The Gasoline-Powered Automobile Is Obsolete

Electric Drivetrains Are the Key to Reducing Climate Change Caused by Our Cars & Trucks
Wall Street Analyst Ron Baron:

While many car companies doubt electric cars will ultimately represent a large portion of new car sales, BMW is not one of those companies.

Two of our research analysts recently visited BMW’s headquarters in Munich, as well as its electric vehicle and carbon fiber assembly plants in Leipzig, Germany, and its battery pack assembly plant and research facility in Dingolfing, Germany.

The BMW financial team believes a revolution in drive train is underway. We believe that BMW will likely phase out internal combustion engines over the next 10 years!

--Baron Funds’ Sept. 30, 2014 Newsletter
“Our cars and trucks are a major cause of global warming. Collectively, they account for nearly one-fifth of all U.S. emissions, emitting around 24 pounds of carbon dioxide and other global-warming gases for every gallon of gas. About 5 pounds comes from the extraction, production, and delivery of the fuel, while the great bulk of heat-trapping emissions—more than 19 pounds per gallon—comes right out of a car’s tailpipe.”

--Union of Concerned Scientists
Yet, Less than 20% of the Power in Gasoline Goes to Propel the Vehicle.
Engine Losses: 71% - 75%
thermal, such as radiator, exhaust heat, etc. (60% - 64%)
combustion (3%)
pumping (5%)
friction (3%)

Parasitic Losses: 5% - 7%
(e.g., water pump, alternator, etc.)

Power to Wheels: 14% - 20%
Dissipated as
wind resistance: (3% - 5%)
rolling resistance (3% - 5%)
braking (7% - 10%)

Drivetrain Losses: 4% - 5%

Idle Losses: 6%
In this figure, they are accounted for as part of the engine and parasitic losses.
Slowing Down or Going Downhill, It Gets Worse...


Only Electric Vehicles Allow You to Recapture the Energy Used to Gain Speed or Climb Hills.
Case Study: Regenerative Braking in My Tesla

8.9 Miles from Genesee Exit to I-70 to my office in Golden.

My Tesla generated 1.5 kWh of electricity, while the cars around me burned ~1 quart of gas. Good for another 5 miles travel.
Hybrid Electric Cars Are Somewhat More Efficient...

But Are Not the Answer.
Engine Losses: 65% - 69% thermal (e.g., radiator, exhaust heat, etc.), combustion, pumping losses, and friction

Parasitic Losses: 4% - 6% (e.g., water pump, alternator, etc.)

Drivetrain Losses: 3% - 5%

Energy Recovered by Regenerative Braking: 5% - 9%

Power to Wheels: 27% - 38%
Dissipated as wind resistance: (11% - 16%)
rolling resistance (7% - 11%) braking (9% - 13%)

Idle Losses: Near 0
Electric Vehicles are...

**Energy efficient.** Electric vehicles convert about 59–62% of the electrical energy from the grid to power at the wheels—conventional gasoline vehicles only convert about 17–21% of the energy stored in gasoline to power at the wheels.

www.FuelEconomy.gov
Environmentally friendly. EVs emit no tailpipe pollutants, although the power plant producing the electricity may emit them. Electricity from nuclear-, hydro-, solar-, or wind-powered plants causes no air pollutants.
Performance benefits.

Electric motors provide quiet, smooth operation and stronger acceleration and require less maintenance than ICEs.
Reduce energy dependence. Electricity is a domestic energy source.

