





# Electric vehicles: is Saudi Arabia plugged-in?

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Despite its fastidious efforts at increasing efficiency in energy consumption, the kingdom still stands to benefit from a strategy to support the transport sector.

Improving energy efficiency is one of the most constructive and cost-effective ways to address the challenges of increasingly high energy prices, air pollution, and global warming. Most developed countries today have mature national-level energy efficiency programs to curb all the inefficiencies embedded in the conventional ways of generating and utilizing energy resources.

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In 2010, Saudi Arabia established the Saudi Energy Efficiency Center (SEEC) to raise awareness of, and enhance, energy efficiency. A secondary aim is to unify the efforts of governmental and non-governmental agencies in this field. In a typical energy efficiency framework, an effective management of demand and supply results in lower energy consumption and cost, improved citizen comfort and enhanced productivity. The SEEC has identified three areas to be addressed in order to achieve the desired objectives as part of its Energy Efficiency (EE) framework: Construction, Transport and Industry. While different initiatives are planned to address the needs of EE in each sector, we believe the kingdom can further benefit in the transport sector by laying down a strategy to support and foster an electric vehicle (EV) culture in the country.

There are significant benefits of using EVs. Globally, the demand for passenger vehicles is increasing, and with it, demand for oil is growing. By 2050, there may be as many as 1.5 billion cars on the road, compared to 750 million in 2010. With oil as a scarce resource, an alternate source of transportation fuel—in this case, electricity—is inevitable. The usage of EVs will also generate demand for new and existing jobs. Many studies have confirmed that job growth in EV industries will outweigh any reduction of jobs in gasoline-based vehicle industries resulting in net job growth. EVs also foster further economic development by improving quality of life and reducing energy spending.<sup>1</sup>

There are many benefits to the end user as well. Being electric, EVs are significantly more silent than gasoline cars. These vehicles deliver amazing torque and have lower fuel & maintenance costs. As opposed to the general perception, these are exciting to drive and provide good performance. A fully charged EV has fewer moving parts than a conventional gasoline vehicle. There's no transmission or timing belt that can get damaged, so the major maintenance costs associated with an internal combustion engine are almost negligible. They also help to create a better and sustainable planet because EVs provide lower overall impact on the environment than gasoline vehicles. In short, EVs offer a good alternative to old automotive technology.

In Saudi Arabia, less has been done in this important area compared to other countries. According to research from InsideEVs.com, approximately 119,710 electric vehicles were sold in the United States in 2014, a 23 percent jump from 2013 and a 128 percent jump from 2012. The Obama administration planned to have one million EVs on the roads by end-2015. The corresponding infrastructure is already in place in the United States. Currently there are 10,567 electric stations, 26,170 charging outlets in the United States.<sup>2</sup>

In the Gulf Cooperation Council region, Dubai seems to be more active in this area. In line with the Smart Dubai initiative, Dubai Electricity and Water Authority (DEWA) is implementing the electric vehicle charging station infrastructure initiative (Green Charger) and collaborating with a number of national and private organizations. DEWA's goal is to install 100 charging stations in Dubai by end-2015.<sup>3</sup>

We have performed a simple math equation to demonstrate how EVs, with current fuel costs in Saudi Arabia (electricity and gasoline) are more cost-effective than gasoline cars. The analysis is performed comparing two Ford cars of the same model: one being an EV and the other gasoline-powered. We took average prices in the United States and Saudi Arabia for our calculations, using the methodology adapted from the U.S. Department of Energy ([www.energy.gov](http://www.energy.gov)).<sup>4</sup> The table below shows the results of the calculations performed:

#### Calculation notes

1. Annual distance: it is assumed that average daily driving distance is 45 miles, there are 7 days per week and 52 weeks per year. The distance travelled includes both city roads and highways.
2. Average costs and fuel economy: electricity and gasoline cost are taken from different sources.<sup>5,6,7,8</sup> For the sake of simplicity the same fuel economy is assumed in the United States and Saudi Arabia.
3. Annual electricity use = distance/100 x electricity economy.
4. Annual gasoline use = distance/gasoline economy.
5. Annual operating costs and annual emissions are also assumed to be the same for both the United States and Saudi Arabia considering all the factors mentioned in the methodology.<sup>9</sup>

