

General

UQM Technologies, Inc. is a developer and manufacturer of energy efficient, power dense electric motors, generators and power electronic controllers. Our primary focus is incorporating our advanced technology into products aimed at existing commercial markets and emerging markets for electrically propelled vehicles that are expected to experience rapid growth, as well as selected existing commercial markets. We operate our business in two segments: 1) technology – which encompasses the further advancement and application of our proprietary motors, generators, power electronics and software; and 2) power products – which encompasses the manufacture of motors, generators, power electronic controllers and related products. Our \$0.01 par value common stock trades on the American, Chicago, Pacific, Berlin and Frankfurt stock exchanges under the symbol “UQM”.

The Company’s revenue from continuing operations is derived from two principal sources: 1) funded contract research and development services performed for strategic partners, customers and the U.S. government directed toward either the advancement of our proprietary technology portfolio or the application of our proprietary technology to customers’ products; and 2) the manufacture and sale of products engineered by us.

We have two principal operating companies: 1) UQM Technologies, Inc. which includes the Corporate Headquarters and Engineering and Product Development Center; and 2) wholly-owned subsidiary UQM Power Products, Inc. which is an ISO quality certified manufacturer of our products. Both operating companies are located in Frederick, Colorado.

Vehicle Electrification

Our primary focus is incorporating our advanced technology into products aimed at emerging markets for electrically propelled vehicles that are expected to experience rapid growth as well as selected existing commercial markets.

Existing Markets

Today there are numerous well-established markets for products that incorporate electric motors, generators and power electronic controllers that are targets for replacement by our advantaged systems. Examples of existing electric vehicle markets that we believe may present opportunities for the commercialization of our proprietary technology include electric wheelchairs, golf carts, forklift trucks and other warehouse vehicles, aircraft tugs and other support equipment, commercial floor cleaning equipment and other similar markets where the product application generally requires high

torque and variable speed operation. In addition, there are a multitude of electric auxiliary motors used on conventional vehicles that provide a further opportunity for replacement by our systems.

We have developed and commercialized several products for existing markets that are currently being manufactured by our wholly-owned subsidiary, UQM Power Products. These products include a direct-drive propulsion motor used in Invacare Corporation’s Storm® electric wheelchair for which we have been supplying field service and warranty units, a fan blower motor and a compressor drive motor that are used in aircraft air conditioning systems manufactured by Keith Products, Inc., a vehicle auxiliary actuator motor for a product manufactured by Lippert Components, and an electric brake actuation motor that is used in selected golf carts manufactured by Club Car, Inc.

We expect to continue to aggressively pursue the commercialization of both technologically advanced and low cost products that we develop to customer specifications in selected large, established markets.

Emerging Markets

Potentially large markets are developing in conjunction with the electrification of a wide-range of vehicle platforms. The electrification of vehicles is being pursued for a variety of application specific reasons including: 1) improved fuel economy, 2) lower vehicle emissions, 3) greater reliability and lower maintenance, 4) the need for higher levels of available onboard electric power to run electrical devices, and 5) improved performance and vehicle control. Of these reasons, improved fuel economy has emerged as a significant factor in the development and potential rate of growth of the emerging vehicle electrification markets as crude oil prices continue to rise, and consumers and businesses alike contend with higher gasoline and diesel prices. This trend toward higher fuel prices is expected to continue for the foreseeable future driven by tight supply levels, geopolitical turmoil in key oil producing countries and increasing world demand driven principally by escalating consumption of fossil fuels by developing countries such as China and India. In addition to these factors, recent government regulations mandating reductions in pollutants from diesel engines are expected to further accelerate the trend toward electrification as increasingly stringent regulations continue with the next reduction set for 2010. Further, in late 2007, Corporate Average Fuel Economy (CAFE) standards received their first overhaul in more than 30 years. On December 19, President Bush signed into law the Energy Independence and Security Act of 2007, which requires, in part, that automakers boost fleetwide gas mileage to 35 mpg by

“...recent government regulations mandating reductions in pollutants from diesel engines are expected to further accelerate the trend toward electrification...”

