

Jordan Electric Vehicles Solar Charging Project: Environmental Importance, Technicality, and the Lessons to Be Learned

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Through a private-public partnership that includes a consortium of local and international partners, the construction of the Jordan Solar Electric Vehicles Charging Pilot Project was kicked off.

Due to its ample renewable energy sources and forward-thinking energy policies, Jordan is at the forefront of the implementation of renewable energy technologies. In order to provide its citizens and visitors with the best access to these technologies, the Government of Jordan desires to develop public sector transportation technologies that utilize renewable energy as well as electric vehicles and charging infrastructure that promotes eco-tourism.

The government's intention is to procure 300 of Nissan's Leaf electric vehicles by the beginning of next year. At the beginning, the vehicles will be used in public sector applications such as Amman Municipality which can be then expanded to others sectors if successful.

The project team will work closely with the Ministry of Environment to secure funds needed to establish the charging infrastructure with solar photovoltaic and provide electric vehicles and light electric vehicles (i.e. e-bikes, e-scooters, neighborhood electric vehicles) to familiarize the Jordanian society with such advanced technologies and to commence a study to expand the use of electric vehicles to include other regions in the Kingdom of Jordan.



Environmental Benefits of the Project

Upon full implementation of the project by the Year 2020, the project envisions the deployment of 100,000 electric vehicles (EV) in Jordan supplemented with a network of 10,000-20,000 EV charging stations. The EV charging network will be equipped with approximately 2 GWhr of advanced Lithium-ion batteries to buffer the EV stations from the grid to avoid stressing the grid and provide additional storage capacity that can be deployed during peak hours as part of a wide smart grid system strategy. In addition, 300 MWp of solar photovoltaic system will be installed and connected to the grid directly to offset electricity used to charge the electric vehicles.

This is an important and unique aspect for the Jordan Solar EV Project since unlike other charging systems that use electricity generated from fossil fuel, this system will be completely renewable and will fully eliminate emissions equivalence to 100,000 conventional vehicles since it uses a zero-emission and renewable energy source. Assuming that an average vehicle has a 10 km/L gasoline efficiency with a daily driving range of 100 km, an annual savings of 300 million liters of gasoline will result from using the 100,000 electric vehicles with a total annual CO₂ emission reduction of 700,000 tons.

Technical challenges

The project has provided an opportunity for potential users in Jordan to realize the technical and performance advantages that electric vehicles provide over conventional gasoline vehicles. Besides the obvious environmental impact and economic benefits due to reducing fuel consumption (i.e. driving on electric power costs 1/4th of driving with gasoline), electric vehicles have better torque and less moving parts which lowers maintenance cost and increase vehicle life expectancy. However, lifetime and cost of Li-ion batteries is still an issue and the auto industry as a whole is working hard to address this critical issue.

Lessons Learned

Although electric vehicles have received significant and worldwide exposure over the past few years, many people are still skeptical of their commercial viability and performance. The project in Jordan and the EV test drives that were allowed for private and public partners have helped immensely in improving the EV image and shedding some of the myths that surround EVs. However, the biggest challenge so far has been the cost premium that EVs have today over conventional vehicles. Cost is a major factor for most consumers and although fuel savings could offset such price premiums over a few years, consumers do not tend to take that into account when deciding on buying a new vehicle. Today, many governments worldwide offer various financial incentives to address this concern and spur demand for EVs. Another big challenge for electric vehicles is the availability of adequate charging infrastructure. Today's EVs have a range of 160 km per charge which is more what is needed for the daily commute of the vast majority of vehicle owners. However, surveys have shown that most potential EV buyers are very concerned about the current 160 km drive range and would prefer a drive range that is at least twice that before they decide to buy a car which is cost prohibitive at this stage and requires significant improvement of the current Li-ion battery technology. This is known as "range anxiety" and is a major concern for EV advocates worldwide. Governments are addressing this matter by providing billions of dollars in grants and financial assistance to install public EV charging infrastructure across highways and urban areas which should help in addressing this matter.