amber_kinetics

DOE Peer Review
October 20-21, 2011
Ed Chiao, CEO
Amber Kinetics: Our Flywheel History

**Stanford University**
- Start-up launched in 2009, Stanford University Cleantech Entrepreneurship class

**Lawrence Livermore National Laboratory**
- Established a technology licensing & flywheel development partnership with LLNL; Amber Kinetics identified new material & lower-cost rotor designs for commercialization

**U.S. Department of Energy**
- Awarded a Smart Grid Energy Storage Demonstration grant award for flywheels

**California Energy Commission**
- Awarded a matching grant for development & demonstration of flywheel technology

*World-class institutions | innovative, deep flywheel technology owned by Amber*
Siemens Partnership

Collaboration with Siemens TTB Opens Doors for Startup Amber Kinetics

One of the presentations to attend was at Siemens TTB's 2011 New Ventures Forum this past June was by Amber Kinetics, a startup that is developing a kinetic energy storage system that integrates intermittent, renewable wind and photovoltaic solar energy into the electrical grid. Amber Kinetics is also a Siemens TTB partner, and an excellent example of the benefits that a startup can yield from working with a large corporate partner.

Partnership Goals:

2011: Technology Development
2012: Scale & Commercialize
2013: Utility-Scale Demonstrations in CA
Program Schedule

Technology Development

Commercial Product Development

Field Installations

0 months | 16 months | 32 months | 48 months

2010 | 2011 | 2012 | 2013 | 2014
Technology Milestones: Spin Testing

Operated to 200% of design speed; no imbalance, run-out growth, or fatigue
Spin Test Cycling Results

- Nearly 400 m/s tip speed
- No run-out growth; excellent balance characteristics
- Low cost material
- Low cost MFG
Technology Milestones: Prototype Flywheel System

Generation One: Prototype 20 kW | 5 kWh Flywheel System

Result: High round-trip efficiency measured, < 1% energy coasting losses
Next Steps: Generation 2 Flywheel System

Innovation:

Amber Kinetics flywheel rotors employ low cost, high-strength steel

Material is twice as strong as traditional steel

1/20th the cost of carbon fiber & simpler to manufacture

Material is mature; rotor design is scalable

Lower balance-of-system costs

Carbon fiber rotors cost 20x more
Amber Kinetics: Focus on Applications

Lower Cost Steel Flywheel Rotor

+ 

Economies of Scale (Larger Flywheel System)

< 1/2 Capital Cost ($ / KW)

vs. traditional flywheels

Our Focus: “Seconds to Minutes”
2013: Grid-Scale Demonstration in CA

Amber Kinetics & Siemens Partnering to Co-Develop & Demonstrate Grid-Scale Flywheel Systems
thank you

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