

Covington Technologies

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Sam Covington: Chief Executive Officer

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*Plan prepared May 2011
By the Corporate Officers*

EXECUTIVE SUMMARY



Summary Description of the Business

Covington Technologies is a company that designs, develops, and commercializes advanced products and services to support the electricity grid. The company will focus mainly on commercializing its first product the *IMAR*, which is an improved version of modern Flywheel technology.

Mission

At *Covington Technologies*, our mission is to manufacture energy storage products that aim to reduce our reliability on current methods that are detrimental to the environment.

Problem

Energy travels from places of generation, through utility companies, to consumers. The U.S government requires a strict rate of distribution for this energy, 60 Hz. Utility companies must maintain this frequency by balancing peak load demand and supply of energy. In order to meet this compliance, utility companies use generators.

Generators however, are neither energy nor environmentally efficient due to using oil to produce energy “on demand.” Oil loses energy as heat waste when burned, but is economically viable because it is cheap to store and transport. Despite these advantages, the price of oil is rising considerably and its effects on the environment are causing a transition to renewable energy sources.

By 2020, California is expected to reach a renewable energy portfolio of 33%. But in order to reach this goal, the cost of renewable energy must be lowered. The problem with renewable energy is not its generation, but in its distribution. Renewable energy sources, such as wind and solar, are variable by nature. If the wind isn't blowing, or the sun isn't shining, the loss of energy must be found from elsewhere, in most cases generators.

Solution

The solution to renewable energy problem is storage. By rerouting excess energy gathered during peak supply to storage devices, utility companies are able to react to peak demand without relying on oil. Covington Technologies combines proven flywheel technology with maturing superconductor technology.

Flywheel technology has been commercialized and shown to be an efficient and clean way to regulate the grid. Superconductor technology is new to the utility industry, but is receiving government attention for its ability to provide resistance free energy storage. For further information refer to the "Proposed Product" section.

Market

The main target market for Covington Technologies is power-grid regulation, also known as ancillary services for the energy market. California alone spent \$8.45 million on ancillary services in 2010.¹

Ancillary services include balancing energy demand and supply, as well as keeping a certain amount of energy available for emergencies and major variations in load demand and supply. The California ISO implemented a 25% minimum generation requirement for San Diego and Humboldt in order to ensure power would be available for emergencies.²

This means that generators must provide energy equal to 25% of the total power San Diego provides on a standard day. This policy has led to higher costs of energy generation, though no specifics have been calculated.³

It is clear from these actions that the California ISO is looking for an efficient and cost-effective way to store and regulate energy in California. In addition to a minimum generation requirement, the California ISO has

a goal of providing 33% of all power through green technology such as solar and wind by 2020.⁴

The problem they are facing, however, is maintaining grid reliability. This is where flywheel technology can help. Flywheel technology has been proven to store energy and effectively regulate the power grid.⁵ When combined with superconductors, many of the weaknesses of modern flywheels are mitigated.

There has been a lack of investment in flywheel technology, however, because of confusion about regulation market rules.⁶ This barrier is beginning to become less of an issue as competitors such as Beacon Power, A123 Systems, and ABB have been able to secure funding from the U.S. Department of Energy.

Our market consists of power providers in the United States including, but not limited to all of California's electric providers:

- Alameda Municipal Power
- Anaheim Public utilities
- Azusa Light & Water
- City of Palo Alto Utilities
- Bear Valley Electric
- Burbank Water & Power
- Colton Public Utilities Glendale Public Service Department
- Gridley Municipal Utilities
- Healdsburg Municipal Electric Department
- Los Angeles Department of Water and Power
- Mountain Utilities

These companies are listed as possible partners, but Covington Technologies will be able to provide their service across the United States, thus expanding this list.

¹ California Independent System Operator, or ISO, Monthly Market Report March 2011
<http://www.caiso.com/2b6c/2b6cba3272f40.pdf>

² ISO Technical Bulletins: <http://www.caiso.com/2381/2381f87327f70.html>

³ California ISO Quarterly Report on Market Issues and Performance, February 8, 2011:
<http://www.caiso.com/2b1f/2b1f838819910.pdf>

⁴ California ISO-Renewables: <http://www.caiso.com/green/greenhome.html>

⁵ Beacon Power: <http://www.beaconpower.com/solutions/frequency-regulation.asp>

⁶ (Market Analysis of Emerging Electric Energy Storage Systems by Dr. Rahul Walawalkar and Dr. Jay Apt: <http://www.netl.doe.gov/energy-analyses/pubs/Final%20Report-Market%20Analysis%20of%20Emerging%20Electric%20Energy%20Storage.pdf>).

