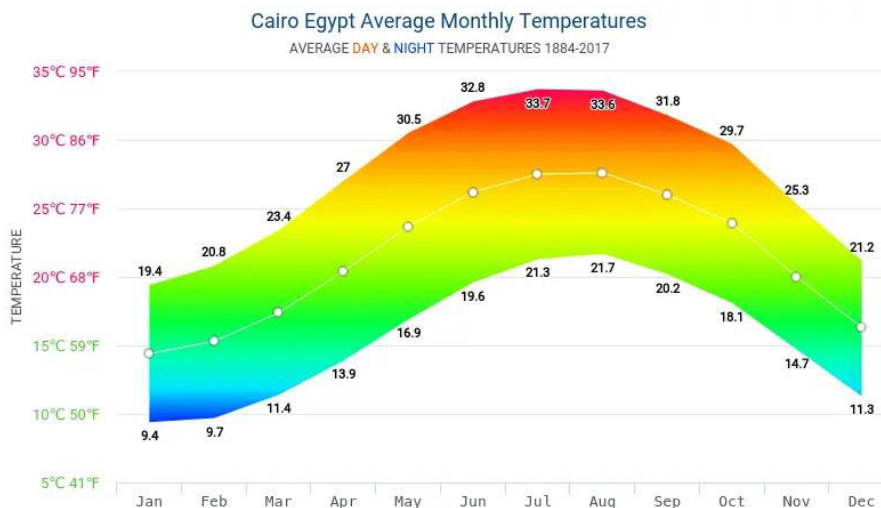


Fig.3.Cairo, Egypt average monthly temperature all over the years.

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## IV. DISCUSSION AND RECOMMENDATIONS

After reviewing some of the main challenges and opportunities, in this section authors recommendations are presented.

The government should work closely with all relevant ministries to immediately resolve the licencing and legalization problems. Such problems should not exist in first place since the importing process was allowed. As all information of imported vehicles is available at government hand, a detailed survey should be carried out to find a solution for various charging protocols available and to decide which ones deserve to be used in charging stations serving most of the electric vehicle population.

A detailed plan for future charging stations should be set at once to give users future proof sight. Investors may be sought to make partnerships with ministry of electricity and renewable energy to expand the charging stations network rapidly and efficiently.

The government should use policies such as the one used in California state many years ago and force the cars dealers to offer electric vehicles for sale otherwise, they would face big financial and legal penalties. This in turn will force car dealers to train their employees on electric vehicles maintenance and import spare parts. Big public advertisements should be utilized by the government to increase population awareness towards the advantages of owning electric vehicles and facilitate the process of owning them. Finally, more incentives such as zero registration taxes, incentives as share in vehicles purchase price, discount on annual federal taxes, discounts on public charging fees, discounts on public parking fees. etc.

## V. CONCLUSION

Expanding electric vehicles market has numerous advantages to the government, where carbon emissions can be decreased and dependency on fossil fuel can be minimized. The fact that Egypt currently has a stable electric grid with good amount of electric reserve is one another factor that urges the government to put all its efforts towards transforming the main portion of the transportation segment into electricity based instead of the currently available fossil fuel based one. This will happen only by taking into consideration the real-life constraints and challenges that face electric vehicles owners and investors and resolving all of these matters. Several challenges proposed in this paper can be resolved instantly by just setting proper laws and regulations. Some other challenges need more integrated work between different ministries. In this paper, authors presented direct recommendations on how such challenges can be removed. Finally, authors highlighted potential opportunities that are available in Egypt and can drive the electric vehicles forward if properly utilized. Authors believe that if such recommendations are practically realized, the electric vehicles market in Egypt will rise dramatically as it happened earlier in other leading markets.

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