

ENGL 210, Fall 2025

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PROJECT ONE: Problem Statement

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Scarcity of Electric Vehicle Charging Stations in Qatar

Problem Statement

Qatar is a hydrocarbon state, as its economy is dependent on oil. Given the threat of climate change and the global rise in the sustainability movement, Qatar is facing a big challenge to diversify its economy. To ensure its survival in the changing world, Qatar is undergoing a historical transformation. Under the Qatar National Vision (QNV) 2030, it is transforming its economy to a sustainable, climate-friendly future. To ensure this, it is shifting various sectors, aligning them closely with its environmental commitments. One of these includes the transport sector. Notably, Qatar is attempting to strike a delicate balance between modernisation and the preservation of its natural, non-renewable resources (General Secretariat for Development Planning [GSDP], 2008). Until 2030, it is envisioned 35% electrification of all its transport (PwC, 2025). Despite Qatar's environmental commitments with QNV 2030, it faces numerous challenges, proving to be key gaps hindering it from achieving its objectives.

Qatar introduced its Qatar National Vision (QNV) 2030 in 2008, keeping in view the rising global shift from non-renewable energy. Foreseeing upcoming challenges, it aligned its future and development with international environmental and sustainable standards. Even though it has been trying to intertwine its economic identity with these standards, Qatar has historically taken pride, in all senses, in its oil production and consumption. Due to this, it is a challenge to transform all its sectors from this reality to a completely new one. Nonetheless, the electrification of its transportation sector is essential for Qatar. But it does not free Qatar from the persistent gaps that exist in order to achieve this. As Al-Thani et al. (2025) noted, Qatar's transport electrification initiative is still budding compared to its fellow Gulf countries. For instance, the UAE EV charging station density is the highest in the world, while Saudi Arabia is partnering with American manufacturing, positioning itself as the leading Gulf EV manufacturer (Ajel, 2023).

Furthermore, there seem to be more grave concerns when it comes to EV infrastructure in Qatar. Studies have found that there have been 'demonstration projects' in Qatar with regard to transport electrification. One of the prime examples of this includes the FIFA 2022 World Cup electric bus fleet (Ajel, 2023). Even when projects are not simply for demonstration, the expansion is slow and limited. Al-Shaiba et al. (2023) have found that EV charging stations in Qatar are mainly confined to high-end areas, i.e., Lusail and West Bay. It is hindering the general public from accessing these stations, resulting in leaving suburban and industrial areas underserved and discouraging potential EV consumers. Other studies have also highlighted two more factors playing a significant role in adding to this issue. There

is a lack of public-private partnerships alongside low public awareness and acceptance of EVs (Al-Shaiba et al., 2023).

Additionally, there seems to be another issue in the infrastructure that is acting as a deterrent for potential EV consumers in Qatar. Deshmukh et al. (2024) revealed significant challenges to voltage stability under unmanaged charging conditions. It means that there is a high plausibility that EV penetration can cause transformer overloading, cable thermal limits, and voltage drops during morning and evening peaks. It is even more likely to happen if high-power fast chargers are used. Similarly, Al Wahedi & Bicer (2020) also found that there are substantial vulnerabilities if the country relies on grid-connected fast-charging stations without renewable backup systems. They also contend that stand-alone, hybrid renewable-based charging models can be a good solution as they can reduce grid stress. However, it will come at high upfront costs and land-use limitations.

Purpose of the Project

The core purpose of this research project is to investigate and come up with recommendations to resolve EV-related infrastructural, technical and socio-economic problems in Qatar to align better as well as fulfil Qatar's environmental commitments in its QNV 2030 plan. To do so, this research will provide evidence-based understanding of the issues, i.e., spatial inequality in charger distribution, grid limitations, policy gaps, and consumer attitudes, to address them. The target would be to

1. calculate the current scale and spatial distribution of Qatar's EV charging stations;
2. look into geographical inequalities that are causing access and availability issues; and
3. analyse the current capacity of Qatar's electricity grid to assess potential EV load demand under different adoption scenarios.

By doing so, this research would attempt to bridge the existing and persistent gap between the national sustainable commitments and operational realities of Qatar in terms of electrification of its transport industry.

3. Objectives and Scope (Faisal)

A. Objectives

Use bullet points for clarity (as required in the assignment):

- **Identify the extent and causes of EV charging scarcity in Qatar.**
- **Evaluate the impact of this problem on EV adoption and sustainability goals.**
- **Assess how this scarcity affects users, the environment, and the economy.**
- **Define user requirements and design limitations for future infrastructure projects.**

- Align findings with the Qatar National Vision 2030 environmental and economic pillars.

