

Research Report
ABOUT Automotive

EV/Hybrid Batteries & Battery Material Suppliers: An automotive market review

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By Roger Schreffler



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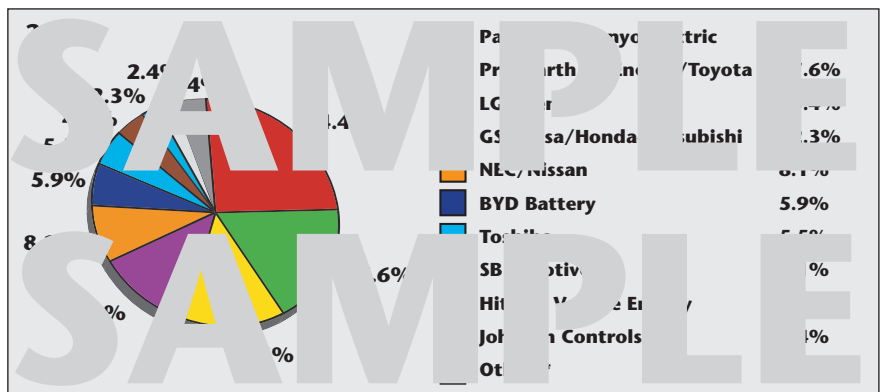
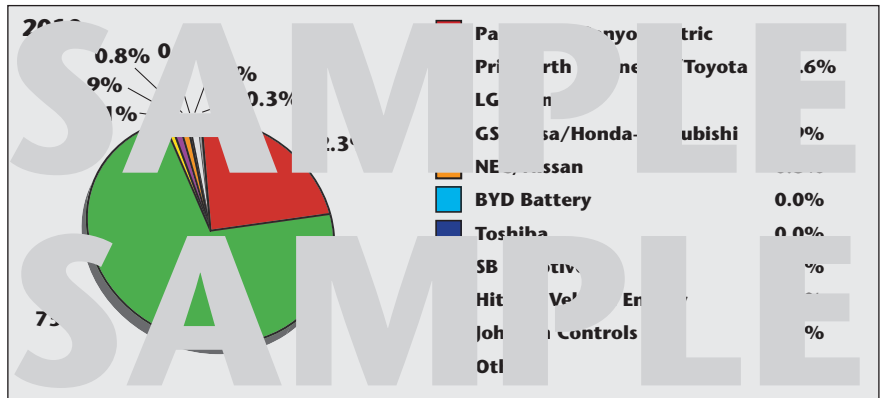
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Appendix 1: Hybrid/EV sales (model level) April 2010 – March 2011

Appendix 2: Hybrid/EV sales (by manufacturer) April 2010 – March 2011

Figure 3: EV-hybrid batteries: manufacturer market shares 2010 / 2020



	2010	2020
Panasonic/Sanyo Electric	22.3%	24.4%
Primearth EV Energy/Toyota	73.6%	17.6%
LG Chem	1.0%	1.0%
GS Yuasa/Honda-Mitsubishi	0.3%	1.3%
NEC/Nissan	0.0%	0.1%
BYD Battery	0.0%	5.9%
Toshiba	0.0%	0.0%
SB LiMotive	0.0%	4.1%
Hitachi Vehicle Energy	0.0%	0.0%
Johnson Controls	0.9%	2.4%
Others*	0.8%	0.9%
Total	100%	100%

* including batteries for idle-stop systems

Source: ABOUT Automotive

Its overall share will drop as lithium-ion batteries emerge as the battery of choice

Primearth EV Energy Co., a Toyota subsidiary, will continue to supply Toyota and Hino in the coming 10 years. But as a specialist in nickel-metal hydride technology, its overall share will drop as other vehicle manufacturers enter the hybrid/EV field and as lithium-ion batteries emerge as the battery of choice.

Note, however, that it is not clear whether Toyota might decide to have Primearth manufacture lithium-ion batteries in some sort of joint venture arrangement with either Panasonic Corp., still holding a 19% equity stake in Primearth, or with Sanyo Electric, a wholly owned Panasonic subsidiary. Primearth produced the lithium batteries inside Toyota's Teiho plant for the first 600 Prius Plug-In Hybrids.

