



February 13, 2016

Coverage Initiation

Industry: Green Technology

ZERO E TECHNOLOGIES LLC

Innovative Electric Motor Company Set to Transform Industry

Analyst: Rob Goldman

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COMPANY SUMMARY

Zero E Technologies LLC designs, develops, and manufactures highly efficient permanent magnet motors, known as the *ZEUS Motor™* using a platform that is readily adapted to a range of power outputs. The Company seeks more efficient power use and to help developing nations grow sustainably. The *ZEUS Motor™* offers very high efficiency, small size, robustness, and is potentially less expensive to manufacture than conventional motors. Zero E is currently targeting OEMs that use motors in their products that account for 60% of new motor sales.

KEY STATISTICS

Inception Date	2009
Funding-to-Date	\$6.5 Million
Addressable Market Size	\$18 Billion
Est. Net Present Value	\$54 Million
Projected Value (5 Years)	\$289 Million
Funding Sought	\$10 Million

COMPANY INFORMATION

Zero E Technologies LLC

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INVESTMENT HIGHLIGHTS

Leveraging the wide-ranging benefits of its proprietary design, Zero E's flagship permanent magnet motor is primed to disrupt an \$18 billion industry. The Company is on the cusp of commercialization during 2017.

Following seven years of development and \$6.5M in expenses, the Company's ZEUS Motor™ may be the most efficient, smallest, lightweight, and robust performing motor of its kind available. The highly efficient and customizable offering is geared for OEMs whose products include motors such as fans, compressors, pumps, conveyors, etc.

Independent tests demonstrated the ZEUS Motor™ is the first to achieve and exceed new efficiency motor standards. The improved output over competing products reduces the electricity required, thereby creating a sustainable offering.

With an enviable leadership team, Zero E is poised to generate \$140M in revenue and \$19M in operating profit in Year 5.

Utilizing a typical market multiple of 15x operating income in Year 5 and a conservative 40% discount rate, we arrive at a NPV of \$54M which should dramatically rise as the Company achieves its objectives. Moreover, Zero E could emerge as a takeover target as meaningful sales are recorded.

COMPANY OVERVIEW



Figure 1: Industrial ZEUS Motor
Source: Zero E Technologies

Tracing its roots to 2009, Zero E Technologies LLC (“Zero E”) is set to migrate from the R&D phase to full-scale commercialization. A technology company that could be viewed as a pure play sustainable energy or “green technology” firm, Zero E designs, develops, and manufactures highly efficient permanent magnet (PM) motors, known as the *ZEUS Motor*[™] using a platform that is readily adapted to a range of power outputs. Moreover, one of the Company’s technology and corporate objectives is to develop motors that offer greater power use efficiency thereby enabling developing nations to grow sustainably.

According to an IEA study, 46% of all electricity generated worldwide is used to power electric motors. Thus the market opportunity is enormous, with industry estimates suggesting that the global market for 10-30hp (horsepower) motors is 7 million new units annually, an \$18 billion market, of which OEMs account for \$10 billion. These motors can be used as generators thereby opening the door to other markets such as distributed power generation and wind turbines.

After \$6.5 million invested in R&D over the past seven years, Zero E has developed a product and platform that is potentially disruptive in numerous major markets. The *ZEUS Motor*[™] is a high performance electric motor for use in industrial and other applications. The broad implementation of the Company’s offerings will lead to a reduction in power use, a reduction in emissions, and will help developing countries to grow sustainably through the use of high efficiency motors. Moreover, Zero E Technologies’ flagship technology has four advantages over conventional motors:

- **Efficiency:** *ZEUS Motor*[™] is believed to be the most efficient general purpose motor ever developed, and the first to reach and exceed the newly proposed “IE5 Ultra Premium” efficiency standards.
- **Size:** It is very small, a fraction of the size of conventional motors.
- **Robust:** *ZEUS Motor*[™] is very robust, which is an important property of industrial motors that are expected to operate non-stop at full power for many years.
- **Cost:** Since the motor utilizes less than half the material used in conventional motors, with just 23 distinct parts, it is expected to become the least expensive motor on the market when in full production and economies of scale have been achieved.