B. Scope

- Focus on Qatar, especially high-density and high-income regions (e.g., Doha, Lusail, Education City).
- Mention this report does not propose solutions but identifies the problem framework to guide Project 2.

Target audience: Qatar's transport authorities, sustainability researchers, and policymakers.

- Limitations:
 - Time constraints (2-month research window).
 - Access to public data on infrastructure expansion.
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Previous and Current Research:

A. Global Overview

Electric vehicles (EVs) are becoming more common around the world as countries work to reduce pollution and move toward clean energy. The growth of EVs has made it very important to build more charging stations. In 2024, over 1.3 million public charging points were added worldwide, which is about a 30% increase from 2023 (International Energy Agency [IEA], 2024a). The total number of public chargers reached around 4 million, and this number is expected to grow to more than 15 million by 2030 if the current trend continues (IEA, 2024a).

China is the global leader in this area, with about 70% of all public EV chargers, and nearly half of them are fast chargers, which are used to quickly charge a car's battery (IEA, 2024b). Norway also has a very large network of charging stations, and the government there gives drivers strong incentives to switch to EVs. The United Arab Emirates (UAE) is another regional example, with a well-developed network and new rules that require EV charging facilities in new buildings (Roland Berger GmbH, 2024).

Many successful countries follow the same key practices: placing fast chargers on highways, building public stations in cities, and using smart systems to connect charging with the national electricity grid. These steps make owning an EV easier and help more people make the switch. Studies show that people are more likely to buy electric cars when they know charging is easy and accessible (Zero Emission Vehicle Transition Council, 2024).

The data from the International Energy Agency (2024) shows how the number of public electric vehicle charging points has grown between 2018 and 2024 in different parts of the world. The chart includes China, Europe, the United States, and the rest of the world.

As seen in Figure 1, it is clear that China has had the biggest increase in public chargers. In 2018, the total number of public chargers around the world was less than one million. By 2024, the number reached almost five million, and most of these chargers are located in China. This means that China has invested heavily in electric vehicle infrastructure and continues to lead globally.

Europe comes next after China, showing a steady rise in charger installations, especially after 2020. This is mostly because of stronger environmental laws and government support for electric transport. The United States also shows some growth but at a slower rate compared to Europe and China. The top part of each bar, which represents the rest of the world, is still small in size. This shows that countries outside of these main regions, such as those in the Middle East, have not yet developed large charging networks.

Overall, the chart makes it easy to see how fast other regions are building electric vehicle infrastructure compared to the Middle East. It helps show that Qatar is still behind in this area, which supports the main idea of this report. Based on the figure below, it is clear that the shortage of charging stations in Qatar is part of a wider regional gap when compared to more advanced countries.