Chapter 3: Vehicle manufacturer strategies

3.1: Hybrids still reign as EV era begins

Japanese vehicle manufacturers will continue to spearhead the industry's move into the hybrid and EV markets in the coming 10 years.

Toyota and Honda, which created the hybrid segment with the Prius and first-generation Insight, will sell nearly 4 million units in 2020, giving them a 55% share of global hybrid sales.

In fiscal 2010, they sold 840,414 units.

Joining Toyota and Honda will be GM, Ford, Hyundai and Volkswagen, all promoting hybrid technology as a more cost-effective alternative to EVs and fuel cell vehicles.

Table 6: Hybrid / EV sales by manufacturer: 2010, 2015, 2020

	COMBINED HYBRID/EV SALES (in million units)			HYBRID SALES (in million units)		EV SALES (in million units)	
	2010	2015	2020	2010	2020	2010	2020
JAPAN BRANDS							
Toyota	0.67(72.2%)	1.41(37.2%)	3.0(60.6%)	0.4(4%)	3.6(50.6%)	0(0.0%)	3(39.0%)
Honda	0.17(18.1%)	0.47(12.4%)	1.3(26.3%)	0.6(6%)	1.0(13.6%)	0(0.0%)	0.3(3.9%)
Nissan	0.01(1.1%)	0.08(4.7%)	0.2(4.0%)	0(0%)	0.05(0.7%)	0.01(0.1%)	0.1(1.3%)
Mitsubishi	0.01(0.9%)	0.02(2.6%)	0.2(4.0%)	0.01(0.1%)	0.01(0.1%)	0(0.0%)	0.1(1.3%)
Others	0.00(0.0%)	0.01(1.3%)	0.15(3.0%)	0(0%)	0.01(0.1%)	0(0.0%)	0.14(1.8%)
Subtotal	0.86(100%)	3.85(100%)	6.0(100%)	0.9(100%)	4.12(100%)	0(100%)	3(100%)
CHINESE BRANDS							
Hyundai	0(0.0%)	0.01(0.3%)	0.44(8.8%)	0(0.0%)	0.35(4.7%)	0(0.0%)	0.09(1.1%)
BYD, Other Chinese ¹	0.00(0.0%)	0.44(11.6%)	1.32(26.3%)	0.00(0.0%)	0.73(9.9%)	0.00(0.0%)	0.60(7.7%)
Subtotal	0.00(0.0%)	0.59(15.6%)	1.76(35.5%)	0.00(0.0%)	1.08(14.6%)	0.00(0.0%)	0.69(9.0%)
U.S. BRANDS							
GM	0.01(1.0%)	0.02(3.2%)	0.02(0.4%)	0(0.0%)	0.32(4.3%)	0(0.0%)	0.01(0.1%)
Ford	0.04(4.5%)	0.04(4.0%)	0.08(1.6%)	0(0.0%)	0.37(4.9%)	0(0.0%)	0(0.0%)
Eaton	0.00(0.0%)	0.00(0.3%)	0.02(0.4%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)
Chrysler, Tesla	0.00(0.0%)	0.00(0.5%)	0.05(1.0%)	0(0.0%)	0.04(0.5%)	0(0.0%)	0.01(0.1%)
Subtotal	0.05(0.6%)	0.06(0.9%)	0.17(0.3%)	0(0.0%)	0.75(10.1%)	0(0.0%)	0.02(0.3%)
EUROPEAN BRANDS							
BMW-Mini	0.00(0.0%)	0.05(1.3%)	0.15(3.0%)	0.00(0.1%)	0.13(1.8%)	0.00(0.0%)	0.02(0.3%)
Mercedes	0.01(1.0%)	0.10(2.6%)	0.09(1.8%)	0(0.0%)	0.09(1.2%)	0(0.0%)	0(0.0%)
PSA ²	0.00(0.0%)	0.08(2.1%)	0.02(0.4%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)
Renault	0.00(0.0%)	0.08(2.1%)	0.02(0.4%)	0(0.0%)	0.04(0.5%)	0(0.0%)	0(0.0%)
VW-Audi	0.00(0.0%)	0.05(1.3%)	0.04(0.8%)	0(0.0%)	0.57(7.6%)	0(0.0%)	0.07(0.9%)
Others	0.00(0.0%)	0.02(2.9%)	0.02(0.4%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)
Subtotal	0.01(0.1%)	0.28(6.7%)	0.30(6.0%)	0(0.0%)	1.0(13.2%)	0(0.0%)	0.09(1.2%)
FC Vehicle/supplier	0.00(0.0%)	0.03(0.8%)	0.07(1.4%)	0(0.0%)	0.10(1.4%)	0(0.0%)	0.07(0.9%)
- Subtotal	0.00(0.0%)	0.03(0.8%)	0.07(1.4%)	0(0.0%)	0.10(1.4%)	0(0.0%)	0.07(0.9%)
TOTAL	0.92(100%)	3.76(100%)	6.13(100%)	0.9(100%)	7.40(100%)	0.02(100%)	2.13(100%)

