

Economic efficiency of e-mobility in the Republic of Croatia

Electric cars are much more expensive than conventional vehicles with internal combustion engines and hybrid vehicles because of the additional costs of their lithium-ion batteries. However, the price of the batteries falls because of the mass production and is expected to continue to fall.



Electric cars are driven by an electric energy, which if it is given from the renewable energy sources, causes minimal environmental pollution.

Efficiency of electric car is about 80% while the efficiency of conventional car is about 36%.

Not using oil as a means of getting more mobility but electric energy, greatly reduces a dependence on oil of foreign countries.

Taking into account losses from the charge/discharge, the consumption is 15-20 kWh per 100 km. If you pay for electricity at a daily rate, it is 15-20 kn. Night tariff is 7.5-10 kn per 100 km. But if you use electricity from your own sources for charging, e.g. windmills or solar panels, then the price is even lower.

Example of calculating the costs of the vehicle VW Golf:

Vehicle	E – golf	Golf 1.6 TDI	Golf 1.4 TSI
Engine power	85 kW / 115 KS	81 kW /110 KS	81 kW/110 KS
Price of the vehicle	283 000 kn (- 70 000 kn subvention)	190 000 kn	150 000 kn
Consumption	12.7 kWh/100 km	3.9 l/100 km	4.9 l/100 km
Fuel costs	0.529 kn/kWh	7.39 kn/l	8.65 kn/l
Vehicle tax	-	600 kn	600 kn
Additional costs	-	1500 kn	1500 kn

		(maintenance)	(maintenance)
Costs at 15 000 km	1007,75 kn	6423,15	8457,75 kn

Data source: www.autozubak.hr (8th February, 2016.), fuel costs on 8th February, 2016.

If we consider the average travelled annual mileage, the costs of using electric vehicles are much lower than in conventional vehicles.

Maintenance costs are totally minimal and it is also important to note that with the government incentive, for an electric vehicle there are no additional costs for taxes on vehicle.

Prices of the electric vehicles in the Republic of Croatia in 2015:

	POWER kW/KP	REA CH	TYP OF BATTERY	CHARGI NG TIME	PRICE OF VEHICLE
TYPE OF VEHICLE					
Citroen C- Zero	49 / 65	150 km	Li-Ion	6 sati	230.000 kn
Mitsubishi i- Miev	49 / 65	160 km	Li-Ion	8 sati	202.000 kn
BMW i3	125 / 170	160 km	Li-Ion	5,5 sati	29.400 €
KIA Soul	81 / 110	212 km	Li-Ion Polymer	14 sati	25.880 €
Nissan Leaf	85 / 109	199 km	Li-Ion	10 sati	29.690 €
VW e-Golf	85 / 115	190 km	Li-Ion	13 sati	283.000 kn
VW e-Up	60 / 82	190 km	Li-Ion	9 sati	191.000 kn
Tesla Model S	225 / 306	390 km	Li-Ion	10 sati	65.000 €
Ford Focus Electric	107 / 145	162 km	Li-Ion	11 sati	33.605 €
Renault Zoe	65 / 88	210	Li-Ion	16,5	21.700

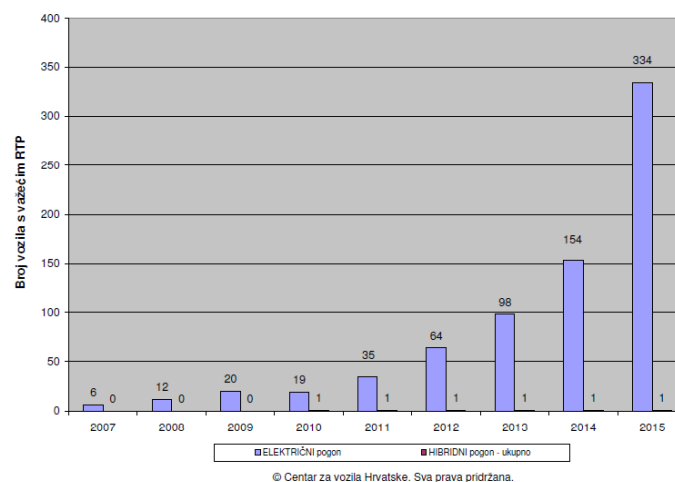
		km		sati	€
Smart Fortwo	55 / 75	145	Li-Ion	7	19.000
ED		km		sati	€

Although the starting price of electric vehicles is greater than the other, what we can see from the previous table, when we add up the costs of maintaining and charging, or refueling, the use of an electric car saves between 5000 – 8000 kn.

Therefore, with the incentive of 70 000 kn to the buyer, on average, already after 5 years it pays the difference in the price when he bought the car. Fund for Environmental Protection and Energy Efficiency in the period from 2014. to 2015. spent 29.7 million kn of incentives for the purchase of hybrid, plug-in and electric vehicles.

Demand for electric vehicles is increasing year by year. The trend is subject to various factors such as: economic growth, the demographic composition of the population, the availability of eco-incentives, the purchasing power of citizens, the supply of electric cars, the infrastructure of electric filling station,...

It is also necessary to note that the trend will increase at the moment the fleet sales start; high profitability of electric cars such as vans, vehicles for short distances in cities, rent a cars and commercial vehicles (cars utilities).



Picture: The demand trend of electric cars in the Republic of Croatia

One of the biggest weaknesses of electric vehicles application in Croatia is a small bottlers offer. With the increasing demand for electric vehicles, appears the increasing supply of electric filling stations. In 2015 , Zagreb County has given 630.000 kn (80.000 euros) to

the cities in its area for the construction of electric filling stations.

The grants are given as part of a pilot program of the Zagreb County to urge the construction of filling stations, which are co-financed by national and EU funds, in the cities of Zagreb County. The same trend of increasing e-filling stations offer is also present in the rest of the country.



HEP (Hrvatska elektroprivreda – Croatian Electricity Company), the main distributor of electricity in the Republic of Croatia, will build public infrastructure according to its Strategy 2020., which established 345 locations ,covering highways, towns and villages located on state and county roads.

The plan is to place ultra-fast DC bottling plants, which fill the battery for 15 to 30 min., on the highway,providing the necessary link between the major Croatian cities, especially between Zagreb and Split, and the goal is to set up filling stations for electric vehicles at service stations on the motorway. In this way, with the construction of the AC filling stations in the cities, HEP will build a network in Croatia and anyone with a pure electric vehicle or plug-in hybrid electric vehicles will be able to use them.

By implementing a public accessible electric vehicles bottler network, Croatia becomes one of the members of the European Energy Highways and in accordance with Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014., HEP (the branch office for alternative fuels infrastructure) will allow access fee and other e-mobility service providers to use this infrastructure.

We will be able to find bottling plant for our new cars within the public garage, shopping centers, office buildings and so on.

Unlike conventional vehicles, electric vehicles can be recharged at home while the public infrastructure will serve for recharging batteries, filling in an emergency when the customer forgot to charge his vehicle.



With the regard to projects and campaigns of the Ministry of Environment and the Fund for Environmental Protection and Energy Efficiency, which is co-financed purchase of electric, plug-in and hybrid vehicles, electric vehicles will soon become everyday on our roads, and the electricity that is available in households, workplaces, shopping malls and other places will become the main driver of such cars.

Growing demand for electric vehicles, the production of the same will also be increased, and thus the price of electric vehicles will decrease.

Electric cars are our future!