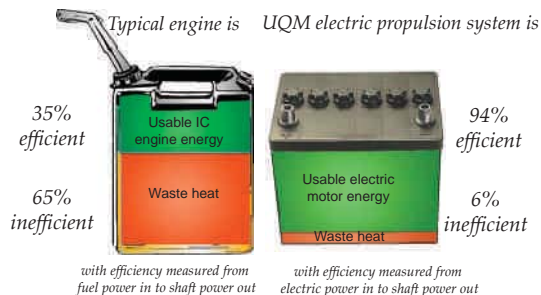
the year 2020. This requirement applies to all passenger automobiles, including light trucks.

Crude oil consumption in the United States as reported by the Transportation Energy Data Book: Edition 22 and the EIA Annual Energy Outlook 2003 averages approximately 22 million barrels per day. Of this amount, approximately two-thirds is used for transportation.

The electrification of conventional vehicles, ranging from passenger vehicles and over-the-road trucks to off-road vehicles such as agricultural tractors, construction equipment and military vehicles, can potentially offer improvements in fuel economy and emissions. Nearly all conventional vehicles are powered by a gasoline or diesel fueled internal combustion engine that converts the energy stored in the fuel to rotating power out of the engine. The power out of the engine's rotating shaft is used to propel the vehicle and operate all of the vehicles auxiliaries either directly with belts, pulleys and gears or indirectly through electricity generated from a belted alternator.

Internal combustion engines are relatively inefficient, typically converting only 25 to 35 percent of the input energy in the fuel to the output shaft to do useful work. The remaining 65 to 75 percent of the input energy is wasted by the engine as heat loss. Electric motors, on the other hand, are much more efficient in converting input electric energy to the rotating shaft to do useful work. UQM® electric propulsion systems have some of the highest efficiencies (input energy to output work) in the industry, ranging from 80 to 95 percent.

“Internal combustion engines are relatively inefficient, typically converting only 25 to 35 percent of the input energy in the fuel to the output shaft to do useful work.”



The electrification of vehicles can range from simply replacing inefficient belt and gear driven under-the-hood auxiliaries (water pump, power steering, HVAC, cooling fans etc.) with efficient electric powered ones, to eliminating the internal combustion engine entirely and replacing it with full electric propulsion such as in a battery or fuel cell powered vehicle. Generally, as the vehicle power plant content becomes increasingly more electric, the fuel efficiency improves and the cost and

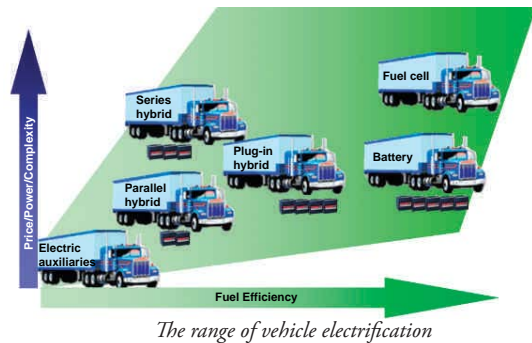
complexity increases. With rising fuel prices, vehicle makers are finding it much more feasible to justify this added complexity and cost.

We believe that the trend toward increasing electrification of vehicles will continue at an accelerated pace. Accordingly, we have developed and continue to develop, with considerable funding from our customers, electric propulsion systems and other motor and electronic products that will enable our customers to introduce alternative powered vehicles in the markets they serve, should they elect to do so. An expanded description of the different degrees of vehicle electrification follows:

Electrification of engine driven auxiliaries - In most existing conventional gasoline and diesel-powered vehicles, under-the-hood components such as water, oil and fuel pumps, power steering systems, cooling fans and air conditioning compressors are powered by engine belts, pulleys and gears. These devices perform their functions very inefficiently and represent a significant load on the engine. Because they are directly connected to the engine, there is no way to independently vary their speed or modulate their power. The electrification of these components provides numerous advantages including: 1) variable speed and power operation which improves efficiency and fuel economy, 2) the

ability to locate them strategically anywhere in the vehicle because an electric component does not require proximity to an engine driven belt or gear, 3) improved controllability and reliability and 4) flexible architectures and improved access for service and maintenance. Existing conventional alternators do not provide enough power to electrify the engine driven auxiliaries and must be replaced with a higher power generator. The typical UQM® generator is smaller, nearly twice as efficient and provides five times the power of a conventional alternator. In addition, these higher power generators can provide export power to power other on-board or offboard equipment. This electrification strategy is easily adopted because required changes to vehicle design and operation are the least disruptive and can improve vehicle fuel economy by 7 to 15 percent.