And...
Electricity is the only energy that you and I can create at home!
Today’s Sustainability Model Is Here:

A Net Zero Energy home, possible through Solar PV and the removal of natural gas appliances, can also power your personal transportation!
“Okay, But Gasoline-Powered Cars Will Only Be Obsolete When Electric Vehicles Are Practical”

But Wait...
Electric Vehicles Are Practical NOW:

As a **Second Car** for Commuting and Local Use:
  Examples: Nissan Leaf, Smart EV, Fiat 500e

As a **Primary Car** Because of Increasing Battery Range or Range-Extending Gas Engine:
  Examples: Tesla Model S, Chevy Volt, BMW i3
Electric Cars Are Affordable to Buy Because of Federal/State Tax Credits:

Chevy Volt -- $34,170 minus $13,500 = $20,760
Nissan Leaf -- $28,980 minus $13,500 = $15,480
Fiat 500e -- $31,800 minus $13,500 = $18,300
Ford C-MAX -- $31,635 minus $13,500 = $18,135
Tesla Model S 85 -- $79,900 minus $13,500 = $66,400

Note: These Tax Credits Are for Early Adopters - Be One!
**EV’s Cost Less to Operate:**

**Cost per Mile**
- Electric Cars -- 4 cents
- Gasoline Cars -- 15 to 30 cents

**Don’t Forget Maintenance Costs!**
- Electric Cars -- negligible
- Gasoline Cars -- 10 cents/mile (est.)
Don’t Invest in Auto Repair Shops…
The 10 Most Common Auto Repairs (Gas vs. Electric)

Brake Jobs - EV brakes last much longer
Oil Changes -- In my Chevy Volt, every 60,000 miles
Coolant System -- Yes, for battery management & climate control
Tires -- Actually, this is the EV’s highest per mile cost
Ignition System -- EV’s always start
Electrical System -- Less complicated in an EV
Fuel System - In hybrids
Transmission -- No transmission in my Tesla
Exhaust System -- In hybrids
Air Conditioning -- Not fan-belt driven in an EV
Lower Maintenance Cost:

Tesla cars need less service than ICE cars. A standard ICE automobile has more than 2,000 moving parts. Tesla cars have 18 moving parts!

--Baron Funds’ Sept. 30, 2014 Newsletter
My Advice to Americans:

Don’t buy a new gas-powered car. If the type of vehicle you want (e.g., pickup, van, SUV) is not available today, it will be soon. Hang on to your current vehicle just a little longer. The EV you want will be here within 5-10 years at most.
Look at the EVs already available:

<table>
<thead>
<tr>
<th>Nissan Leaf</th>
<th>BMW i3 and i8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart EV</td>
<td>Toyota RAV4 EV</td>
</tr>
<tr>
<td>Fiat 500e</td>
<td>Ford C-MAX Energi</td>
</tr>
<tr>
<td>Kia Soul EV</td>
<td>Ford Fusion Energi</td>
</tr>
<tr>
<td>Honda Fit EV</td>
<td>Honda Accord PHEV</td>
</tr>
<tr>
<td>Mitsubishi iMEV</td>
<td>Porsche Panamera</td>
</tr>
<tr>
<td>Mercedes B-Class</td>
<td>Tesla Model S</td>
</tr>
<tr>
<td>Chevy Volt</td>
<td>Cadillac ELR</td>
</tr>
<tr>
<td>VIA Van &amp; Pickup</td>
<td>Volkswagen e-Golf</td>
</tr>
</tbody>
</table>
Other Countries Are Further Along in the Manufacture and Adoption of Electric Vehicles

Here Are Some Examples:
100% Eléctrica

100% ELECTRIC CAR
FOB U$4,500 TO U$9,000
vehiculoselectricos@yahoo.es

Pure Power
Extreme Efficiency
100% Electric. Zero Emissions.
Our Challenge:
To Hasten the EV Revolution

1) Workplace Charging as an Employee Benefit
2) Get Solar Companies to Promote Oversizing of PV Systems to Power the Family Car
3) Discounted Loan Rates for EV Purchases
4) Media Awareness of Already Affordable EV’s
5) More Manufacturer Promotion of Their EV’s
6) Convince Utilities to Institute Lower Off-Peak Rates
7) Get Tesla to Create a Police Car Model S or Model X

Note: EV’s make great fleet purchases (low downtime)
8) Convince Cab Companies to Purchase Teslas

Tesla Model S automobiles are used as taxis in Vienna (left) and in Norway (right).

There are 167 Tesla Model S taxicabs in service at the Amsterdam airport.