Slated for production and commercialization this year the ZEUS Motor™ Series B 15hp motor is already being tested by potential customers, including a major HVAC company that could emerge as a critical source of future business while 10–50hp motors are also in the product pipeline. Initially, Zero E is focusing on OEMs--original equipment manufacturers that put a motor inside their product, e.g., fans, compressors, pumps, conveyors, material processors. These OEMs account for 60% of new motor sales. The Company plans to employ an aggressive international strategy that will allow Zero E to “blitzscale”, i.e., go global quickly, aided in part by the fact that the motors are so light-weight that they can be air-freighted anywhere in the world in two days or in some cases, overnight. Plus, Zero E is in discussions with several key international groups to set up locally-owned motor assembly operations and to serve their home and regional markets.

The bottom line? There is a great deal of interest in the Company’s products from numerous prospective customers due to the best-in-class platform that has significant performance, efficiency, price and size advantages over the induction motors and other permanent magnet motors available today.

Future milestones include the filing of a number of patents (on top of the current patent award and 6 provisional patent filings) along with the introduction of new size motors, prospective partnerships for final assembly and sales abroad, among other initiatives.

Thus, we believe that Zero E Technologies’ ZEUS Motor™ is poised to capture measurable market share in the industrial and commercial OEM markets over the next 3-5 years.

The Valuation

To date, the Company has raised over \$6.5M—amazingly all from angel investors which is very unusual and a testament to the broad appeal of the Company and its prospects. Moreover, it boasts an enviable Board of Managers and management team that is likely unrivaled in the segment. This includes the founder of a \$15 billion money management firm, a former Governor, numerous C-level and other officials in engineering and other related disciplines.

We should note that the Company has just embarked on a \$10 million fund-raising at a \$28M pre-money valuation. In our view, this valuation is arguably too low and that the current standing and prospects could support a valuation nearly twice of the proposed figure.

For example, management projects that in 5 years Zero E will generate over \$19M in operating income on an estimated \$140M in sales. Considering that the cost of

goods in the model may be too high in later years (as critical mass occurs this figure will decline on a material basis), if the Company's sales forecasts are met, operating income is likely to be much higher. Plus, price/performance characteristics may enable Zero E to raise prices higher than currently projected.

Our estimated Net Present Value for Zero E is \$54 million. We arrive at this figure by assigning a 15x multiple to the operating income forecast in Year 5, discounted back 5 years with a 40% discount rate. Clearly, the \$28M proposed pre-money valuation may be too conservative as it assumes a 60% discount rate, according to our approach. In five years, we believe the Company could be worth \$289M, or 10x the valuation in the proposed round and more than 5x our Net Present Value calculation.

INDUSTRY OVERVIEW

The electric motor industry is a huge market with a myriad of industrial and commercial applications and uses, although they are primarily used for power generation. In fact, according to an IEA study, 46% of all electricity generated worldwide is used to power electric motors. The market opportunity even at the small motor level (10-30hp) with an installed base of 64 million units and the sale of 7 million new units annually, an \$18 billion industry, of which OEMs account for \$10 billion. These small motors are used to operate fans, pumps, compressors, conveyors, etc., and those with greater horsepower can be used for distributed power generation and wind turbines, among others.

Interestingly, the market for industrial motors is dominated by induction motors, or IM's, which are typically considered "conventional" motors. In fact, over 95% of all motors used in industry today are IM's, yet they are constructed and operated based on the basic design first invented by Nikola Tesla in the 1880s. In recent years, permanent magnet motors, or PMs have been introduced, reflecting the drive for higher efficiency. PM motors are nearly always more efficient than IM's, smaller in size, lighter in weight. Their development has been enabled by the development of high energy rare earth magnets, and by the development of VFDs. VFD's, or variable frequency drives, control the motor's speed and torque by varying motor input frequency and voltage.