Parallel hybrids - Parallel hybrid vehicles incorporate an electric motor to join the internal combustion engine in propelling the vehicle. In a low power configuration, often referred to as a “mild hybrid”, a starter/motor/generator that is typically integrated into the flywheel of an engine is used to combine three separate functions in one electric machine. The machine starts the engine, eliminating the need for a conventional starter, performs power generation, eliminating a conventional belt driven alternator, and can be run in motoring mode, supplying supplemental power to the



driveline to improve acceleration and vehicle performance. Higher power parallel hybrids incorporate additional system features such as regenerative braking and automatic engine shutdown and all-electric propulsion during certain operating conditions. In a typical parallel hybrid vehicle, acceleration from a standing stop is generally performed by the motor in all-electric mode up to a given speed, at which time the engine starts and the engine and electric motor work in parallel to accelerate the vehicle. Once the vehicle achieves highway speed, the motor ceases operation and the vehicle is propelled using the engine only. During braking operations, the motor is switched to power generation mode and used to recapture and store energy into a battery pack that is normally lost as brake heat in conventional vehicles. The stored energy is then consumed by the electric motor in the next acceleration cycle. If the batteries need additional charging, the engine drives the machine in generator mode, sending electricity to charge the battery pack. These vehicles have sufficient battery charging capacity to be self-sustaining, thereby eliminating the need to plug the vehicle into the electric power grid. Depending on the vehicle's level of electric motive power and its duty cycle, parallel hybrids can achieve fuel economy improvements of 10 to 45 percent.

Series hybrids - Series hybrid vehicles contain a greater degree of electrification than parallel hybrids. In a typical series hybrid vehicle, all of the motive power for the vehicle is supplied by electric motors, thereby eliminating conventional driveline components such as the transmission and drive shaft. Generally, series hybrids contain a larger amount of batteries to store electrical energy and the engine's principal function is to turn a separate generator to produce the electrical energy necessary to maintain the state of charge of the onboard battery pack. As in a parallel hybrid, during braking operations, the motor is switched to power generation mode and used to recapture energy that is normally lost as brake heat in conventional vehicles. The stored energy is then consumed by the electric motor in the next acceleration cycle. Also, as in the parallel hybrid, a series hybrid vehicle has sufficient battery charging capacity to be self-sustaining, thereby eliminating the need to plug the vehicle into the electric power grid. Because the en-

gine serves as an under-the-hood power plant, series hybrids typically have large amounts of available onboard power to perform additional functions while the vehicle is operating or when it reaches its final destination. Depending on vehicle configuration and duty cycle, series hybrids can achieve fuel economy improvements of 35 to 50 percent.

Plug-in hybrids - A plug-in hybrid vehicle can be configured as either a parallel or a series hybrid, although the most common is the parallel configuration. What distinguishes this category of hybrid is that it is designed to operate in all-electric only mode for a range of 20 to 40 miles and be charge depleting, therefore requiring it to be periodically plugged into and recharged from the electric grid. Because a portion of the energy consumed by a plug-in hybrid vehicle is acquired at a relatively low cost from the electrical grid, in addition to the efficiencies obtained from its hybrid configuration, this category of vehicle can achieve fuel economy improvements of 60 to 75 percent.

All-electric battery and fuel cell vehicles - All-electric battery and fuel cell vehicles are powered entirely from electric energy stored on board in batteries or generated onboard by a fuel cell. In this category of vehicle, all motive power is produced by electric motors and there is no engine and associated transmission, driveline and exhaust components. Similarly, many vehicle functions currently performed by auxiliaries attached to the engine through belts or gears, such as power steering and air conditioning, must be performed using electric motors. As with hybrid electric vehicles, all-electric battery-powered vehicles switch the motor to power generation mode during braking operations to recapture and store energy into the battery pack that is normally lost as brake heat in conventional vehicles. The stored energy is then consumed by the electric motor in the next acceleration cycle. The energy needs of all-electric battery-powered vehicles are obtained by recharging their batteries using the electric power grid. Fuel cells are energy production devices that generate electricity through a chemical reaction resulting from combining hydrogen and oxygen. The by-product of this reaction is water, therefore allowing for the total elimination of vehicle exhaust emissions in this category of vehicle. Because there is no battery energy storage in a fuel cell powered vehicle, there is no opportunity for regenerative braking energy recapture. Fuel economy improvements for all-electric battery and fuel cell vehicles are generally 75 percent or greater.

