

## Assessing Electrification Benefits

Popular EV's <https://fueleconomy.gov/>

- Chevy Bolt
- Nissan Leaf
- Hyundai Kona

Popular Hybrid vehicles by 2019 sales data <https://afdc.energy.gov/data/10301>

- Ford Fusion
- Toyota RAV4
- Toyota Prius

Popular Diesel vehicles by 2021 sales data <https://www.dieselforum.org/vehiclesales>

- Chevrolet Cruze
- Volkswagen Golf
- Volkswagen Jetta

Popular gasoline vehicles by 2021 sales data <https://www-statista-com.proxy2.library.illinois.edu/>

- Toyota RAV4
- Honda CR-V
- Nissan Rogue

	MSRP	Driving Range (miles)	Energy Efficiency (miles/gallon)	Greenhouse Gas Emissions (CO2 g/mile)(tailpipe)
Chevy Bolt	\$36,500	259	127	<b>230/0</b>
Nissan Leaf	\$31,670	123	149	<b>250/0</b>
Hyundai Kona	\$37,390	258	132	<b>220/0</b>
Ford Fusion	\$26,067	610	103	<b>270/99</b>
Toyota RAV4	\$28,500	600	94	72
Toyota Prius	\$24,525	640	133	<b>200/78</b>
Chevrolet Cruze	\$26,120	500	37	276
Volkswagen Golf(2015)	\$18,000	462	35	267
Volkswagen Jetta(2015)	\$17,000	508	35	260
Toyota RAV4	\$26,250	580	40	223
Honda CR-V	\$25,350	532	38	234
Nissan Rogue	\$25,850	420	33	270

- ❖ Current 15 regular gasoline
  - initial cost(MSRP)=\$**387,250**
  - lifetime fuel cost=\$5643.243\*(15)=\$**84,648.645**
  - lifetime CO2 emissions= **721,242.3 pounds**
- ❖ 6 EV's, 7 hybrids
  - Initial cost (MSRP)=\$**395,668**
  - lifetime fuel cost= \$794.1176\*(6)+\$818.18\*(7)=\$**10,491.97**
  - lifetime CO2 emissions= **148,216.8 pounds**
- ❖ 11 EV's
  - Initial cost (MSRP)=\$**387,053.33**
  - lifetime fuel cost per vehicle=\$794.1176\*(11)+\$5643.243\*(3)=\$**25,665.02**
  - lifetime CO2 emissions= **144,248.5 pounds**

### **Summary**

These calculations were found using vehicles that might not be the exact makes and/or models purchased by the University; however, because these vehicles were found to be the top-sellers in the U.S., and the costs were calculated based on their respective averages, it can be realistically assumed that the general trend for the savings and environmental benefits extend beyond these specifications.

Replacing 12 of the 15 sedans with EV's has the lowest initial cost and generates the least greenhouse gas emissions, but the lifetime fuel cost is greater than replacing all of the sedans with a combination of hybrids and EV's by a margin that far outweighs the difference in initial costs.

### **Maintenance costs**

Electric vehicles have lower operating costs over their life-time compared to regular gasoline powered vehicles because they don't require oil changes, don't have as many moving components as combustion engines, and have regenerative braking. This is significant knowledge to consider because it can offset the initial increased cost of purchasing electric vehicles compared to regular gasoline, especially when considering over 90,000 miles.