

## Range

The gas Rav4 (15-gal gas tank) has a range of **405 miles/tank**. The Rav4-EV has a range of **100 miles/charge**. Commute studies show about 80% of the public drives 40 miles or less each day, a 100 mile range easily handles this. So, for most drivers, the plug wins.

**Personal Preference** - you decide.

## Summary

10-Year Lifetime Cost			
Item	Gas-Power	EV-Power	The Winner?
Total Purchase	\$23,873	\$34,486	<b>Pump</b>
Min Ins.	\$2,500	\$2,500	<b>Tie</b>
Full Ins.	\$10,429	\$12,470	<b>Pump</b>
Fuel	\$12,388	\$2,741	<b>Plug</b>
Maintenance	\$10,107	\$1,562	<b>Plug</b>
Trips to gas station	300	0	<b>Plug</b>
Range (per "tank")	405 mi	100 mi	<b>You decide</b>
<b>Total Cost</b>	<b>\$49,190</b> (min ins.)	<b>\$41,290</b> (min ins.)	<b>Plug</b>
	<b>\$57,119</b> (full ins.)	<b>\$51,260</b> (full ins.)	<b>Plug</b>

The total cost comparison shows that it's time to send the dinosaur packing. The price of gas will continue to rise. As the production volume of EVs increase, the purchase price will decrease. Each mile, each year, gas-powered cars add more pollution and greenhouse gases into the environment. As the electrical grid gets cleaner, by increasing the use of renewable energy sources (mandated by law), EVs will continue to get cleaner!



It's all about the power of the plug! Tell car dealers **"no-plug, no-deal"** for your next car.



## References

1. CA sales tax was 8.25% in 2002. \$4000 Fed EV tax credit; \$9000 CA EV rebate over 3 years.
2. [eia.doe.gov/emeu/steo/pub/fsheets/real\\_prices.html](http://eia.doe.gov/emeu/steo/pub/fsheets/real_prices.html), [eia.doe.gov/oil\\_gas/petroleum/data\\_publication/s/wrqp/mogas\\_history.html](http://eia.doe.gov/oil_gas/petroleum/data_publication/s/wrqp/mogas_history.html)
3. [alternativefuels.about.com/od/resources/a/gge.htm](http://alternativefuels.about.com/od/resources/a/gge.htm).
4. [en.wikipedia.org/wiki/Toyota\\_RAV4\\_EV](http://en.wikipedia.org/wiki/Toyota_RAV4_EV), [toyota.com](http://toyota.com), [epri.com](http://epri.com) (battery life).
5. 2009 PG&E (CA) electricity rates. Daytime (peak) rate: \$0.18496/kWh; Overnight (off-peak) rate: \$0.08447/kWh.
6. [autorepair.about.com/cs/generalinfo/a/aa040701a\\_2.htm](http://autorepair.about.com/cs/generalinfo/a/aa040701a_2.htm), [www.dmv.org/ca-california/smog-check.php#Fees](http://www.dmv.org/ca-california/smog-check.php#Fees), Ins quote: [progressive.com](http://progressive.com) (Santa Clara County, CA)

## About the Electric Auto Association

The Electric Auto Association (EAA) is a non-profit educational organization founded in 1967 to promote the advancement and widespread adoption of Electric Vehicles.

The EAA's mission is to act as a public source of information about developments in electric vehicle technology, to encourage experimentation in the building of electric vehicles, and to organize public exhibits and events of electric vehicles to educate the public on the progress and benefits of electric vehicle technology.

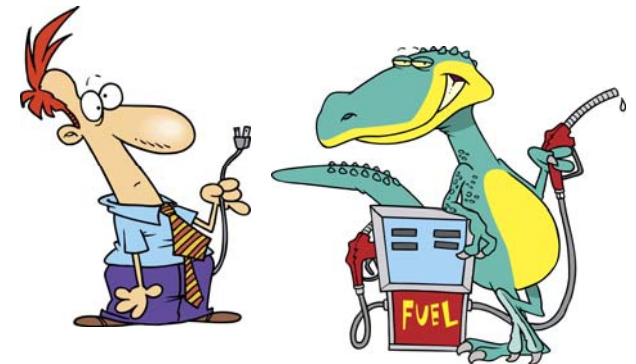
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# Plug or Pump?



## A California Case Study: Electric Power Vs. Gas Power



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## Costs to Consider

It's important to consider the total cost of ownership of the vehicle. This includes: initial purchase price (w/sales tax), annual insurance, license/registration fees, fuel, and maintenance costs. There are additional costs to society in the form of air pollution and reliance on foreign sources of petroleum, but for purposes of this discussion those costs will be ignored.

Over the 10-year life of a vehicle, fuel costs (assuming 12,000 miles/year) can be the most significant cost associated with owning and driving any car.