Markets

We have historically focused our resources on the development of highly efficient electric propulsion systems for each category of vehicle described above with power levels of 0.5 kW to 150 kW, which are suitable

for vehicles ranging from wheelchairs to passenger automobiles to large trucks, tractors, construction equipment and military vehicles. In addition, we have developed electric motors, generators and electronic controls to power under-the-hood auxiliaries such as water, oil and fuel pumps, power steering, cooling fans and air conditioning compressors. We have also developed DC-to-DC converters that step down high voltage electrical systems to 12 volts and DC-to-AC inverter electronic products that convert DC power to consumer friendly 110-volt alternating current power. We are pursuing the commercialization of our technology and products designed by us in numerous large emerging and existing markets where we intend to introduce technologically advanced products or lower cost systems or a combination of both.

We believe that our technology and products are well suited for application in a wide range of vehicles as the trend toward electrification continues to gain momentum. In this regard, we have focused our attention on several niche markets where we believe we can most effectively compete and which we expect to have higher than average rates of growth and expansion. A brief description of each of these markets follows:

Passenger automobiles and light trucks - There are approximately 16 million passenger automobiles and light trucks sold in the United States each year. Over the last several years a market has developed for automobiles that are powered by hybrid electric powertrains. These vehicles have good performance and provide above average fuel economy compared to conventional automobiles. Several automakers have introduced vehicle models incorporating hybrid electric powertrains including Toyota, Lexus, Nissan, Honda, Ford, Saturn and General Motors. The Electric Drive Transportation Association reported that sales of hybrid electric vehicles in 2007 totaled 324,318 units, of which 181,221 units or nearly 56 percent were Toyota's Prius model. Total hybrid electric vehicle sales for 2007 were 31 percent higher than the previous year, and this trend is expected to continue as manufacturers expand their hybrid electric model offerings. These automakers to date are using hybrid electric powertrains that they have developed themselves or have acquired from other automakers or existing Tier 1 automotive suppliers. Many of these automobile companies are also developing fuel cell or battery-powered vehicles that they hope to introduce at a future date. During fiscal 2008 we shipped electric and hybrid electric propulsion systems to two international automobile companies for use in their vehicle development programs.

In addition to the established automakers, there are a variety of small entrepreneurial companies that are

developing and hope to commercialize electric, hybrid electric or plug-in hybrid electric cars. Although many of these companies lack substantial financial resources and/or significant automobile industry experience, they are pursuing a variety of strategies to introduce these types of automobiles into either niche markets, such as for fleet users or high-end luxury sports car buyers, or the consumer vehicle market generally. Should any of these companies be successful in commercializing their product offerings, it could cause the growth rate of this market to accelerate. These companies are generally using electric or hybrid electric powertrains that they have developed themselves or have been developed by other entrepreneurial companies. We have been and continue to be in discussions with nearly all of these companies and have provided our propulsion systems to several of them for use in their vehicle development programs.

Trucks, buses and recreational vehicles - The U.S. Department of Energy estimated that in 2004, trucks consumed 8 million barrels of crude oil per day and they project that by 2025, trucks will consume approximately two-thirds of all crude oil used in transportation, or 12 million barrels of crude oil per day.

There are approximately 6 million trucks, buses and other medium and heavy-duty on-road vehicles sold in the United States each year. The market for these vehicles is characterized by a large number of suppliers, a wide range of vehicle designs and configurations, diverse power and performance levels and relatively low production volumes for each model.