Despite their broad use and deployment, IM's are not available for purchase on a custom-basis, i.e., OEMs usually cannot order special IM's of that are of different dimensions or carry different characteristics, which is considered a negative in many circles. Moreover, PM motors offer other, significant advantages over IM's, as outlined in the comparative table below.

Comparison table: Permanent magnet spindle motor vs. induction motor		
Attribute	Permanent magnet spindle motor	Induction motor
Cost	More expensive due to magnet material costs and costs for magnet fixing	Lower cost
Torque ripple	Comparable	Comparable
Maximum speed	More complex to realize due to magnet fixing	Easier to realize; limit is short circuit ring and rigidity of the metal sheets
Rotor / shaft temperature	Low temperature due to less rotor losses	Higher temperature
Bearing currents	Less bearing currents due to larger air gap	Higher bearing currents due to smaller air gap
Magnetic torsion forces due to eccentricity and tolerances	Smaller radial forces due to larger air gap	Up to 10 times higher radial forces due to smaller air gap
Current	Lower because no magnetizing current necessary	Higher due to magnetizing current
Drive control in field weakening	Complex field weakening current calculation necessary	Simple
Ramp-up time	Shorter, constant power up to maximum speed	Longer, less power at higher speed due to voltage limit curve

Figure 2: IM Motors versus PM Motors

Source: www.ControlEng.com

Efficiency and Sustainability

At the UN conference on Sustainable Development Goals in Paris, December 2015, 186 countries committed to reduce their emissions. The fastest way to accomplish reduction of emissions, is by mandating the use of high efficiency motors, similar to the U.S.'s strategy which also provides incentives or rebates for the replacement of old, low efficiency motors with high efficiency ones. For example, there are certain U.S. and EU standards of efficiency for motors. These range from IE1 through IE5, with IE1 serving as a "Standard" efficiency measure (84%) and IE5 designated as "Ultra Premium" (94.8% for a 15hp motor). Importantly, Zero E is the only company to demonstrate efficiency at rates not just meeting but exceeding the IE5 level. As the first to offer the highest efficiency motor, Zero E owns a significant advantage of IM and PM manufacturers alike.

While Zero E competes both directly and indirectly with IM producers, its status as a PM producer places it with other industrial grade PM manufacturers such as Baldor, Marathon, NovaTorque, Weg, and Lafert. Baldor was acquired by the ABB Group for over \$3B in 2011, at a valuation of 11x EBITDA. Other notable players in the market include **Regal Beloit (NYSE - RBC)**, an electric motor company trading 15x EPS, Siemens, and others. It should be noted that most IM manufacturers produce PM motors as well. However, since IM is such a profit center, they have not promoted the PM business which has effectively opened the door for Zero E and its unique approach.

THE ZERO E APPROACH

Founded in 2009, Zero E Technologies LLC has developed an innovative, proprietary design for its soon-to-be commercialized electric motor whose unrivalled efficiency, robust performance, small size, and low production cost make it primed to serve as a disruptive force in its \$18 billion industry. To date, the Company has spent seven years and \$6.5 million to develop what may emerge as the preferred and most efficient electric motor by OEMs that incorporate motors for a variety of applications in their end products.

The ZEUS Motor™

Zero E Technologies' flagship has four key advantages over conventional motors:

- **Efficiency:** *ZEUS Motor™* is believed to be the most efficient general purpose motor ever developed, and the first to reach and exceed the newly proposed "IE5 Ultra Premium" efficiency standards.
- **Size:** It is very small, a fraction of the size of conventional motors.
- **Robust:** *ZEUS Motor™* is very robust, which is an important property of industrial motors that are expected to operate non-stop at full power for many years.
- **Cost:** Since the motor utilizes less than half the material used in conventional motors, with just 23 distinct parts, it is expected to become the least expensive motor on the market when in full production and economies of scale have been achieved.