Source: ABOUT Automotive

(1) Other Chinese include foreign subsidiaries in China

(2) Most produced by Mitsubishi

Projected hybrid sales in 2020, total market: 6.1 million including 2.5 million in North America.

An estimated 1 million units, 15% of the total, will be plug-in types, including range-extenders like the Chevrolet Volt.

If Hyundai can sell the car profitably it will signal the beginning of the end for nickel-metal hydride batteries

The Sonata Hybrid, which employs a lithium-polymer battery, will help determine the timing of the industry's switchover from nickel-metal hydride to lithium for conventional hybrids. If Hyundai can sell the car profitably, overcoming the battery's cost penalty, it will signal the beginning of the end for nickel-metal hydride batteries. The Buick LaCrosse, which incorporates a mild hybrid system as a standard feature, could lead the way for more mild hybrid offerings if consumer response is positive.

Similarly, Nissan's Leaf and Mitsubishi's i-MiEV provide the first major test for pure electric cars in North America, Europe and Japan while BYD's e6, still limited to fleet operations, will signal whether China's commitment to electrification is realistic.

Not to be forgotten, Ford and Toyota's joint hybrid program could well decide if full-size SUVs and pickup trucks can maintain their market in North America if gas prices rise above \$4/gallon.

3.2: Toyota

Toyota, the first vehicle manufacturer to mass-produce a hybrid car, estimates that hybrids will account for 30% of its global sales by 2020. We believe 25% is more realistic given that more than half of industry growth in the coming 10 years will be in emerging markets where hybrids and EVs are generally unaffordable. Thus we expect the auto maker to sell 2.9 million units, combined hybrids and EVs, out of estimated global sales of 11.4 million.

In fiscal 2010, Toyota sold a record 670,388 hybrids of which 72% were Priuses. Cumulative hybrid sales, dating back to the 1997 Prius launch, have grown to 3.5 million units. Including models produced outside Japan (see table 7), the overseas sales ratio now stands at 47%.

Toyota currently sells 12 main hybrid models including five through its Lexus channel – namely, the LS600h, GS450h, RX450h, HS250h and CT200h. The auto maker, which remodeled the Camry Hybrid in November 2011, plans to add five all-new or revamped models by the end of 2012. Among them: the Prius wagon, whose April launch was delayed by the March 11th earthquake and tsunami; the Prius c, to be sold as the Aqua in Japan; and the Prius Plug-In Hybrid.

The Prius wagon, featuring 58% more cargo space and an 8-cm longer wheel base than the standard Prius, is now scheduled to hit dealer showrooms in December 2011. The remodeled Camry Hybrid, which is produced in the U.S., Australia, Thailand and China, will be launched in the same time frame while the Prius c, which debuted at the Detroit Auto Show in January 2011 and is designed to compete with the Honda Insight, is due out in early 2012.

By 2020, Toyota plans to offer a hybrid for each vehicle series in its lineup

By 2020, Toyota plans to offer a hybrid for each vehicle series in its lineup.

Several years ago, the auto maker set a one million hybrid sales target for early in this decade. The target was predicated on hybrids accounting for 10% of its global sales which at the time were on track to reach 10 million units by 2012.

Meanwhile, Toyota will begin the switch to lithium batteries for conventional hybrids with the Prius wagon launch although it is unlikely this application will be more than a one-off to create space for an extra row of seats in the seven-seater version of the car. The five-seater version, as with other Toyota hybrids, will use a nickel-metal hydride battery supplied by the auto maker's main battery supplier and subsidiary,

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