



## Memorandum 3

**To:** Industry Representative

**From:** Group 2 (Yousif Ahmed, Kholoud Darwish, Al-Anoud Al-Kubaisi, Faisal Bustami)

**Date:** 02/11/2025

**Subject:** Engineering Solutions to Address the Scarcity of EV Charging Stations in Qatar

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As part of our ongoing research to identify sustainable engineering solutions for Qatar's electric vehicle (EV) station scarcity, our team has been exploring ways to strengthen the country's charging infrastructure and energy network. Qatar is actively transitioning toward low-emission transportation to support the Qatar National Vision (QNV) 2030, which emphasizes environmental sustainability and energy diversification. However, as electric vehicle (EV) adoption increases, the current charging infrastructure remains insufficient in capacity and distribution. Therefore, establishing solutions that expand charging access while maintaining efficient power network performance is essential. The following sections present three engineering solutions targeting infrastructure expansion, smart energy management, and strategic deployment flexibility.

### Option A: Smart EVCS Network Powered by Renewable Energy

This solution proposes developing charging stations powered by solar photovoltaic systems integrated with energy storage units such as lithium-ion batteries or hydrogen-based storage. By generating clean energy onsite, these stations reduce reliance on the national grid and significantly lower long-term emissions. This approach directly aligns with Qatar's sustainability commitments, as renewable-powered charging stations support both environmental and energy efficiency goals (Al Wahedi & Bicer, 2020). While the initial cost of implementation is relatively high, this option provides a durable and future-oriented solution capable of maintaining stable charging availability as EV adoption continues to grow.

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### Option B: Tawseel – Smart EV Optimization System

The second solution is Tawseel, which is a system used to organize the expansion of EV charging stations and manage the distribution of charging demand. Tawseel relies on data such as station usage levels, traffic patterns, and transformer capacity to indicate where new stations should be placed in order to prevent overload and uneven demand across the grid (Deshmukh et al., 2024). By doing so, it reduces the likelihood of transformer stress and helps maintain a stable power supply during peak times. Moreover, Tawseel can detect where the "E-Zone" or Areas of Electrification may be, which are the smart mobility hubs that will be created by KAHRAMAA, and this will aid the development of the power infrastructure in a more strategic way. Tawseel, in conjunction with KAHRAMAA's Tarsheed Smart EV

Platform TASMU, contributes to the country’s digitization aspiration; The Tarsheed mobile application might also incorporate a "Smart Forecast" function that will provide drivers with predictions of charger availability, waiting times, and heat-safety alerts (CITAEVCharger, 2025). This allows the charging network to grow in a strategic and coordinated manner rather than expanding at random locations. Because Tawseel focuses on planning efficiency rather than large immediate construction, it is a scalable and cost-effective solution suitable for long-term EV infrastructure development.

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**Option C: Modular Solar-Powered Fast-Charging Units**

This solution involves deploying portable high-speed EV charging units equipped with solar power generation and integrated energy storage. These units can rapidly charge vehicles and can be relocated to areas of temporary or seasonal high demand (Luobinsen Global, 2024). Their flexibility makes them practical for areas where constructing permanent infrastructure is not immediately feasible. However, their impact remains localized, as they support accessibility but do not address large-scale grid management or long-term energy distribution planning.

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**Decision Matrix**

The following matrix evaluates each proposed solution according to five categories directly related to the main problem of EV station scarcity: cost efficiency, implementation time, scalability, effectiveness in reducing scarcity, and long-term sustainability.

Solution	Cost Efficiency (10)	Implementation Time (10)	Scalability (10)	Effectiveness in Reducing Scarcity (10)	Long-Term Sustainability (10)	Total (50)
Tawseel (Smart EV Optimization System)	9	6	10	9	10	44
Portable Battery / Modular Fast-Charging Units	7	9	7	8	7	38
Solar-Powered EV Network	5	5	6	7	9	32

Even though the Tawseel implementation might be a longer process in comparison with the portable battery units, it provides a strategic, data-driven framework that not only helps engineers make smart choices but also does not need large funds for that. On the other hand, the portable battery solution is more instant but less eco-friendly, whereas the solar-powered network needs a lot of resources and a long lead time to establish.

Thus, the team points out Tawseel as the method of choice because it is the one that most corresponds with KAHRAMAA's digital vision, and it also helps the long-term sustainability goals of Qatar National Vision 2030.

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**Conclusion & Connection to QNV 2030**

All of the solutions we’ve worked on come together as one clear step contributing to the QNV 2030. Renewable-powered charging promotes environmental stewardship, Tawseel strengthens economic and technical development through innovation, and portable charging infrastructure enhances social accessibility and mobility equity. Collectively, these solutions support Qatar’s position as a leader in sustainable and future-ready transportation.

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## References

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