As a result, the typical truck manufacturer is unlikely to have the technical expertise or financial resources to internally develop components that can compete in emerging markets for increasingly electrified vehicles. Accordingly, we expect truck manufacturers to purchase products from suppliers who have developed technologically advanced electric motors, generators and power electronic energy management controls that can be applied to their vehicles.

We are currently supplying an automotive qualified DC-to-DC converter to Eaton Corporation which is used on board medium and heavy-duty hybrid trucks. We have also developed a DC-to-AC inverter that we expect to sell into the truck market to meet the growing onboard and export power requirements of hybrid trucks. Some medium and heavy-duty hybrid electric trucks manufactured by customers of Eaton currently have our DC-to-DC converter on board. We expect the medium and heavy-duty hybrid electric truck market to grow at an accelerating rate as potential customers for these vehicles gain a greater understanding of their operational, environmental and economic advantages.

Consequently, we expect revenue from the DC-to-DC converter we are currently supplying to Eaton, together with revenue from additional products we hope to supply to Eaton and others, to rise substantially during fiscal 2009 and beyond.



Electrorides Inc.'s Zero Truck™

In addition to our supplier relationship with Eaton, we have been and expect to continue to be in discussion with truck OEMs regarding potential niche vehicle programs. We have also supplied a hybrid electric propulsion system to a commercial truck manufacturer in the Middle East and have been selected as the propulsion system supplier for the Zero Truck™, an all-electric medium-duty truck being developed by Electrorides, Inc.

Also, several truck manufacturers are considering other electrically-based products that either enhance the utility of their vehicles, such as the ability to generate large amounts of exportable electric power, or that may be necessary to meet regulatory mandates, such as diesel engine emission standards and restrictions on emissions arising from diesel engine idling. These products include electric propulsion systems, higher power engine generators, electric auxiliaries and DC-to-DC and DC-to-AC inverters. We intend to continue to aggressively pursue the commercialization of our products for these and other applications in the market for hybrid trucks as it emerges over the next several years.

We are involved in a number of bus programs. Over the last several years we have supplied generators and motor controllers to the Denver Regional Transportation District (RTD) for its fleet of thirty-six MallRide hybrid electric shuttle buses, the first large-scale deployment of hybrid electric buses for use in the United States. The 45-foot MallRide hybrid electric shuttles operate on the 16th Street Mall in downtown Denver, providing a free ride for passengers across the 1.3 mile long 16th Street Mall.

We also are the propulsion system supplier for a hybrid electric bus being developed by Mobile Energy Solutions, LLC, Golden, Colorado. The 40-foot composite body bus incorporates a battery dominant plug-in hybrid power system, which provides a significant portion of the vehicle's power from batteries, which are recharged by being plugged into the electric power grid at night.

In addition, we are supplying generators to Traction Technology PLC to power their hybrid electric power packs for use in city buses in the United Kingdom. The Traction Technology hybrid electric power pack is expected to enable a city bus to meet the upcoming Euro

V Diesel Emissions Standards while at the same time improving vehicle performance. Working in conjunction with Transport for London operator Epsom Coaches, Merseytravel and Ipswich Buses Limited, Traction Technology plans to develop the hybrid power packs to meet the Low Emission Zone requirements set forth by the 2010 EU air quality objectives.

We also are the supplier of propulsion motors to a collaborative advanced hybrid electric bus development program being performed by the Flint Michigan Mass Transportation Authority ("MTA"), Kettering University, Michigan State University and Transportation Techniques LLC. MTA currently operates five hybrid electric cutaway buses on routes in Flint, Michigan and throughout Genesee County. The replacement of the existing propulsion systems with a UQM® propulsion system is expected to provide additional fuel efficiency improvements of 15 percent to 20 percent over that achieved by the current hybrid buses, or an overall improvement of up to 40 percent over standard diesel-powered vehicles.

We currently supply a vehicle auxiliary actuator motor to Lippert Components for use in conventional recreational vehicles. During fiscal 2008 we manufactured and shipped over 29,000 units of this product and have shipped over 51,000 units since the launch of production in fiscal 2007. There are a variety of specialty on-road manufacturers of conventional vehicles who represent an opportunity for us to further expand the deployment of our products, and we intend to continue to aggressively pursue the commercialization of our products for these applications.