## Comparison Vehicles

Toyota released the 1st generation all-electric Rav4-EV to the California public in 2002. It's based on the 1996-2000 gas-powered Rav4. This case study will compare the gas Rav4 to the Rav4-EV; using prices available in California (since that was where the Rav4-EV was available).



## Initial Purchase Price

Today, production electric vehicles are produced in low volume, raising the initial purchase price. The battery pack is the high cost component in EVs - but lasts at least 150,000 miles<sup>4</sup> in the Rav4-EV.

The Rav4-EV had a sticker price of \$42,596. After sales tax<sup>1</sup>, DMV and doc fees, less California and federal incentives (\$13,000<sup>1</sup>), it had a **net price of \$34,487**. The total purchase price for a **gas Rav4 was \$23,873**.

**Pump wins** - by over \$10,000.

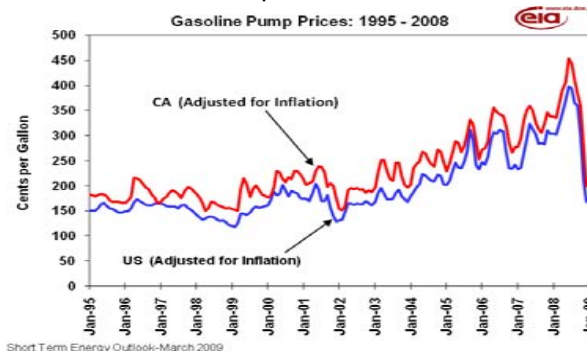
## Ease of Use

EVs refuel overnight. Each day can start with "full fuel"! EV drivers love fueling at home avoiding the hassle of trips to the gas station. At 12,000 mi/year, the gas Rav4 needs 444 gallons of gas - that's 30 trips per year to the gas station.

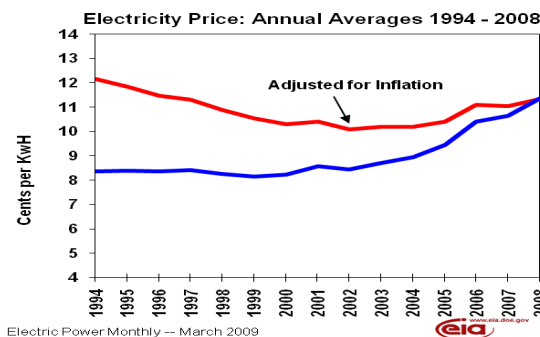
**Plug wins** - by a long shot.

## Fuel Cost/Mile

The price of gasoline has had some dramatic fluctuations over the years. Even though the price dropped in early 2009, it is expected to rise again. The average CA gasoline price between 2000 and 2008 was \$2.76/gal<sup>2</sup>. For the calculations, the weekly CA averages (adjusted for inflation)<sup>2</sup> were used, assuming 250 mi/week, for 10 years.



Electric rates have not drastically changed<sup>2</sup>. For these calculations, the CA 2009 overnight rate of \$0.08447/kWh<sup>5</sup> was used.



One gallon of gasoline has the same energy as 33.53 kWh of electricity (GGE)<sup>3</sup>. The Rav4-EV has a 27 kWh battery pack<sup>4</sup> (or 0.805 GGE) and a 100 mile range<sup>4</sup> (124 miles/GGE). The gas powered Rav4 is rated at 27 mpg.

Fuel Costs	Mile/GGE	\$/Mile	\$/Month
<b>Gas RAV4</b> (\$2.83 = 1.03 gal)	<b>27</b>	<b>\$0.100</b> (\$2.76/gal)	<b>\$102</b>
<b>RAV4-EV</b> (\$2.83 = 1 GGE)	<b>124</b>	<b>\$0.023</b> (\$0.08447 / kWh)	<b>\$23</b>

**Plug wins** - by nearly \$100!

## Maintenance

There's no contest here. EVs do not need oil changes, tune-ups, smog-checks. In fact, electric motors can go over a 1,000,000 miles! License and registration fees are the same, tires, and other common parts are the same.

Maint <sup>6</sup> .	Items	Lifetime
<b>Gas RAV4</b>	Smog checks, tune ups, oil changes, tires, brake pads, belts, hoses.	<b>\$10,107</b>
<b>RAV4-EV</b>	Tires, brake pads.	<b>\$1,562</b>

**Plug wins** - by a long shot.

## Insurance

Cost of insurance is based, in part, on the purchase price of the vehicle. Production EVs have a higher purchase price so the cost for full insurance is also higher. For minimum insurance (required for registration), there is no cost difference.

Insurance	Premium/yr <sup>6</sup>	Lifetime
<b>Gas RAV4</b>	<b>\$250 - \$1,043</b>	<b>\$2,500 - 10,429</b>
<b>RAV4-EV</b>	<b>\$250 - \$1,247</b>	<b>\$2,500 - 12,470</b>

**Pump wins** - for full coverage.