

Research Report
ABOUT Automotive

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

January 2012

By Roger Schreffler



Contents

1	Executive Summary
5	Chapter 1: EV and Hybrid Batteries
5	1.1: Battery trends – the market
9	1.1.2: The power of Toyota
9	1.1.3: Post-2020
10	1.2: EV/Hybrid battery manufacturers
11	1.3: EV Battery manufacturer review
11	1.3.1: GS Yuasa Corp. (Lithium Energy Japan)
11	1.3.2: GS Yuasa Corp. (Blue Energy Co. Ltd)
13	1.3.3: Hitachi Vehicle Energy Ltd.
15	1.3.4: Johnson Controls Inc. and Saft Groupe SA
17	1.3.5: LG Chem Ltd.
19	1.3.6: Mitsubishi Heavy Industries Ltd.
19	1.3.7: NEC Corp. (Automotive Energy Supply Corp.)
21	1.3.8: Panasonic Corp.
23	1.3.9: Primearth EV Energy Co.
26	1.3.10: BYD Battery Co.
26	1.3.11: Sanyo Electric Co.
28	1.3.12: SB LiMotive
29	1.3.13: Toshiba Corp.
32	Chapter 2: Automotive battery material supplier market
32	2.1: Japanese dominance
33	2.2: The market
33	2.2.1: Separators
34	2.2.2: Anode materials
34	2.2.3: Cathode materials
35	2.2.4: Electrolytes
36	2.2.5: Electrolyte salt
36	2.3: Japanese material manufacturers
36	2.3.1: Asahi Kasei
37	2.3.2: Celgard
38	2.3.3: Toray Tonen Specialty Goro Kaisha
38	2.3.4: Sumitomo Chemical Co., Ltd.
38	2.3.5: Mitsui Chemicals
39	2.3.6: UBE Industries
40	2.3.7: Hitachi Chemical Co., Ltd.
40	2.3.8: Showa Denko K.K.
41	2.3.9: Nippon Power Graphite Co., Ltd.
41	2.3.10: Mitsubishi Chemical Corp.
42	2.3.11: Tanaka Chemical Corp.
43	2.3.12: Toda Kogyo Corp.
43	2.3.13: Kanto Denka Kogyo Co., Ltd.
43	2.3.14: Kureha Corp.
44	2.3.15: JSR Corp.

45 Chapter 3: Vehicle manufacturer strategies

- 45 3.1: Hybrids still reign as EV era begins
- 46 3.1.1: Six key vehicles to watch
- 47 3.2: Toyota
- 50 3.3: Honda
- 50 3.3.1: Honda EV and plug-in hybrid strategy
- 52 3.4: Mitsubishi
- 54 3.5: Nissan
- 56 3.5.1: Carlos Ghosn makes strong case for EVs
- 59 3.6: Suzuki, Mazda and other Japanese manufacturers
- 62 3.7: Japanese truck and bus manufacturers
- 63 3.8: North American OEMs
- 65 3.9: European OEMs
- 69 3.10: Asia OEMs

List of tables

- Table 1: Lithium battery cost targets (per kWh)
- Table 2: Energy efficiency by major vehicle types
- Table 3: Battery-Vehicle manufacturer ties
- Table 4: Lithium Energy Japan's plant investment history
- Table 5: Primearth batteries by model and type
- Table 6: Hybrid / EV sales by manufacturer: 2010, 2015, 2020
- Table 7: Toyota's overseas plants that produce hybrids and EVs
- Table 8: Countries where the Mitsubishi i-MiEV is being sold
- Table 9: Nissan's plant investment
- Table 10: Countries where the Nissa Leaf is being sold
- Table 11: Prefectures offering EV incentives
- Table 12: Japanese government hybrid and EV penetration plan
- Table 13: Nissan Leaf sales price by market

List of figures

- Figure 1: Global Automotive EV battery forecast (in units): 2010, 2015, 2020
- Figure 2: Global Automotive EV battery forecast (in value): 2010 / 2020
- Figure 3: EV-hybrid batteries: manufacturer market shares 2010 / 2020
- Figure 4: Hitachi Vehicle Energy's latest lithium-ion battery module
- Figure 5: LG Chem battery pack for the Chevrolet Volt
- Figure 6: Chevrolet Volt powertrain layout with LG Chem lithium-ion battery pack
- Figure 7: Nissan Leaf battery pack cutaway
- Figure 8: Nissan Leaf battery assembly
- Figure 9: Nissan Leaf battery mounting
- Figure 10: Primearth's NP2.0 6-cell module structure
- Figure 11: Primearth's NP2.5 battery pack
- Figure 12: BYD's lithium-ion phosphate (FE) battery
- Figure 13: Sanyo Electric's new lithium-ion battery plant
- Figure 14: SB LiMotive's lithium-ion battery and module
- Figure 15: Toshiba's SCiB battery module
- Figure 16: Battery system for the Honda EV-neo scooter
- Figure 17: Breakdown of lithium-ion battery costs by material
- Figure 18: Separator demand: 254 million sq.m (2009)
- Figure 19: Anode material demand: 18,652 tons (2009)
- Figure 20: Cathode material demand: 30,845 tons (2009)
- Figure 21: Electrolyte demand: 12,520 tons (2009)
- Figure 22: Electrolyte salt demand: 3,780 tons (2009)
- Figure 23: Toyota Prius Plug-In hybrid
- Figure 24: Toyota Prius Plug-In hybrid lithium-ion battery
- Figure 25: Honda Fit EV
- Figure 26: Mitsubishi i-MiEV powertrain layout
- Figure 27: Mitsubishi i-MiEV EV system layout

- Figure 28: Nissan Leaf EV
- Figure 29: Mazda Demio
- Figure 30: Suzuki Swift Plug-In hybrid
- Figure 31: Hino Dutro nickel-metal hydride battery pack
- Figure 32: Chevrolet Volt
- Figure 33: Ford Focus Electric powertrain
- Figure 34: Eaton's hybrid system
- Figure 35: Mini E powertrain
- Figure 36: Audi A1 e-tron powertrain
- Figure 37: Renault's EV lineup
- Figure 38: Volvo V60 Plug-In hybrid
- Figure 39: Hyundai Sonata Hybrid powertrain
- Figure 40: BYD F3DM Plug-In hybrid

Appendices

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

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