

# What Happened to Low Energy Cars?

Pat Murphy, April 13, 2016



In December 2010, the first few GM Volts and Nissan Leafs were delivered in the U.S. Sales grew rapidly from 17,813 units in 2011, the first full year of sales, to 118,682 units in 2014, the maximum sales year for plug-ins. For hybrids the maximum sales year was 2013, with 495,685 units shipped that year. Hybrid sales declined in 2014 and declined again in 2015 to 384,404 units sold. What happened? Did plug-ins take the market from hybrids?

Table 1 shows the decline in hybrid and plug-in sales as a percent of sales of all cars. As noted above, this percentage peaked in 2013 at 3.8% percent and declined to 2.9% in 2015. The percent of sales declined further to 2.5% for first quarter 2016. This is a remarkable occurrence considering the huge investment and subsidies for such cars.

Year	Hybrids Sales	Plug-In Sales	Hybrid & Plug-In Sales	Sales of All Cars	Hybrid & Plug-Ins % All Cars
2008	314,271		314,271	13,260,747	2.4%
2009	290,272		290,272	10,429,014	2.8%
2010	274,763		274,763	11,588,783	2.4%
2011	268,807	17,813	286,620	12,734,356	2.3%
2012	434,498	53,172	487,670	14,439,684	3.4%
2013	495,685	96,602	592,287	15,531,609	3.8%
2014	452,152	118,682	570,834	16,435,286	3.5%
2015	384,404	114,248	498,652	17,386,331	2.9%
2016-Q1	74,094	28,131	102,225	4,062,321	2.5%

Table 1: Comparison of Hybrids, Plug-Ins and Conventional Cars

Plug-in cars were originally marketed as the next evolution after the conventional hybrid with the implication that hybrid cars would no longer be needed. Table 2 shows the changing market share of the conventional hybrid and plug-in cars. In 2015 hybrids had 77% of the combined hybrid and plug-in market, down from 100% in 2010. It's possible that the subsidies (\$7,500 per car from the federal government) for plug-ins may have taken sales away from hybrids. This subsidy will be exhausted at some point and the hybrids percent of market may rise.

Year	Hybrids Sales	Plug-In Sales	Hybrid & Plug-In Sales	Hybrids % of Hybrids + Plug-Ins	Plug-Ins % of Hybrids + Plug-Ins
2011	268,807	17,813	286,620	93.8%	6.2%
2012	434,498	53,172	487,670	89.1%	10.9%
2013	495,685	96,602	592,287	83.7%	16.3%
2014	452,152	118,682	570,834	79.2%	20.8%
2015	384,404	114,248	498,652	77.1%	22.9%
2016-Q1	74,094	28,131	102,225	72.5%	27.5%

Table 2: Comparison of Hybrids, Plug-Ins and Conventional Cars

Both hybrids and plug-in cars offer a reduction in CO<sub>2</sub> emissions compared to conventional cars. Most of the newer plug-in cars represent a new generation. Hybrid cars such as the latest Prius are now beginning their fourth generation. This is a good time to measure actual CO<sub>2</sub> emissions to determine how effective both hybrids and plug-ins are in reducing greenhouse gases. Tables 3 through 5 show the emissions per mile for the 2016 models. This information provides the latest values to compare hybrids to plug-ins.

The average emissions of the hybrids and plug-ins shown can be compared to the national value of 440 grams of CO<sub>2</sub> per mile for all types of cars sold. The weighted average for hybrids, plug-in hybrids, and battery cars is respectively 241, 246, and 238 grams per mile. The weighted average for all three types of cars combined is 241 grams of CO<sub>2</sub> per mile, 45% less than conventional cars.

<b>2016 Hybrid Car Sales Q1 - 10 out of 51 models</b>				
<b>Company</b>	<b>Model</b>	<b>Q1 2016</b>	<b>Q1 US Share</b>	<b>CO<sub>2</sub>/m</b>
Toyota	Prius Liftback	21,632	28.3%	200
Toyota	RAV4	7,508	10.7%	323
Toyota	Prius C	6,633	9.1%	213
Ford	Fusion Hybrid	5,194	7.2%	254
Hyundai	Sonata	4,436	6.6%	260
Toyota	Camry Hybrid	4,601	6.1%	260
Toyota	Prius V	3,648	4.6%	254
Ford	C-Max Hybrid	2,609	3.8%	267
Lexus	CT200h	2,356	3.4%	254
Lexus	ES Hybrid	2,149	3.1%	267
<b>Totals and Weighted Average</b>		<b>60,766</b>	<b>82.7%</b>	<b>241</b>

