The Four Most Prevalent Myths About Electric Cars

By Stefan Krause, CEO and Co-Founder, EVELOZCITY, and Boris Liedtke , INSEAD Emerging Markets Institute Distinguished Executive Fellow

Breaking down the myths that hinder acceptance of electric vehicles.

Just one look at our cities – from Berlin to Baghdad, Bangkok to Buenos Aires, Boston to Baton Rouge – makes it blatantly obvious. During rush hours or holidays, potentially productive or relaxing time is wasted. Individuals are stuck in metal boxes that weigh over a tonne, moving slowly forward while they inhale air packed with carcinogenic particles. Surely, we can do better. Fortunately, disruptive players are working hard to accelerate the switch to electric cars.

Meanwhile, those with interests to stave off mobility disruption tend to make four spurious attacks:

1. E-cars merely shift the pollution and energy consumption from the vehicle itself to oil, gas, coal or nuclear power stations somewhere else.

2. The production and eventual disposal of e-car batteries are a source of dangerous pollution.

3. Our electricity network would collapse under the increased demand.

4. E-car technology does not enable us to charge our cars as fast as we can at a petrol station (“charging anxiety”), nor does it allow consumers to travel vast distances (“range anxiety”).

Let’s address these concerns one at a time.

Energy consumption of electric cars

Indeed, any acceleration or forward movement against air resistance requires energy. However, the efficiency with which we convert primary sources of energy (such as oil and gas) into forward movement matters tremendously.

A combustion engine needs to be small enough to fit inside the vehicle, light enough to ensure that the vehicle remains mobile, and clean enough to be tolerated by humans. Each engine powers exactly one car and new ones need to be produced all the time. The engine takes the primary energy source and converts it through up to 6000 explosions per minute into forward movement.

The conversion from primary energy sources to electricity follows a very different path. Enormous power stations located outside of cities have virtually no size or weight restrictions. They don’t need to be mobile. A single power station can service millions of cars and machines. The pollution created can even be filtered at a single source, making investments in better environmental control more efficient.

As any first-year engineering or physics student will attest, any machine faces compromises between energy conversion efficiency and other restrictions imposed on it. If the machine must be smaller, lighter, built at scale or more mobile, it is bound to lose efficiency. The upshot of all these compromises is that a modern combustion engine inside a car has an efficiency ratio of just over 20 percent, compared to 70 percent for a modern power plant. So, ten litres of petrol, which might allow us to travel 100 kilometres, would generate sufficient electricity to cover a distance of over 350 kilometres. The difference in efficiency is even greater if you consider the costs and energy used in refining crude oil into petrol and transporting it to petrol stations around the world.

E-car batteries

Is it true that the production and disposal of batteries for electric cars cause environmental damage?

As research in this area intensifies, great solutions are emerging in the recycling and refurbishment of car batteries. Restoring battery chemistry is one such solution. Another is the repurposing of car batteries once their vehicular use has ended. It is estimated that even with our present know-how, spent batteries still have over ten years of usable life in a stationary function. Moreover, conventional automobiles also require batteries, so this objection could equally be applied to them.

Electricity demand

What of the claim that our electricity network would not cope with the increased demand for electricity? Let’s consider Germany and its 40 million cars, each driven about 10,000 kilometres per year. An electric car consumes about 20 kWh per 100 kilometres. So, if all German cars were to be replaced by electric vehicles, there would be an additional 80,000 million kWh (or 1,000 kWh per capita) of electricity consumption per year. Presently, Germany uses 6,600 kWh per capita per year and could easily increase this to 7,600 kWh per capita. This would place Germany at about the same consumption level as Russia, Japan, Belgium and Switzerland. This level would still be substantially lower than in South Korea, Australia and New Zealand (8,000–10,000 kWh per capita) and approximately half the consumption in the United States, Canada, Sweden and Finland (all over 10,000 kWh).

Furthermore, the recharging pattern of e-cars helps to smooth out consumption cycles. Electricity consumption increases from 6.00 am onwards, reaches a plateau at around 9.00 am, starts falling off from 6.00 pm and drops sharply from 11 pm onwards. Charging cycles of electric cars work in precisely the reverse pattern – rising when people arrive home at 7.00 pm, remaining constant throughout the night and tapering off as the vehicles are put in use from 7.00 am.

Tesla founder Elon Musk has argued that the electricity currently required to refine crude oil into fuel is enough to power his cars. At present, it takes about 1.6 kWh to refine one litre of fuel. At a fuel consumption of 10 litres per 100 kilometres, this is almost the same as the usage of an electric car for the same distance (about 20 kWh).

Charging and range anxiety

Finally, let's address concerns that electric cars are not workable because of the time it takes to power them up (the so-called "charging anxiety") and because they don't allow for long-distance driving ("range anxiety").

Electric vehicles do not have to be driven to a petrol station, which is a great advantage. Electricity is everywhere, unlike petrol stations. Petrol stations not only create olfactory and groundwater pollution from spillage, they also take up premium space in congested cities and reduce local property values. By contrast, charging opportunities require virtually no real estate and can be incorporated easily into the existing infrastructure of car parks and garages. As a result, e-cars could be charged constantly when they are not in use. Given that the average car in the industrialised world is used less than five percent of the day, it makes no difference how long it takes to recharge the battery. Consumers do not have to wait next to their car until it is filled up (unlike a combustion engine), nor do they have to wait for the tank to be almost empty. They simply plug it in when possible, even with 80 percent energy remaining.

Regarding "range anxiety": According to an European Commission **survey**, the average personal weekday trip distance in six European countries ranged from about 15 kilometres in Italy to less than 35 kilometres in Spain. The total average range driven per day was between 40 kilometres (United Kingdom) and 80 kilometres (Poland). The report concluded that "such distances can be comfortably covered by battery electric vehicles that are currently already available on the market".

So much for everyday transportation. But consumers do occasionally use their cars for a lengthy road trip or to drive long distances to a holiday destination. Here, we should take a step back and make some predictions about future social behaviour. We see that consumers are increasingly choosing low-cost air travel over prolonged driving. Ryanair's customer base has exploded from 75 million in 2011-2012 to over 130 million in 2017-2018. In addition, the rapid development of fast-charging networks, coupled with technology to significantly shorten charging times, will provide viable and acceptable options for long-distance travel.

Some travellers will be nostalgic for the road trip of old, with its reek of petrol fumes and roar of engines. However, for most of us, the future will consist of being driven to work and home in an electric, non-polluting, quiet vehicle that easily charges itself when not in use. There is simply no stopping technology.

This is a shortened version of an article originally published in **The European Business Review***.*

Stefan Krause *is CEO and Co-Founder of EVELOZCITY, an electric vehicle company addressing the future needs of urban mobility.*

Boris N. Liedtke *is a Distinguished Executive Fellow at* ***INSEAD Emerging Markets Institute****.*

Follow INSEAD Knowledge on ***Twitter*** *and* ***Facebook****.*

Find article at
https://knowledge.insead.edu/entrepreneurship/four-most-prevalent-myths-about-electric-cars

---

About the author(s)

Boris Liedtke is a Distinguished Executive Fellow in the INSEAD Emerging Markets Institute.