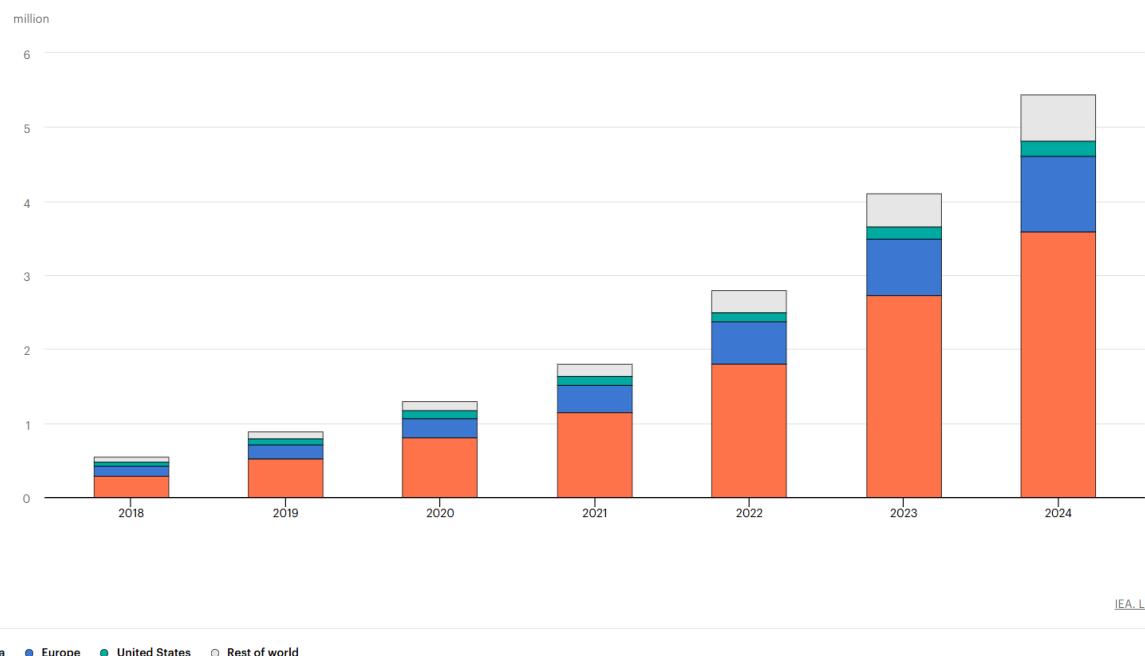


Figure 1: Global stock of public charging points by region, 2018–2024. Adapted from [International Energy Agency \(2024\)](#).

B. Qatar's Current Situation

In Qatar, the number of EV charging stations is still limited compared to the goals set by the government. The Qatar General Electricity & Water Corporation (KAHRAMAA), through its Tarsheed program, started installing stations across the country in partnership with the Ministry of Transport (MoT). As of early 2024, there were about 200 charging stations, and the goal is to reach 600 by 2025 and more than 1,200 by 2030 (The Peninsula Qatar, 2024).

KAHRAMAA also launched the Smart EV Charging Platform, which helps monitor and connect all the chargers in Qatar (Ministry of Communications & Information Technology [MCIT], 2024).

Even though these numbers sound promising, the actual number of working public chargers that drivers can easily access is still low. CITAEVCharger (2025) reported that there are around 100 active stations, most of which are in places like malls or parking areas in Doha and Lusail. Meanwhile, Electromaps (2025) lists less than ten public chargers across Doha that are open and visible to users. This shows that while Qatar has plans, progress on the ground is slower than expected.

A report from Roland Berger GmbH (2024) shows that Qatar and Saudi Arabia each have fewer than eight electric vehicles per public charger, while the UAE has around 18 EVs per charger. This means that Qatar's infrastructure is still small, even compared to nearby countries.

In addition to that, Qatar's weather makes building chargers more difficult. The very high summer temperatures and humidity can affect both the charging machines and the car batteries (Research Portal, Hamad Bin Khalifa University [HBKU], 2024). Also, in many areas, parking is underground or in tight spaces, which makes it harder to install chargers.

The figure below from [6Wresearch \(2022\)](#) shows how Qatar's electric vehicle charging market has developed between 2019 and 2025. The dark blue bars represent the market revenues, while the orange bars show the volume, which refers to the number of charging stations or units. It is clear that both the revenue and the number of chargers start at a very low level in 2019 and 2020 but begin to increase slowly after 2022. This rise reflects the time when Qatar started paying more attention to electric transportation and sustainability through programs such as Tarsheed and the efforts of KAHRAMAA. Although there is some growth, the increase is still small compared to what is needed for a complete public charging network across the country. Figure 2 also highlights two growth rates that show the expected increase between 2020 and 2025. The revenue growth rate is about 121.8 percent, while the volume growth rate is about 106.2 percent. These numbers show that Qatar expects both investment and installations to more than double in the next few years. However, the growth shown here is mainly based on projections for the future rather than actual progress that has already taken place. Overall, the figure shows that Qatar's electric vehicle charging market is still developing and has not yet reached its planned targets. The limited number of available chargers today continues to slow down EV adoption and shows that the infrastructure is still in its early stages. This situation also connects to the environmental and social challenges caused by the shortage of charging stations, which will be discussed in the next section.



Figure 2: Qatar Electric Vehicle Charging Infrastructure Market Revenues and Volume, 2019–2025. Adapted from [6Wresearch \(2022\)](#).

Overall, Qatar has taken steps toward electric transportation, but the small number of functioning chargers limits how many people can switch to EVs. This lack of availability is a key problem that affects the country's sustainability goals.

C. Environmental and Social Research

The shortage of EV charging stations affects both people and the environment. One major issue is range anxiety, which is when drivers worry that their car will run out of charge before finding a station. This problem is more common in countries like Qatar, where chargers are spread out or hard to find (CITAEVCharger, 2025). When people do not trust that they can easily charge their car, they are less likely to buy one.

From an environmental point of view, slow progress in building charging infrastructure also means slower progress in reducing emissions. The IEA (2024a) notes that if public chargers are not widely available, people continue to depend on regular fuel-powered vehicles, which keeps pollution levels high. This situation goes against the Qatar National Vision 2030, which focuses on protecting the environment and managing natural resources responsibly (General Secretariat for Development Planning, 2008).

