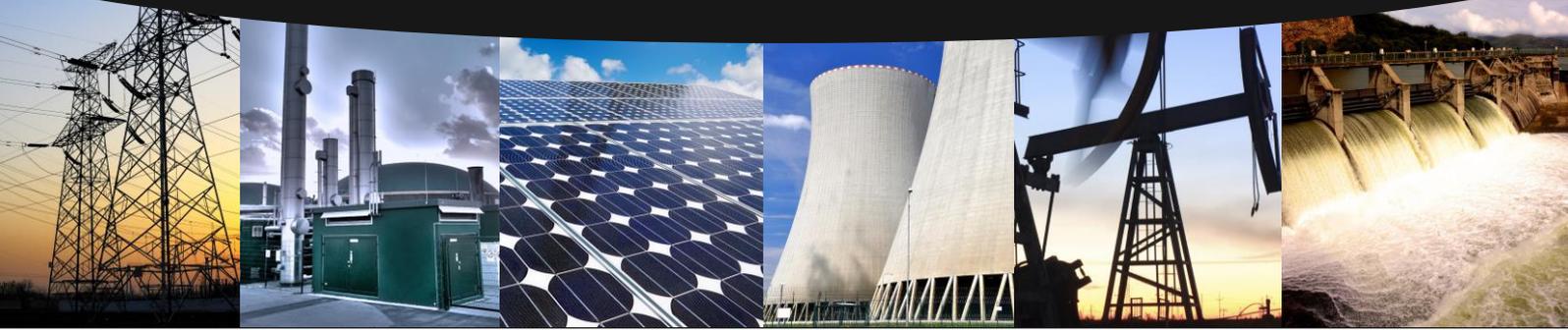




NRGExpert
Energy Intelligence

Analyst Briefing



This Analyst Briefing was prepared by NRG Expert

We hope you find it both interesting and informative and we would welcome your feedback.

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NRG Expert Analyst Briefing 22 May 2013: Battery Fueling Limited

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Company Information



Battery Fueling Limited is a U.K. registered company with U.S. patent-pending electric vehicle refueling technology. NRG Expert believes that Battery Fueling Limited is currently looking to commercialize its patent pending technology and is seeking investors and/or buyers of the technology.

Address: www.batteryfueling.com

Technology & Patent

One of the primary challenges to further adoption of the electric vehicle has been range limitations and the lengthy recharge times associated with them – at present, most electric vehicles can travel less than 200 km on a single charge and typically require hours of recharging time to regain full capacity. The holy grail of the electric vehicle market would be a refueling technology that allows for the same ease and convenience of traditional gasoline stations. While several companies are working towards solutions, Battery Fueling has brought a number of unique concepts to the table, including:

- A system that allows for the specific desired amount of motive energy to be purchased at the battery fueling station, rather than an entire battery swap (in which the remaining power in a partially charged pack would be lost) as in the Chaney US patent 6,631,775.
- A Battery Fueling process that takes only a few minutes.
- Removing the prohibitive cost of the electric vehicle battery (often as much as 50% of the entire purchase price of the vehicle) from the hands of the consumer.

Commercial Advantages

There are a number of important commercial advantages including:

- The quick refueling process gasoline-powered vehicle drivers are accustomed to, thus removing one of the key anxieties around electric vehicle purchase.
- It preserves the globally understood, pump-like interface.
- Ownership of the batteries is taken out of the hands of the vehicle owner, reducing the cost of the vehicle and creating a battery pool managed by an intelligent energy system with powerful support facilities akin to the fossil fuel energy providers.



- Control of the refueling business remaining in the hands of the forecourt companies.
- A refuelling process that is local and can be accomplished via eco-friendly means.
- Eco-friendly power generation can be a visible aspect of the refueling experience, e.g. prominent wind or solar installations.
- Few or no delivery costs of new fuel.
- Remaining energy is not lost during the refueling process, as it would be in a scenario involving an entire battery pack swap.
- The system can identify and remove faulty cell-modules before they become a problem or cause damage to the vehicle.

Market Analysis

The vehicle market itself is one of the biggest in the world and the electric vehicle sector is expanding rapidly:

- In 2012 alone, United States refineries sold 356,727,700 barrels of gasoline to retail distributors.¹
- Worldwide, 113,000 electric vehicles were sold in 2012 and an estimated 3.8 million will be sold yearly by 2020.²

Growth has been encouraged by considerable government incentive programs throughout the world. Some programs include:

- The United States.
 - The federal government will offer tax credits for both plug-in electric vehicles³ and converted plug-ins.⁴
 - The government of California offers rebates of up to USD 5,000.
 - Various other American states have offered incentives, ranging from tax credits to lower licensing fees.

