



**For Immediate Release**

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## **Patent Powers Up Firefly Energy's Drive to Market Ground-Breaking Graphite Foam Battery**

*Foundational Patent Awarded in December to Caterpillar Spin-out*

PEORIA, IL —Jan. 17, 2006 -- Firefly Energy ([www.fireflyenergy.com](http://www.fireflyenergy.com)) has received a U.S. patent for a new lead acid battery technology that it believes has the potential to revolutionize the existing \$16 billion worldwide lead acid battery market as well as serve applications like hybrid electric vehicles which historically aren't suitable for lead acid batteries.

The Peoria, IL-based company, which was formed to create the next generation of lead acid battery technology based on a material sciences innovation discovered by Caterpillar Inc., said the U.S. Patent and Trademark Office has issued patent number 6,979,513, titled, "Battery Including Carbon Foam Current Collectors." The patent was awarded on December 27, 2005.

The invention is a battery comprised of an electrical current collector constructed of carbon or lightweight graphite foam. This foam exhibits a sizeable increase in surface area for chemical reactions to take place and eliminates the need for heavy lead plates found in traditional batteries. The graphite material resists corrosion and sulfation build-up, thus contributing to longer battery life and is lighter in weight than today's lead acid batteries.

Firefly Chief Scientist Kurtis C. Kelley developed the technology while serving as senior research scientist in the advanced materials division of Caterpillar's R&D center.

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Kelley was assigned the problem of pursuing increased performance for lead-acid batteries used by Caterpillar's product groups. The challenges that Kelley faced were manifold. First among them were how to address the main performance challenges of a lead acid battery:

- Short life caused by corrosion (of the battery's positive plate) and sulfation (of the battery's negative plate).
- Removing the bottlenecks to realizing the theoretical power and capacity of the lead acid chemistry itself.

Since Kurt, an accomplished material scientist, had never designed a battery before, his problem-solving approach was unconstrained by the conventional battery wisdom held by lead acid battery technologists, says Edward F. Williams, CEO and a co-founder of Firefly Energy.

Performance improvements in lead acid batteries are realized through better utilization of surface area, he adds. The overwhelming restriction to lead acid battery efficiency to this point has been the lack of interface area between the active chemistry and the electrodes. Today, the chemistry is capable of delivering approximately 170 Watt Hours per Kilogram (Whr/kg), yet lead acid batteries only average around 30 Whr/kg. Up to now, achieving a higher surface area within a given lead-acid battery box required the addition of more and thinner lead electrodes. However, lead electrodes corrode, so increasing surface area by putting thinner lead electrodes in the battery increases corrosion and decreases battery life.

By removing the corrosive heavy lead grids and replacing them with a graphite foam, Kurt Kelley's invention has helped unleash the innate power of lead acid chemistry, adds Williams. It introduces a material that doesn't corrode and enables the weights and sizes of lead acid batteries to be reduced significantly.

Williams concluded, We congratulate Kurt on this patent award which represents a major corporate milestone.

Mil Ovan, senior vice president and Firefly Energy's other co-founder, believes the invention also addresses important environmental problems. One of the reasons Firefly was picked as the name of our company was because it's a green technology, since our battery's design drives one-half to two-thirds of the lead out of the battery through use of the graphite foam composite material. The graphite form is also easily recyclable through the existing infrastructure of lead acid battery recycling.

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## About Firefly Energy

Firefly Energy ([www.fireflyenergy.com](http://www.fireflyenergy.com)) is a Peoria, Illinois-based company which has developed a next generation lead acid battery technology that has the opportunity to address major portions of the \$30 billion worldwide battery marketplace. Firefly's graphite foam-based battery technology can deliver a unique combination of high performance, extremely low weight, low cost and, all in a battery which utilizes the best aspects of lead acid chemistry while overcoming the corrosive drawbacks of this same chemistry. This product technology delivers to battery markets a performance associated with advanced battery chemistries (Nickel Metal Hydride & Lithium), but for one-fifth the cost, and can be both manufactured as well as recycled within the existing lead acid battery industry's vast infrastructure. The Company was formed after its technology, technical founder, and initial seed funds were spun out of Caterpillar, Inc. ([www.cat.com](http://www.cat.com)), a Fortune 90 company, in May 2003, and is headed by co-founders Edward Williams (CEO), Mil Ovan (Senior VP), and Kurtis Kelley (Chief Scientist). Investors include Caterpillar (NYSE: CAT), BAE Systems ([www.baesystems.com](http://www.baesystems.com)) (London Stock Exchange over the counter symbol: BAESY), Chicago-area Venture Capital firm KB Partners ([www.kbpartners.com](http://www.kbpartners.com)), the State of Illinois Illinois Finance Authority, and Electrolux ([www.electrolux.com](http://www.electrolux.com)) (SSE: ELUX-B).

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