QNV 2030 talks about creating balance between economic growth and environmental protection. Limited access to EV chargers makes that balance harder to achieve, because it slows down the move toward cleaner transportation. In addition, the QNV's Environmental Development Pillar aims to build a "harmony between economic growth, social development, and environmental protection" (General Secretariat for Development Planning, 2008, p. 30). The current shortage of chargers shows a gap between this vision and what is happening in reality. As seen in Figure 3 from CEIC Data shows Qatar's carbon dioxide (CO₂) emissions from the transport sector between 2012 and 2023. The graph shows that emissions have stayed high over the years, with a steady rise after 2020. This increase means that most vehicles in Qatar still rely on fuel-powered engines, which continue to produce large amounts of greenhouse gases.

Although Qatar has started encouraging the use of electric vehicles and renewable energy, the limited number of charging stations has slowed down progress in cutting emissions. The

graph makes it clear that the transport sector remains a major source of pollution because people cannot easily switch to electric cars without enough public chargers. This situation shows that Qatar is still in the process of meeting the environmental goals of the Qatar National Vision 2030, which focuses on reducing emissions, protecting natural resources, and promoting cleaner transportation.

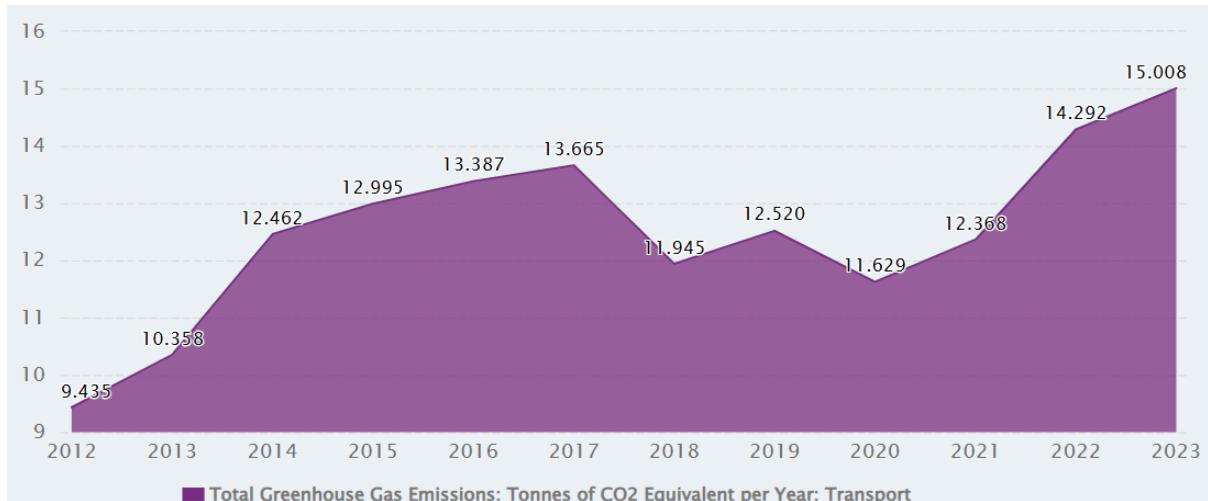


Figure 3: Transport CO₂ emissions in Qatar (2012–2023). Adapted from [CEIC Data \(2024\)](#).

5. User Needs and Design Constraints (Yousef)

A. User Needs

- **Primary Users:** EV owners, fleet operators, delivery companies, and government transport sectors.
- **Secondary Users:** Visitors, car rental services, shopping malls, and residential developers.
- **Needs:**
 - Reliable access to fast charging across Doha and suburbs.
 - Affordable rates and convenient payment options.
 - Real-time location tracking through mobile apps.
 - Covered charging points to protect from heat exposure.

B. Design Constraints

- **Environmental:** Extreme heat affecting battery and charger efficiency.
- **Economic:** High installation and maintenance costs; limited incentives for investors.
- **Spatial:** Limited land for new chargers in dense urban zones.
- **Regulatory:** Government permits, safety regulations, and grid load capacity.

- **Timeframe:** MoT targets 600 stations by 2025—realistic feasibility concerns.
- **Resource Constraints:** Dependence on imported technology and specialized technicians.

C. Connection to QNV

Relate to QNV's environmental and economic goals:

QNV aims for “development that balances economic growth with environmental protection” and seeks to “develop world-class infrastructure supporting a sustainable economy.” [OB]

6. Formatting & Sources

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