¹ From: <http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pets&s=a103600001&f=m> Retrieved May 21, 2013

² From: source: <http://www.forbes.com/sites/tjmccue/2013/01/03/worldwide-electric-vehicle-sales-to-reach-3-8-million-annually-by-2020/> Retrieved May 21, 2013

³ From: http://www.irs.gov/irb/2009-48_IRB/ar09.html Retrieved May 21, 2013

⁴ From: <http://energy.gov/savings> Retrieved May 21, 2013



- Canada.
 - Ontario offers a rebate of between CAD 5,000 – CAD 8,500 on new vehicle purchase⁵, green license plates for eligible vehicles that allow use of carpool lanes regardless of passenger number and use of charging stations at provincially-owned parking lots.⁶
 - Quebec offers a rebate of CAD 8,500 on the purchase of an electric vehicle with CAD 50 million earmarked for the program.⁷
 - British Columbia will offer rebates of CAD 5,000 per clean energy vehicle.⁸
- China.
 - In 2010 the Chinese government announced that it would provide incentives of up to 60,000 yuan to the purchase of battery electric vehicles and 50,000 to the purchase of plug-in hybrids for the cities of Shanghai, Shenzhen, Hangzhou, Hefei and Changchun.⁹
- The United Kingdom.
 - The “Plug-in Car Grant offers a reduction of 25% towards the cost of a new plug-in car across the UK.¹⁰
 - This grant was extended in 2012 to include 20% towards the purchase of an electric van.¹¹
 - The “Plugged-In Places” program offers match-funding to the development of recharging points across the UK.¹²
- Japan.
 - The “Green Vehicle Purchasing Promotion Measure” provides tax exemptions and deductions for environmentally friendly vehicles.¹³

⁵ From: <http://www.mto.gov.on.ca/english/dandv/vehicle/electric/ev-faq.shtml#incentive> Retrieved May 21, 2013

⁶ From: <http://news.ontario.ca/mto/en/2010/06/ontario-paves-the-way-for-electric-vehicles.html> Retrieved May 21, 2013

⁷ From: <http://vehiculeselectriques.gouv.qc.ca/english/pdf/action-plan.pdf> Retrieved May 21, 2013

⁸ From: <http://energycenter.org/index.php/incentive-programs/clean-vehicle-rebate-project> Retrieved May 21, 2013

⁹ From: <http://wheels.blogs.nytimes.com/2010/06/02/china-to-start-pilot-program-providing-subsidies-for-electric-cars-and-hybrids/> Retrieved May 21, 2013

¹⁰ From: <http://www.telegraph.co.uk/motoring/green-motoring/7316351/5000-grant-to-buy-plug-in-electric-cars.html> Retrieved May 21, 2013

¹¹ From: <https://www.gov.uk/government/publications/plug-in-van-grant> Retrieved May 21, 2013

¹² From: <https://www.gov.uk/government/policies/reducing-greenhouse-gases-and-other-emissions-from-transport/supporting-pages/ultra-low-emission-vehicles> Retrieved May 21, 2013

¹³ From: <http://www.evaap.org/pdf/incentive.pdf> Retrieved May 21, 2013



- Purchases of new electric vehicles are eligible for subsidies of between 100,000 yen and 250,000 yen (the latter if a used, gasoline car is also scrapped).¹⁴

Innovation & New Product Development

While battery swapping companies do exist, this technique offers some important advantages:

- Charge added to the cells at home by the consumer is not lost – rather, only the depleted cells are swapped out, allowing for a precise amount of electricity to be purchased.
- Damaged or dangerous cells can be identified and removed before they can harm the vehicle.
- Cell swapping can be accomplished rapidly and in a format similar to existing gasoline service stations.

NRG Expert Outlook

Despite considerable challenges relating to range and charging infrastructure, the electric vehicle market is already growing and this trend is likely to continue:

- 113,000 total units were sold worldwide in 2012.¹⁵
 - 52,835 in the United States.¹⁶
 - 12,791 in China.¹⁷
- 3.8 million units will be sold annually by 2020.
- Tesla Motors anticipates sales of over 20,000 units in 2013 – a success story that proves that a significant market for high performance electric vehicles exists.

Access to convenient, fast, and familiar charging methods has remained one of the biggest hurdles that the electric vehicle industry has yet to overcome. While other companies have developed concepts to address this issue, Battery Fueling Limited has taken a novel approach. If implemented, NRG Expert believes that this technology could usher in a new electric vehicle fueling standard and be the key to the success of the electric vehicle.

¹⁴ From: <http://jama.org/pdf/FactSheet10-2009-09-24.pdf> Retrieved May 21, 2013

¹⁵ From: http://www.iea.org/publications/globalevoutlook_2013.pdf Retrieved May 21, 2013

¹⁶ From: <http://www.electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952> Retrieved May 21, 2013

¹⁷ From: <http://www.cars21.com/news/view/5227> Retrieved May 21, 2013