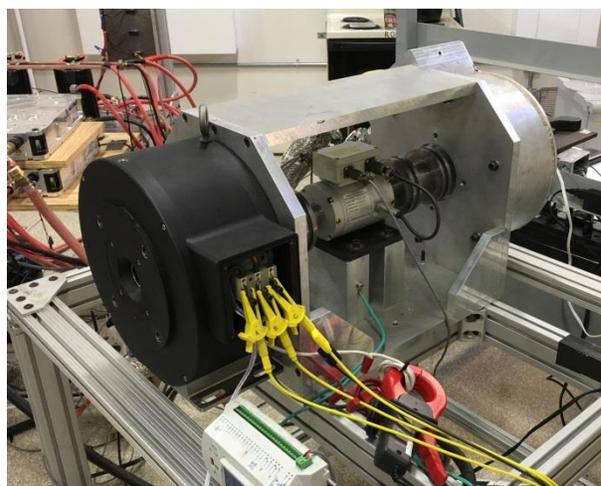


Figure 3: ZEUS Motor Test
Source: Zero E Technologies

Slated for production and commercialization this year the *ZEUS Motor™* Series B 15hp motor has been tested by potential customers, including a major HVAC company that could emerge as a critical source of future business. Initially, Zero E is focusing on OEMs--original equipment manufacturers that put a motor inside their product.

Products include fans, compressors, pumps, conveyors, material processors. OEMs account for 60% of new motor sales. Thus, Zero E also plans to produce products up to 500hp as well. The Company plans to employ an aggressive international strategy that will allow Zero E to “blitzscale”, i.e., go global quickly, aided in part by the fact that the motors are so light-weight that they can be air-freighted anywhere in the world in two days or in some cases, overnight. Plus, Zero E is in discussions with several key international groups to set up locally-owned motor assembly operations and to serve their home and regional markets.

In May 2016, Zero E sent its 15 HP motor for testing to Advanced Energy (AE), a leading motor testing company based in Raleigh, NC. AE was the first independent certified lab in the US. The motor was run at full speed and load until it was thermally stable and then its efficiency was measured: 95.5%. AE then performed a second test so that results could be compared with those of conventional IM's. Results of that test demonstrate that the motor's efficiency was measured at 96.4%. This is well above the efficiency of a NEMA Premium/IE3 15 HP motor (92.4%), or the proposed IE5/Ultra Premium (94.8%). It should be noted that the average worldwide efficiency for a motor is only 84%. Thus, switching to a high efficiency motor such as the ZEUS Motor™ (95.5% efficient) offers a meaningful energy cost savings and reduced emissions as less electricity generation is required.

In other tests of the *ZEUS Motor*™, the product has also demonstrated:

- 4.5% greater efficiency at full power output; 18% at partial power
- At 15hp, the product is one-fourth the volume of IM's
- Products not at risk of demagnetization by EM currents or heat
- Electromagnets encapsulated and so cannot be contaminated
- No cooling system to break down

Marketing Strategy

In the near term, the Company plans to focus its efforts on its domestic strategy which includes the leverage of heavy indications of interest from a major HVAC player which could serve as a key strategic partner and a customer as it has already completed numerous tests of the flagship product. Other low-hanging fruit include OEMS that utilize small motors in their product. It should be noted that given the relative small size and weight (130 lbs.) of a next iteration of the *ZEUS Motor*™ called *The SmartMotor*, it can even be sold through Amazon (NASDAQ – AMZN) fulfillment services.

This new version dovetails with the Company's international markets which are equally as important given the high efficiency and sustainability of the Company's PM motors. In fact, Zero E is developing a product for developing nations with a built-

in VFD, which makes it less complex, comes at a lower sticker price, and is cheaper than to operate than IM's.