Proposed Product

Covington Technologies is currently developing its first product named the IMAR. The IMAR is a device that partners both Superconductor Magnetic Energy Storage (SMES) along with Flywheel energy storage devices. The IMAR is in short a high efficiency energy storage device.

The problems with current SMES systems are that although they are extremely efficient, the cost to benefit ratio is high due to the constant need for cryogenic refrigeration. Cryogenic refrigeration keeps the superconductor at freezing temperatures (~4 Kelvin), but requires outside energy which is costly. But with the refrigeration aside, SMES has the quickest energy discharge rate. With SMES ability to store energy without resistance it means that energy sent in will nearly equal the amount out, resulting in little energy waste. SMES devices provide short term response energy storage, and are used when rapid power delivery is desired. These are used when power quality is significant instead of large energy storage capacity. Similarly, batteries can be used for both bulk energy storage as well as short-term power quality applications. However, batteries are associated with environmental and durability problems which is why the IMAR will be used with renewable energy.

With flywheels electricity is stored as the rotational kinetic energy of the disc. Friction must be kept to a minimum to prolong the storage time. This is often done by placing the flywheel in a vacuum and using magnetic bearings to keep it from generating heat due to friction, tending to make the method expensive. Larger flywheel speeds allow greater storage capacity but require stronger materials such as steel or composite materials. Since the IMAR uses a magnetic bearing it is able to spin at speeds up to 35,000 RPM. Using a magnetic core, and with the

added electromagnetic driving system, it is actually able to spin as fast as the material will allow, possibly up to 50,000 rpm. Some materials could include woven carbon nanotubes, or hemp plastics, to add onto the outer casing of the flywheel core to make the system more ridged.

The way that this system works is through energy conversions. When collecting large continuous amounts of energy, the SMES system is in use. When storing the energy for prolonged periods of the flywheel is in use. SMES systems are less cost effective the longer they are running, due to cryogenics, the transfer of energy to the flywheel will allow the power that would have been lost to the cryogenics to be saved for future use inside the rotating flywheel.

For example, a system that has a flywheel whose mass is about 50 kg with a diameter of a meter and spinning at 23,000 rpm could store 20Kwh.

The system becomes more cost effective the more flywheels that are placed together because the cryogenics system is roughly \$60,000 dollars alone and plus the cost of the SMES. The cost per IMAR would be about \$90,000 for a system that can store roughly 20 KWh and each system after that would be about \$30,000 per additional 20KWh Flywheel System so a 100KWh system would cost about \$190,000

With funding, the first IMAR would be developed by January 2012.

Advantages of the IMAR:

- 100% clean energy storage
- Compatible with renewable energy sources
- 20-year lifetime
- Able to store large amounts of energy for prolonged periods of time
- Proven technology tested in the market place
- Saves more energy than competitors' technology

Pipeline:

- Get funding to finish research
- Finish research and development for the prototype and attain a SMES system
- Integrate SMES system with the IMAR flywheel
- Go through testing with trial and error
- Make modifications and test again (if needed)
- Have final product by December 15 and first one fully created by January 1st

Competition

1. Description of Major Competitors

Beacon Power Corporation - The Company's primary business strategy is to build merchant plants and sell turnkey regulation facilities to meet both domestic and international grid requirements using its patented flywheel energy storage technology. Its flywheel technology stores and recycles energy on an emissions-free basis; and provides frequency regulation and energy balancing services for the electricity grid, utilities, and distributed generation and renewable energy markets:

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Website: <http://www.beaconpower.com>

A123 Systems, Inc.- A123 Systems provides energy storage solutions that enable a more efficient and reliable electric grid and help integrate renewable generation sources. A123 leverages its patented Nanophosphate® technology to deliver dynamic energy storage solutions for power generation, transmission and distribution. With more than 36MW shipped to date, A123 has produced and deployed more lithium ion batteries for ancillary services for the grid than any other company in the world.

A123 Systems, Inc.

