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GreenTech Motors Corporation

Friday, August 14, 2015

MEMORANDUM

To: California Department of Finance - AB 32 Cap-and-Trade Auction Proceeds
From: Burnet D. Brown, Executive Vice President, GreenTech Motors, and Ron Pretlac, CEO of GreenTech Motors

Subject: **Allocation of Cap-and-Trade Auction Proceeds**

GreenTech Motors (GTM) submits these comments to express strong backing for proposals to allocate AB 32 Cap and Trade Auction Proceeds to support funding of cleantech startups and small business enterprises. Specifically, GTM recommends that proceeds be dedicated to support the funding of 1) high efficiency clean energy prototype technologies being developed by small businesses, 2) marketplace demonstration of these technologies, and 3) programs to build a bridge over the 'Valley of Death" that currently prevents promising startup technologies from successful entry into the marketplace.

From Hewlett Packard to Apple, small businesses and garage-borne startups have engineered breakthrough technologies that have played a crucial role in making California the largest economy in the U.S. and equivalent to the 8th largest in the world. California cleantech small businesses and startups, however, are facing a trending decline in cleantech investment, do not have the financial resources, the pre-existing revenue streams that large industrial enterprises enjoy or the luxury of large budgets necessary to develop prototypes and validate, integrate and demonstrate them. Nor do they have the large industry legacy of networking access to infrastructure, distribution channels or utilities.

At a recent Growth Capital Conference in Los Angeles, venture capital and angel investors advised cleantech startups in the audience that the U.S. has reached the end of the current investment cycle – similar to the period following the Dot Com bubble. Clean energy startups were advised that cleantech had lost much of its luster over the past few years and that it would be an unlikely proposition as well as extremely difficult to secure angel or venture capital investments for cleantech companies.[1]

As a result of these obstacles, funding of prototype and demonstration of clean energy

technologies presents a critical opportunity to fill this gap. Providing seed money and a framework to overcome these barriers will go far toward more rapidly developing solutions for reducing greenhouse gas (GHG) emissions and achieving AB 32's 2020 objectives in the rapidly narrowing timeline that the State of California faces.

A summary of GTM's key points are as follows:

1. **Valley of Death Barrier.** In the State of California, there is no single statewide mechanism in place specifically for small startup companies (that GTM is aware of) that addresses the 'Valley of Death' barrier faced by startups. Given the scale of the climate instability challenge, filling this gap presents a critical opportunity to enlist the innovative capabilities of California startups and small businesses and leverage them to solve this problem and accelerate market penetration.

2. **Prototype Development and Demonstration.** Given the policy demands for clean energy technology solutions, the inability to secure sufficient funding to develop prototypes and demonstrate them is preventing more rapid entry into the marketplace. In GTM's case, a half-dozen potential demonstration projects (U.S. Air Conditioning Distributors, City of Thousand Oaks water pumping stations and the TAG Forum water utility districts) remain in waiting due to the shortage of prototype development dollars.

3. **Priorities.** GTM urges that special attention be given to energy efficiency startups and small businesses for the following reasons:

    - Energy efficiency is the fastest deployable energy source (AAAS Holdren) and offers to most rapid route to attainment of GHG emissions objectives.

    - Energy efficiency is the cheapest, easiest, fastest, safest, largest and least risky energy resource.

    - Energy efficiency is the single most important lever in addressing the climate change issue. (McKinsey)

    - No other energy resource matches the compelling economics offered by energy efficiency. (McKinsey)

Electric motors represent one of the largest untapped energy efficiency opportunities. Electric motor-driven systems are *the single largest consumer of electricity worldwide,* accounting for 46% of global power use and consuming more than twice as much electricity as lighting, the next largest end-use.[2] In the U.S., at a cost between $70 - $90 billion per year, electric motor-driven systems account for more than 50% of the total electricity used nationwide[3] — meaning, that *half of all power plants in the U.S. exist exclusively to generate electricity to operate electricity motor-driven systems.* In the words of John Malinowski, Senior Product Manager at Baldor Electric and Chairman of the National Electrical Manufacturers Association (NEMA) Motor and Generator Section, for a single product category, electric motors place a "staggering" amount of demand on the electricity grid.[4]

The global market is dominated by aging and inefficient motors. *Nearly two-thirds of the existing global stock of running electric motors are inefficient* (classified as falling under IE1 or IE0/Eff3 efficiency standards).[5] In addition, the global stock of electric motors is aging as many old motors installed into the infrastructure in the 1970s and '80s are approaching the end of their useful life while industries continue to operate less efficient motors beyond their rated life.[6] [7] As a result, high efficiency motor systems present enormous opportunities for cutting electricity consumption, capturing cost savings and reducing greenhouse gas emissions.