	USA		Saudi Arabia	
	2015 Ford Focus Electric EV	2015 Ford Focus FWD Gasoline	2015 Ford Focus Electric EV	2015 Ford Focus FWD Gasoline
Annual distance (miles)	16380	16380	16380	16380
Average electricity cost/kWh	\$0.149	-	\$0.04	-
Average gasoline cost/gal	-	\$2.19	-	\$0.61
Gasoline economy (miles/gal)	-	28.5	-	28.5
Electricity economy (kWh/100 miles)	32	-	32	-
Annual electricity use (kWh)	5242	-	5242	-
Annual gasoline use (miles/gal)	-	575	-	575
Annual gasoline/electricity cost	\$783	\$1,257	\$210	\$351
Annual operating cost	\$3,069	\$3,745	\$3,069	\$3,745
Total annual cost	\$3,852	\$5,002	\$3,279	\$4,096
Cost per mile	\$0.24	\$0.31	\$0.20	\$0.25
Annual emissions (lbs CO <sub>2</sub> )	7,601	13,688	7,601	13,688

It is evident that in a year, an all-electric vehicle (like the Ford Focus) in Saudi Arabia will cost US\$141 less than its gasoline counterpart if only fuel cost is considered. The same car will cost US\$817 less annually if both, fuel and operating costs are considered. In 2014, almost 830,000 passenger cars and commercial vehicles were sold to customers in Saudi Arabia.<sup>10</sup> Based on these numbers, it is estimated that if five percent of the total vehicles sold in Saudi Arabia from 2015 to 2022 had been EVs, total savings would have been at around US\$47 million; and if EVs had constituted 25 percent of sales, the savings would have been in the order of US\$236 million. Similarly, these numbers would have saved two billion and 10 billion pounds of carbon emissions, respectively, in seven years.

It is very positive that initiatives like the SEEC have already begun in Saudi Arabia, but to further ensure its success, the country needs to consider investing in the electric vehicles industry, whose benefits are far more than the traditional gasoline-based industry. We believe Saudi Arabia should take the following initial measures to establish an electric vehicle culture in the country in order to realize the associated benefits explained earlier.

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First, the focus should be on building awareness and the EV infrastructure.

• **Awareness of the benefits of EVs:**

- Arrange public demonstrations of EVs.
- Improve consumer perception—consumer perception can distort the facts of EV ownership and suppress demand.
- Develop a consumer education plan.
- Market “success stories” of EVs’ economic impact.

• **EV infrastructure:**

- Conduct feasibility studies on developing the charging infrastructure.
- Provide incentives for investment in charging infrastructure.
- Invest in charging infrastructure in public spaces.

Once a baseline level of demand and supply is established, focus should be on incentives and public sector measures

• **Incentives to the consumers and the suppliers:**

- Provide incentives to the distributors to sell EVs in the country.
- Alleviate battery ownership risk by reducing upfront cost as battery is the most important consumable component in an EV.
- Encourage utility rate discounts for charging.

• **Public sector measures:**

- Transition government fleets to EVs.
- Encourage EVs cabs.
- Make public investments in research and development (R&D) in the areas of EVs and batteries by encouraging universities.
- Create tailored workforce training programs.

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#### Endnotes

1. Creating The Clean Energy Economy, Analysis of the Electric Vehicle Industry, International Economic Development Council, 2013.
2. [http://www.afdc.energy.gov/fuels/electricity\\_locations.html](http://www.afdc.energy.gov/fuels/electricity_locations.html)
3. <https://www.dsoa.ae/en/news/dubai-silicon-oasis-installs-first-charging-station-for-electric-vehicles/>
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5. <https://www.se.com.sa/en-us/Pages/ChangingTariffForCommercialAndIndustrialSectors.aspx>
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10. <http://www.statista.com/statistics/375695/motor-vehicle-sales-in-saudi-arabia/>

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