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Website: <http://www.a123systems.com>

2. Assessment of Their Strengths/ Weaknesses

Competition exists within the industry but Covington Technologies is prepared to compete on a different level. The competition utilizes solely either flywheel technology or lithium-ion batteries, none of them utilize flywheel technology combined with the added benefits of super-conductors.

It is through this combination of two different technologies that Covington Technologies aims to compete and gain a competitive advantage.

Business Strategy

Covington Technologies is still in the developmental stage. Our primary focus will be to raise funds to retrieve the necessary materials to build a prototype.

Covington Technologies Timeline

1. Raise funds to build proof-of-concept prototype: 6 months
2. Apply for Patent
3. Test several facets of prototype: 6 months
4. Apply for Department of Energy (or other) grants: 1 year
5. Establish partnerships or contracts with firms and utilities: 1-3 years

Milestones

- Raise \$10,000 to build first prototype
- Complete prototype and testing
- Receive Department of Energy approval and grant

Exit Strategy Options

- IPO- the most common option found among competitors

- Acquisition- companies offering similar products such as Beacon Power (flywheel), or company's looking to diversify their technological risk such as A123 Systems (batteries) may be interested in acquiring Covington Technologies
- Licensing- due to the patentable technology that we provide, larger companies may be interested in distributing the technology under their brand.

Partnerships

Covington Technologies' business models allow the ability to partner with large energy companies. Renewable energy companies have a great need for energy storage, thus make financial sense to partner with. There are many wind and solar generation companies around the world that are potential partners.

Management

- **Sam Covington, Founder, Principal Engineer, and CEO-** Sam Covington, Founder, CEO majors in Bio-Molecular Engineering, Mechanical Engineering, and Quantum Mechanics. He is also the president of the Tau Kappa Epsilon.
- **Ryan Bishop, COO-** Placed in charge of writing and coordinating his team's business plan, Ryan's team placed 2nd in the 2009-10 Business Plan Competition. He adds value to the company with his experience in writing business plans and overall understanding of the competition's processes.
- **Crystal Goude, Executive VP of Marketing-** Crystal Goude has worked as the Assistant Business Manager of On The Spot, a non-profit student organization. With her background as a Neighborhood Assistant she brings with her experience facilitating meetings and conflicts, planning events, advertising and fund raising within the community.

- **John Miano, Principal Advisor, Executive VP of Administration-** John Miano, brings with him leadership experience drawn from his background in managing the Banana Associates Investment group. With his background as a Neighborhood Assistant he brings with him his experience in conflict resolution and team management.

Equity Distribution

Member	% Of Equity
Sam Covington	25.6
Ryan Bishop	20.3
John Miano	19
Ben Chapman	13.5
Crystal Goude	11.5
Andre Bashay	10.1

Appendix A: SWOT ANALYSIS

<p style="text-align: center;">STRENGTHS</p> <ul style="list-style-type: none"> • Interdisciplinary team/ Cohesive team • Strong Company Culture • Patentable idea • 1 year of research 	<p style="text-align: center;">WEAKNESSES</p> <ul style="list-style-type: none"> • Inexperienced management team (Recruit and hire a more experienced team) • No fully developed prototype (Develop the prototype) • Patent for prototype still needed (Once product is developed file for a patent) • Research still needed to evaluate and confirm product's strengths and capabilities. (Once product is developed run tests to prove capabilities) • Costs to develop the product and bring it to market not yet determined (Research the financial documents of competitors) • Brand recognition (How do we develop brand recognition in a congested market?)
<p style="text-align: center;">OPPORTUNITIES</p> <ul style="list-style-type: none"> • Growing demand for electricity along with lack of available non-fossil fuel options drive energy storage development • Increasing resistance to new fossil fuel and nuclear power plants results in a stronger focus on bulk energy • Push for alternative power generation plants such as wind and solar create higher demand for bulk energy storage solutions. • Technology is already proven in the market 	<p style="text-align: center;">THREATS</p> <ul style="list-style-type: none"> • Established competitors in the marketplace (Research competitors in the marketplace, Beacon Power) • Evolving industry standards and practices (Contact Department of Energy for information) • Market has been slow to develop as a result of technology limitations and high capital costs (Research Costs) • Utilities are risk adverse, require a 15 year track record for new technologies • Utility industry highly regulated • Switching costs of potential customers

Covington Technologies Organizational Hierarchy