Zero E has developed an international strategy to set up companies outside of the US that are majority-owned by local investors (50.1% owned locally, 49.9% by Zero E) and that will assemble the motors in country, will supply motors to the host country and the surrounding region, and that will be politically active. This positions the company to be the first to offer IE5/Ultra Premium efficient motors. Zero E will supply the local company with the subcomponents for assembly. The purpose of this strategy is to:

- Circumvent growing protectionism and nationalism around the world, and utilize the free trade agreements that the host country is a party to
- Facilitate a blitzscale strategy of fast introduction worldwide
- Build political connections in the host country to encourage the host country to mandate the use of high efficiency motors (to honor their UN commitment to reduce emissions)
- Facilitate fundraising for both the local company and for Zero E.

Looking Ahead

In addition to preparing for commercialization which includes production and marketing, the Company plans to engage in additional R&D and intellectual property safeguards. The Company plans to develop Series A, B, C D & E motors of 1-200 hp and develop the SmartMotor and Planetary gearboxes. Plus, management plans to file 10 utility applications in the hope of being utility patents issued during 2018. Plus, management plans to file 10 utility applications in the expectation of having utility patents issued during 2018. As the lead inventor, Tom Hopkins, is over the age of 64, the Company's patent applications are afforded accelerated evaluation and are usually issued within twelve months.

POTENTIAL MILESTONES

Zero E Technologies has already achieved key development and is poised to complete additional steps in 2017 and beyond.

2017



2018



ZERO E LEADERSHIP TEAM

The Zero E leadership group is comprised of a remarkable team of business, technology, and financial leaders for a company just beginning commercialization and serves as a testament to the value of the Company's underlying proprietary technology and its overall prospects. Below is a snapshot of the Company's Board of Managers along with its management team, some of whom are identified and committed to the roles but are not yet named.

BOARD OF MANAGERS

Mike Barish, Board Member

Mr. Barish is a major investor and long-experienced financial executive. He founded Cambiar Investors, an equity manager, in 1973 and was its President until 2000. Cambiar currently has over \$15 billion in assets under management. He guides Zero E on its financing strategy.

Tom Hopkins, Founder, CEO, CTO, Board Member

Mr. Hopkins is Zero E's founder, CEO & CTO and led the development of the ZEUS Motor™. He has had long and varied engineering and business experience, and has had extensive experience developing products. Before founding Zero E, he was COO of an international consortium, Transport Ventures, focused on the development of a 300 MPH high-speed monorail. He has published on linear induction motors and has developed vehicle simulation programs. Prior to Transport Ventures, he led the development and commercialization of the AquaCiser underwater treadmill (for therapy, athlete training, and weight reduction) that he built up and then sold to his corporate partner, Ferno Ille.

Hopkins was a board-room consultant, taught the final capstone courses (entrepreneurship and business policy) at Colorado University's business school in Boulder and at the in-house management schools of GE and IBM. Hopkins has a BE from the University of Queensland, a M.Eng.Sc from the University of New South Wales, an MBA from the University of Chicago, and he was a Chartered Professional Engineer (Australia) for twenty years.

Gov. Richard Lamm, Board Member

Mr. Lamm is Co-Director of the Institute for Public Policy Studies at the University of Denver, and the former three-term Governor of Colorado. (1975-1987). He is both a lawyer (Berkeley, 1961) and a Certified Public Accountant. He is an author, has published many articles, and has received many honors.

Dale Mosier, Board Member

Mr. Mosier was president of Poly Hi Solidur, Inc., the leading worldwide manufacturer of special purpose engineering polymer shapes. He led its expansion from \$33 million in 1992 to \$150 million in 2001. Most recently he was with the Peace Corp where he was the Country Director in Malawi before going to Washington DC to head up the training of future Country Directors. He has long experience with second- and third-world countries.

Jon Statler, Board Member

Mr. Statler is the former Principal of Maval Manufacturing, a manufacturer of steering columns for vehicle hobbyists. He has long experience in doing business with Chinese and SE Asian and has well established relationships with multiple suppliers.

