

BUSINESS CASE – PAPER BATTERY COMPANY, INC

Technology on which company is based: The Rensselaer Polytechnic University nanocomposite device innovation being commercialized by the Paper Battery Company enables the integration of a high energy density supercapacitor as an active architectural component for end devices. These conformable, scalable PowerWrapper™ devices will be manufactured by inserting customized modules into established, scalable roll to roll, print forming technology, allowing the technology platform to meet needs of diverse, fast changing markets.

Funding Stage: Seed capital raised.

Business and Business Model

1. Inception: July 2008

2. Value Proposition: A disruptive energy storage technology with structural integrity, can be used to reduce size, weight or address innovative structurally integrated power needs, enabling new product innovation in existing or emerging markets that cannot be addressed by current rigid devices.

3. Current Corporate Structure: C-corporation, Privately held.

4. General Description: The company will establish strategic partnerships and direct sales with original equipment manufacturers (OEMs). Market stratification with end-customization will allow the company to build production volume upstream, improve product performance incrementally, while building customer base, and stay focused on maintaining and improving gross margins. Additional revenue streams will be derived from licensing technology platform to battery companies and other product partnerships.

Product

1. Product: The PowerWrapper technology - a flexible supercapacitor as a structural component that provides power and enables size and weight reduction as an architectural component.

2. Function and Benefit: The nanocomposite device innovation being commercialized by the company integrates a higher energy density power source into structural components of end applications, giving designers and architects a choice of using an active structural component (the PowerWrapper™). Examples include the use of the Power Wrapper technology as roof substratum sheeting or paneling to provide power conditioning or surge power with renewable in buildings or to fast-charge electric vehicles in garages, as casings or linings that can replace or enhance the battery in portable devices, and enable novel product designs. These structurally-integrated, fast-charging, long cycle life power storage devices can allow designers to shrink batteries and make OEM devices lighter and more compact. The “PowerWrapper” technology is scalable and customizable, enabling OEM customers to launch new innovative products, creating unique value propositions in established and new markets and thus expand markets.

3. Development Stage: The product is currently in laboratory prototype mode.

Competitive Position

1. Competitors:

Energy storage is a highly competitive marketplace, but is fragmented, with many existing large and small supercapacitor and battery manufacturers. However, no other company currently sells flexible, structurally integrated supercapacitors, as existing device construction and manufacturing methods require encapsulation in metal cylindrical can and yield a rigid form factor.

2. Edge over competition:

- Structurally integrated, conformable supercapacitors sold by the sq ft are a breakthrough in an industry dominated by rigidly packaged products.
- Conformable architecture supercapacitors with high energy density (>10 Whr/kg) can be produced using a high volume roll to roll manufacturing process that can produce “cut to fit” scalable end product.
- Fault or damage tolerant devices
- Laboratory stage devices have been shown to be functional over 195K to 450K (160C to -60C)

3. Sustainability: The company’s product is planned as a “cut-to-fit”, customizable energy storage unit, sold by the sq ft or sq meter. Additionally, the company has a plan to develop products at significantly higher energy densities, enabling further market expansion.

4. IP Protection: The company holds an exclusive license from RPI to a key platform technology patent. Blocking patent portfolio is under development with additional provisional filings in progress.

Markets

1. Target Markets: Portable, non-consumer electronic devices where a supercapacitor is the only energy storage unit for quick recharge and short duty cycle applications is a targeted entry market. Military applications are also being pursued as entry markets for this technology as are flexible PV markets. The company plans to use these early markets to build and optimize its manufacturing base, lower costs and reach higher energy densities, in order to target the large format and high volume architectural materials market, where the PowerWrapper™ would be added into the building as an active substratum or paneling to provide power conditioning or surge power.

2. Barriers to Entry: The IP around the nanocomposite device, the architecture and design patents around the PowerWrapper™ and proprietary manufacturing processes are quite different from established supercapacitor companies and technology base. Changing to novel manufacturing methods is hard for established companies in this space and our lead time in this area will give us a 2 year window over competition.

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