

Fill 'er up

Today's existing EVs typically carry about 15 lead batteries, with about 15 Kilowatt Hours capacity and have a range of about 50 Km. About 75% of people say they have a place to park and plug in an EV. Condominiums usually don't have power in the garage. Most garages have only a 15 amp capacity, (including plug, wiring, panel and meter capacity and cable to the alley), providing only a one kilowatt maximum charge rate. Thus a full charge from empty batteries could take up to 2 days with existing infrastructure. Eighty percent of vehicles on the road carry only one or two people. Most conversions weigh about 1000 Kg and have a coefficient of drag of 0.35, a frontal area of >2 sq. meters, and tire rolling resistance of 0.015.

Our average commute is 30 Km and 90% of us drive less than 100 Km, yet numerous surveys suggest the public demand is a range of 150 Km. Most people will accept charging overnight.

The limitations for EV adoption are overnight charge time, garage power capacity, lack of plugs in condos and outdoor parking lots and lead battery capacity. An EV requires more onboard capacity and more infrastructure power to charge for the range demand than is typically available overnight at home. Higher capacity batteries cost more and small cars are expected to cost less.

As more powerful lithium batteries become available, the problem is no longer batteries' energy density or power density, but the cost and the ability to fill them up in time without rebuilding the infrastructure.

Given these limitations one solution is to reduce the power needs of EVs. To do this we need to redesign the car to reduce the weight to 1000 Kg total using composites, reduce the aerodynamic drag to <0.1 like an aeroplane body or recumbant bicycle fairing, reduce the frontal area with tandem seating to 1.4 sq meters, use low rolling resistance tires, and use only 10 kilowatt hours of lithium batteries. Plugging these parameters into our EV calculator, our range and acceleration demands, are achievable in a 2 passenger vehicle. This is all possible with today's technology.

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