MANAGEMENT TEAM

In addition to Tom Hopkins (see above) the Company has identified two key hires for the top executive team and Zero E anticipates they will join the team upon completion of this fundraiser:

President, Chief Operating Officer

The President <name withheld but available upon request> is currently the VP of Global Retail Channel Marketing for a major international company in the industrial motor market and that is a global specialist in energy management, power distribution, and sustainability. He is based in Boston and Paris. Prior to this he led business development for a biotech start up and closed complex partnerships which added significant non-dilutive funding; ultimately leading to the company's going public. Before that he was with the Boston Consulting Group. He has an MBA from the Harvard Business School, is a graduate of the U.S. Naval Academy, and was an officer for five years on a U.S. nuclear submarine.

Executive Vice-President, Chief Business Development Officer

The CBDO <name withheld but available upon request> is currently the President and CEO of his own consulting company dedicated to the development of electric motors (he has been intimately involved in the evaluation of over 1,000 electric

motors over the past ten years), training courses for engineers, and working with motor manufacturing companies on their business development, and sales/marketing programs. He has had a distinguished career which includes: prior Chief Engineer at a brushless DC motor manufacturer and he served as an electrical engineering professor and director of the electrical power engineering program. He is very well regarded in the industry, has won numerous awards, is a frequent speaker/presenter at professional meetings, has prepared eighteen technical papers published in leading journals, and has been issued several patents. He has a PhD in Electrical Engineering from the University of Wisconsin, and MS and BS degrees in Electrical Engineering from the University of Illinois. He is a licensed Professional Engineer, Wisconsin.

FINANCIALS

Zero E Technologies, Inc. Unit Sales Forecast					
	Year 1	Year 2	Year 3	Year 4	Year 5
UNIT PROJECTIONS					
Series B Motors	86	516	1,978	5,859	15,104
Other Series Motors		43	280	753	2,365
Other Products				112	366
Total Unit Sales	86	559	2,258	6,723	17,834

Source: Zero E Technologies, Inc., Marble Arch Research

As outlined above, initial sales of the flagship Series B Motor is slated to occur this year, as funds are raised and commercialization commences. Material sales are likely to be recorded in Year 2, with the aid of company relationships and a domestic strategic partnership with a major, brand name HVAC provider. Other product sales shall commence in earnest beginning in the second half of Year 2. Interestingly, given the size of the market opportunity, even with projected sales of over 15,000 Series B units in Year 5, the estimated market penetration of Zero E's main offering would be less than 1%, which is clearly conservative due to the unique inherent advantages of the Company's platform.

The earnings model below illustrates a modest ramp of sales with meaningful year-over-year growth set to occur beginning in Year 2. We believe that the magnitude of the sales growth is muted in the model, due to the "blitzscale" approach to global deployment in which management plans to engage. Moreover, gross profit projections may also be conservative. With few distinct parts, a 60% reduction in the

use of copper and electric steel as compared with induction motors, and the benefit of mass production, the cost to produce the *ZEUS Motor*™ should be the lowest in the space. Therefore, we would not be surprised to see gross margin approach the 50% range in Years 4 and 5, which means that very healthy 15% operating margins are in the cards as well. The line item where the Company could see some negative variability as it relates to forecasts could be modestly higher than projected sales and marketing expenses.

Management has embarked on a \$10M round of financing to achieve its commercialization launch and “blitzscale” marketing and deployment. It should be noted that the Company has a balance sheet with no long term debt and frankly no debt at all save for convertible notes which are expected to convert into equity. From inception, management has operated Zero E as a tight ship and we expect that trend and approach will continue going forward. Importantly, given the relatively high margins, the Company should be able to finance its own growth beginning in Year 4.

