



Sundependence

Solar EV Economics 101 for the Exceptional

Solar and EV economics are influenced by many factors - size of house, car, and family, driving patterns, region, season, and more. Regardless, the results are predictably positive and can be best understood by starting with average values and then adjusting them for individual exceptions.

Basic facts/assumptions:

- The average home uses 900 kWh/month or 30 kWh/day
- The average cost of electric energy is \$0.14/kWh in Michigan.
- The average ICE (car/SUV/light truck) travels 37 miles/day, is parked 90+% of the time, and gets 25 miles/gallon at a cost of \$3.00/gallon (assumed).
- The average EV gets 4 miles/kWh at a cost of \$0.14/kWh.

Fuel cost comparison - 17,500 miles/year (48 miles/day)

- ICE = $17,500 / 25 \times \$3.00 = \$2,100.00$ / year
- EV = $17,500 / 4 \times \$0.14 = \612.50 / year
- **EV saves \$1,487.50 annually + 3.5 oil changes**

Maintenance comparison

- ICE - oil, filters, tune up, exhaust, brakes, radiator, transmission, battery, tires, and windshield wipers - the maintenance cost/mile for the average sedan is approximately \$0.40.
- EV - tires and windshield wipers

EV Economics

- The average monthly home electric bill of \$126 will increase \$50.40 to charge an EV traveling 48 miles/day for a total of \$176.40 while saving \$172.80 in gasoline.
- With low cost off-peak overnight or complimentary public charging, the fuel savings can be a net positive and pay for the entire electric bill.

Solar Economics

- The Grid Tied, Grid Zero, and Grid Free solar systems are based on 2 basic sizes - 3.6 kW and 7.2 kW rated with 12 or 24 panels measuring 220 and 440 sq. ft., and an installed cost of \$10,000 and \$20,000 less 26% Federal Tax Credit. The net installed cost for 3.6 kW and 7.2 kW systems is \$7,400 and \$14,600.
- Solar panels have a 30 year performance guarantee and 50+ year life expectancy.
- A solar systems investment value is maintained in the market value of the home and will increase/decrease with the housing market over time.
- The daily return on investment (ROI) is the value of the energy produced.

- In Michigan, 3.6 kW and 7.2 kW solar systems will produce a daily average of 12 kWh/day and 24 kWh/day respectively (more in summer/less in winter).
 - 12 kWh is 40% of average home usage or 48 miles of EV range.
 - 24 kWh is 80% of average home usage or 96 miles of EV range.
- At \$0.14/kWh and \$3.00/gallon, the 3.6 kW and 7.2 kW solar system will produce \$1.68 and \$3.36 worth of electricity or \$6.00 and \$12.00 worth of gasoline daily. The actual ROI is proportional to the percentage of solar energy used for EV charging with 100% EV charging increasing the ROI to the full gasoline value.
- Assuming 17,500 miles/year, a 3.6 kW solar, net cost \$7,400, and a 7.2 kW solar system, net cost \$14,800, will produce the equivalent of 2 and 4 gallons of gasoline/day respectively. During the 30 year solar panel performance guarantee, the present worth of the solar energy produced:
 - To displace gasoline at \$3.00/gallon will be \$65,700 and \$131,750
 - To displace grid energy at \$0.14/kWh will be \$18,375 and \$36,750

Conclusions

- An EV is a superior driving experience by all measures with a lower cost of ownership than a conventional ICE car/SUV/light truck.
- Investing in a solar system yields an excellent return on investment with “zero” waste heat and deadly and destructive emissions.
- Solar charging an EV quadruples the economic and environmental benefits over each technology independently.
- Substituting your actual values for monthly electric usage and cost that vary seasonally, average daily mileage, fuel economy in mpg, and the cost of gasoline. The result will overwhelmingly favor switching to an EV and adding solar panels to your garage.

Recommendations

- Replace your ICE with a pure EV as soon as possible. If you own your car, trade it in for an EV as soon as an EV is available that meets your driving needs. If you lease your vehicle, insist on an EV replacement when your lease is up - or sooner if possible. Most pure EVs qualify for a \$7500 federal credit to lower the purchase price or lease payment.
- Install a solar system on your home this spring and take advantage of the 26% federal tax credit. The least expensive means is Grid Tied if your electric company treats solar customers fairly, If not, a Grid Zero system makes more sense and provides emergency power during outages. More solar panels can be added in the future.