The potential savings of transitioning from inefficient to high efficiency electric motor-driven systems by the year 2030, according to the International Energy Agency (IEA), are on the order of $2.8 trillion in reduced electricity costs, 42,000 terawatt hours (TWh) of electricity consumption and 29 gigatonnes of reduced greenhouse gas (GHG) emissions.[8]

GTM is based in Westlake Village, California. Our company uses aerospace engineering to develop clean energy solutions. GTM's Large Air Gap Electric Ring (LAGER) technology was developed in the garage of a Boeing engineer in Westminster, California. It is an extremely efficient, extremely compact and extremely lightweight advanced electric motor. The technology has been modeled at 63% more heat loss efficient, 80% smaller and 85% lighter than conventional motors. Finite element analysis (FEA) efficiency simulation findings indicate a motor efficiency of 97.7% for a 20 horsepower (HP) motor. This efficiency level exceeds the efficiency of any other induction motor currently covered by DOE and NEMA up to 500 HP. Its efficiency density (efficiency per unit of weight or volume) surpasses all same size electric motors currently available in the marketplace and measured to date.

Originally designed by aerospace engineers to endure the harsh extremes of space and meet the exacting demands of the lighter weight and smaller dimensions required for space-bound payloads, the technology has been developed for data center cooling, commercial HVAC as well as wastewater, groundwater, desalination and freshwater pumping applications.

Small business startups with garage-borne technologies like the LAGER technology present a significant opportunity to the State of California. They represent a highly valuable State treasure, resource and asset. GTM strongly supports initiatives to leverage this asset to the service of attaining California's greenhouse gas reduction emissions initiatives.

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[1] GCC 2015, John Harbison, Investor and Speaker, GCC 55 - Growth Capital Conference, Los Angeles, California, Tuesday, January 29, 2015

[2] Communication to Burnet D. Brown from Conrad U. Brunner, International Energy Agency, Zurich, Switzerland, March 9, 2012. Electric motor-driven systems (EMDS) account for 46.2% of all global electricity consumption. See also IEA 2011, Paul Waide and Conrad U. Brunner, *Energy-Efficiency Policy Opportunities for Electric Motor-Driven Systems,* International Energy Agency, Paris, France, 2011, Table 12, p. 33.

[3] DOE 1995, *DSM for Motors Popular with Utilities and Customers Alike,* U.S. Department of Energy, Washington, DC, September 1995, p. 1

[4] John Malinowski, Baldor Electric Co., "EISA anniversary a good time to take stock of motor efficiency," *PlantEngineering.com,* Wednesday, December 26, 2012.
[5] Data from Figure 4 in IEA 2011, Conrad U. Brunner, Paul Waide and Martin Jakob, *Harmonized Standards for Motors and Systems - Global Progress Report and Outlook, Implementing Agreement Efficient Electrical End-Use Equipment 4E,* 4E Electric Motor Systems Annex EMSA, EEMODS '11, Washington, DC, September 2011, p. 5.
[6] ASCE 2013, *The Impact of Current Infrastructure Investment on America's Economic Future - Preface,* American Society of Civil Engineers, Reston, Virginia, 2013.
[7] A study analyzing the aging and operating performance of 1500 electric motors in factories in Switzerland found that motors were 56% older than their operating life expectancy. (Brunner et al 2012, Conrad U. Brunner, Rolf Tieben, Sun Wei, Rita Werle, *Electric Motor Performance Data - Lot 30 - Motors Are Too Old,* S.A.F.E. - Swiss Agency for Efficient Energy Use, Zurich, Switzerland, October 2, 2012, Slide 10.
[8] IEA 2011, Paul Waide and Conrad U. Brunner, *Energy-Efficiency Policy Opportunities for Electric Motor-Driven Systems,* International Energy Agency, Paris, France, 2011, p. 15.