Zero E Technologies, Inc.					
Pro Forma Profit and Loss					
(in thousands)					
	Year 1	Year 2	Year 3	Year 4	Year 5
Sales					
Series B Motors	\$407	\$2,847	\$11,743	\$34,186	\$91,883
Other Series Motors		\$610	\$3,965	\$10,675	\$33,550
Other Products				\$4,582	\$14,969
Total Sales	\$407	\$3,457	\$15,708	\$49,443	\$140,402
Cost of Goods Sold					
Series B Motors	\$258	\$1,806	\$7,450	\$21,688	\$58,292
Other Series Motors		\$280	\$1,817	\$4,891	\$15,373
Other Products				\$2,546	\$8,316
Total COGS	\$258	\$2,086	\$9,267	\$29,125	\$81,981
Gross Profit	\$149	\$1,371	\$6,441	\$20,318	\$58,422
Gross Profit %	37%	40%	41%	41%	42%
Sales and Marketing	\$650	\$657	\$2,827	\$8,649	\$23,861
General & Admin	\$1,134	\$1,616	\$2,140	\$5,463	\$15,301
Operating Expenses	\$1,784	\$2,273	\$4,967	\$14,112	\$39,162
Operating Income	(\$1,635)	(\$902)	\$1,474	\$6,206	\$19,260
Operating Margin	N/A	N/A	9.4%	12.6%	13.7%

Source: Zero E Technologies, Inc., Marble Arch Research

RISK FACTORS

In our view, Zero E's' biggest risks relate to the timing and magnitude of its product sales ramp, both domestically and abroad, given the early stage nature of its sales and penetration cycle. We believe this risk is largely mitigated and minimized by the obvious operational and efficiency cost/benefit of its *ZEUS Motor*[™] offering. Given the Company's high level of documented effectiveness, we view this risk as very low. An unrelated risk is the timing of securing a domestic strategic partner may be delayed as could the establishment of local, on-the-ground sales/operations/final assembly relationships and facilities. Favorable funding risks, while very negligible in our view, could also occur. Finally, competition from new entrants or existing customers with similar or better efficacy could prompt changes or delays in achieving its objectives, though we deem it unlikely given the Company's many years' of R&D lead time. Nonetheless, these are all typical future concerns consistent with firms of Zero E's' size and standing.

VALUATION AND CONCLUSION

Leveraging the wide-ranging benefits of its proprietary design, Zero E's flagship permanent magnet motor is primed to disrupt an \$18 billion industry.

Following seven years of development and \$6.5M in expenses, the Company's *ZEUS Motor*[™] may be the most efficient, smallest, lightweight, and robust performing motor of its kind available. The highly efficient and customizable offering is slated for commercialization during 2017 and targets OEMs whose products include motors such as fans, compressors, pumps, conveyors, etc.

Independent tests demonstrated the *ZEUS Motor*[™] is the first to achieve and exceed new efficiency motor standards. The improved output over competing products reduces the electricity required, thereby creating a sustainable offering.

With an enviable leadership team, Zero E is poised to generate \$140M and \$19M in operating profit in 5 years.

Utilizing a typical market multiple of 15x operating income in Year 5 and a conservative 40% discount rate, we arrive at a NPV of \$54M which should dramatically rise as the Company achieves its objectives. Moreover, Zero E could emerge as a takeover target as meaningful sales are recorded.



SENIOR ANALYST: ROBERT GOLDMAN

Rob Goldman joined Marble Arch Research in 2016. He founded and still operates Marble Arch Research Inc. in 2009 and has over 20 years of investment and company research experience as a senior research analyst and as a portfolio and mutual fund manager. During his tenure as a sell side analyst, Rob was a senior member of Piper Jaffray's Technology and Communications teams. Prior to joining Piper, Rob led Josephthal & Co.'s Washington-based Emerging Growth Research Group. In addition to his sell-side experience Rob served as Chief Investment Officer of a boutique investment management firm and Blue and White Investment Management, where he managed Small Cap Growth portfolios and *The Blue and White Fund*.

ANALYST CERTIFICATION

I, Robert Goldman, hereby certify that the view expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the recommendations or views expressed in this research report.

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