Table 3: Hybrid Sales for top 10 models for Q1 2016

Table 3 shows the hybrid car sales for the first quarter of 2016. The top 10 models are selected from the total offerings of 51 models. These models represent 83% of the sales of all models. Note that Toyota and Lexus (Toyota's luxury car division) dominate with roughly an 80% market share. Ford has yet to introduce its latest hybrid models and Hyundai will begin shipping their latest models in late 2016. Chevrolet has introduced its first full hybrid model as part of its Malibu line with shipments in late 2016.

<b>2016 Plug-in Hybrid Car Sales Q1 - 3 out of 14 models</b>				
<b>Company</b>	<b>Model</b>	<b>CY 2016</b>	<b>Q1 US Share</b>	<b>CO<sub>2</sub>/m</b>
Chevrolet	Volt	3,987	35.3%	220
Ford	Fusion Energi	2,751	23.4%	270
Ford	C-Max Energi	1,450	11.5%	270
<b>Totals and Weighted Average</b>		<b>8,188</b>	<b>70.2%</b>	<b>246</b>

Table 4: Hybrid Sales for top 3 models for Q1 2016

Plug-in sales are dominated in the U.S. by Ford and Chevrolet as shown in Table 4. The Volt was the first plug-in hybrid introduced in the U.S. car market. Its 2016 version is now being sold. Ford is still selling the Fusion and C-Max Energi versions with no indications as to when their replacement models will be available.

2016 Battery Electric Car Sales Q1 - 3 out of 14 models				
Company	Model	CY 2016	Q1 US Share	CO <sub>2</sub> /m
Tesla	Model S	6,600	43.5%	250
Tesla	Model X	2,700	23.0%	250
Nissan	Leaf	2,931	15.9%	200
Totals and Weighted Average		12,231	82.5%	238

Table 5: Hybrid Sales for top 10 models for Q1 2016

Table 5 shows that Tesla dominates the U.S. battery electric car market with about 2/3 of all sales. The Leaf has a smaller percentage; however, the Leaf has the most cars sold on a worldwide basis. It has yet to introduce its next generation replacement. Chevrolet has introduced the Chevy Bolt which will be available in late 2016. Tesla has introduced a smaller model, the Tesla 3, to be available in 20 to 24 months.

Worldwide sales of plug-ins in 2015 increased from the previous year as opposed to the decrease in the U.S. Much of this was due to dramatic increases in sales in China. However, plug-ins represent a small part of total sales in 2015 with about 500,000 sold out of a total of about 88 million cars, about one half of one percent.

Almost half of plug-in sales in the U.S. are in California, which has about 12 percent of the nation's population. This shows that in the rest of the U.S., plug-ins have a small market share.

The decline in sales of plug-ins and hybrids in 2015 is often explained by the decrease in gasoline prices. Light vehicle sales (SUVs and pickups) were at a record high during this time. SUV sales increased significantly compared to regular car sales. Plug-in sales remained relatively insignificant with capture rates near one half of one percent nationwide. Hybrid capture rates are much lower too, for the 82% of the population that do not live in California.

It appears that Americans in general are not very interested in making lifestyle changes for lower transportation CO<sub>2</sub> emissions. In a April 16, 2016 article entitled "The Downside of Low Gas Prices", written by John DeCicco, it was estimated that the new EVs sold in 2015 cut CO<sub>2</sub> emissions by roughly 0.26 million metric tons per year. He noted that the market share of vehicles that the EPA classifies as light trucks (including SUVs) for regulatory purposes rose from 33 percent to 40 percent over the past six years and that this seven-point shift from relatively efficient cars to less efficient light trucks implies a CO<sub>2</sub> emissions increase of 1.76 million metric tons per year. That is six times the emissions reduction from EVs.

DeCicco references a 2013 study published by the National Academy of Sciences which concluded that for the next few decades, the most substantial and lowest-cost way to cut automobile CO<sub>2</sub> emissions will be by ongoing improvements of gasoline vehicles. Declining interest in fuel economy across the mainstream market causes more climate harm than the lagging sales of electric cars.