



Executive Summary

Major Fuel Savings for Class 8 Trucks

The Concept

ePower Engine Systems, Inc. has developed an engine-dominant series hybrid electric drivetrain for Class 8 trucks (gross vehicle weights of 33,000 to 80,000 pounds) that replaces the typical 450 hp engine with a 240 hp engine; uses battery boost for acceleration and hill climbing; and improves fuel economy by 40% to 60%. While the national average fuel economy for Class 8 truck fleets is 6 mpg, *ePower's* third-generation drivetrain is expected to deliver fuel economy of 9 mpg in the 80,000 pound weight class and double digit fuel economy for combinations in the more common 55,000 to 70,000 pound weight range. All components used in *ePower's* drivetrain are sourced from first tier manufacturers and have impeccable track records for reliable performance. Therefore, *ePower* does not face the problems associated with developing custom components. Each component is readily available as an off-the-shelf item and its cost is a known factor, up front. The strength of the *ePower* system is the way proven components are integrated into an elegantly simple drivetrain that delivers extraordinary fuel economy.

The Implementation

ePower's third-generation drivetrain is based on an EPA compliant on-road Cummins 6.7L diesel engine that's mated to a 120 kW generator from Marathon and provides the principal motive power. Electricity from the genset is routed through an AC Vector drive from Unico, along with supplemental boost power from an array of 56 PbC batteries from Axion Power, a unique lead-carbon asymmetric capacitor that offers extraordinary cycle-life and charge acceptance, and fed to a 150 hp Marathon drive motor that can be overrated to 380 hp for acceleration and climbing. A 5-speed automatic transmission from Allison and a suite of proprietary cruise control and drive-by-wire electronics round out the package. *ePower's* first drivetrain patent was issued by Mexico in December 2013 and efforts to secure global patent coverage are ongoing.

System Costs

ePower currently buys components from distributors in single unit volumes. The current component costs for its drivetrain are approximately \$93,000 and *ePower* is targeting an end user price of \$112,000 for a conversion kit. As *ePower* grows and becomes eligible for typical volume discounts, it expects component costs to fall into the \$70,000 range, which would allow it to reduce the end user price to approximately \$90,000. Since *ePower* expects to compete with conventional engines and transmissions that ordinarily cost \$45,000, it anticipates a marginal drivetrain cost of \$67,000 in the early days that will decline to \$45,000 over time, resulting payback periods of 17 months for a 120,000 mile per year duty cycle and 10 months for a 200,000 mile per year duty cycle.

Marketing

The national fleet of 2.5 million Class 8 trucks consumes a staggering 28 billion gallons of fuel and generates over 300 million tons of CO₂ per year. For truckers that normally bring 2% to 5% to the bottom line, fuel purchases of \$50,000 to \$130,000 per year that represent 35% of direct operating cost are critical. Long-haul truckers that log 120,000 to 200,000 miles a year and switch to *ePower's* hybrid drivetrain can expect payback periods of 10 to 18 months.

ePower plans to build a 10 unit demonstration fleet. It will charge a nominal rent for a two to three week trial that will give potential customers an opportunity to test system performance in their own business and give *ePower* access to detailed real-world performance data in the form of daily logs. Upon completion of the initial demonstrations, potential customers will be given the opportunity to either lease a single tractor or buy multiple units for long-term durability testing.

ePower's development activities are focused on the conversion market because Class 8 tractors are rebuilt every three to six years at a cost of \$40,000 to \$50,000 and a robust national infrastructure is already in place. By offering its drivetrain to fleets and garages in kit form, *ePower* can go directly to end-users who want immediate savings while leveraging existing infrastructure. When *ePower* receives an initial order, it will ask customers to send mechanical crews to *ePower's* facility in Florence, Kentucky so that the customer's crews can be trained in the conversion process. Once a customer's crew has been trained in the conversion process, *ePower* plans to sell its drivetrain components in kit form so that customers can perform drivetrain conversions in their own facilities.

Financing Requirements and Sales Targets

ePower is seeking \$2.5 million in equity to complete system optimization and build a demonstration fleet. The offering is priced at a post-money valuation of \$11.5 million and investors will own 21.7% of the company

Video

Videos of *ePower's* first- and second-generation tractors are available at: www.youtube.com/user/epowerengines