Off-road vehicles - There are a wide range of off-road vehicles sold in the United States each year. These vehicles range from the small - wheelchairs, golf carts, fork trucks, riding lawn mowers, snowmobiles, all-terrain vehicles, etc., - to large construction, agricultural and mining equipment. The markets for small vehicles are typically characterized by relatively high volumes, low power levels and commodity pricing. During fiscal 2008, we began supplying an electric brake actuation motor to Club Car, Inc., a major manufacturer of golf carts and other utility vehicles. In addition, we have been supplying wheelchair motors to Invacare Corporation for the last nine years and expect to continue to supply field service parts for wheelchairs into the next year. We expect to continue to compete selectively in off-road vehicle markets where the customer requires advanced technology or superior



Club Car golf cart

performance and where acceptable gross profit margins are obtainable.

The market for large equipment - tractors, construction, mining and other specialty equipment - possesses many of the same characteristics as the over-the-road truck market described above. It is estimated that approximately 500,000 of these vehicles are sold in the United States each year. Accordingly, we expect these vehicle manufacturers to purchase products with similar specifications as those required in the over-the-road truck and bus market from suppliers who have developed technologically advanced electric motors and power electronic energy management controls that can be applied to their vehicles. Although these vehicles are produced in relatively lower volumes, they nevertheless represent a substantial opportunity due to higher power levels, substantial technical complexity and therefore substantially higher product content and dollar value per vehicle. We currently have systems under evaluation in both agricultural and construction vehicles for both electric propulsion and under-the-hood auxiliary applications, including an advanced propulsion and waste heat recapture system for an agricultural vehicle.

We have also developed electric products for the aircraft and aerospace market and the boat and marine market. In the aerospace market, we have developed electric auxiliary motors and controllers used in aircraft air conditioning systems. We have also developed auxiliary power units for the generation of onboard power and propulsion systems for various boat applications. We believe that some of the fuel efficiency benefits of vehicle electrification can also be realized in the boat and marine markets. Although our focus is primarily on land applications, we will continue to leverage our technology and products in these potentially large niche markets as opportunities present themselves.

Military vehicles - The U.S. military purchases a wide range of ground vehicles each year including combat vehicles such as tanks, self-propelled artillery and armored personnel carriers, as well as a variety of light, medium and heavy-duty trucks for convoy and supply operations and for the transport of fuel used on the battlefield. The military is particularly interested in the electrification of vehicles because the attributes that these vehicles possess offer exceptional potential for the military to achieve its long-term objectives of developing a highly mobile, lethal fighting force. Fuel economy improvements in military vehicles transfer into substantial savings in support infrastructure and transportation costs associated with transporting fuel to the battlefield, which is typically thousands of miles from the United States. For example, if fuel economy improvements of 25 percent are

achieved in the average truck, a corresponding amount of fuel does not have to be transported and therefore a corresponding number of airplanes or tankers is not required in the transportation process. Also, the availability of onboard electrical power on military vehicles

opens up new opportunities for the development of sophisticated surveillance, detection and battlefield monitoring equipment and for laser, microwave and electrical pulse weapon systems. It is estimated that the military purchases approximately 8,000 trucks per year and greater numbers during periods of armed conflict. As is the case with large off-road equipment, these vehicles are produced in relatively lower volumes, operate at higher power levels, have substantial technical complexity and therefore substantially higher product content and dollar value per vehicle. We have, over the last several years, been working with a number of military contractors and vehicle makers including DRS Technologies, AM General, BAE Systems, Boeing and others, on prototype hybrid electric vehicles, high export power generators, electric auxiliaries, DC-to-DC converters and DC-to-AC inverters. Although this market has not yet begun to emerge, we believe that this market may begin to emerge soon, driven by the availability of hybrid electric components in the commercial truck market that operate at similar power levels as those required by many military vehicles.

Distributed power generation - As the price of crude oil and natural gas has continued to rise over the last several years, there has been an increased focus on the development and adoption of clean, renewable energy products including wind turbine power generators, solar panels and stationary fuel cell power generators. In addition, many experts believe that power users will increasingly consider on-site power generation using diesel or natural gas fueled internal combustion engine generators as an alternative to power supplied over the electrical grid. We have developed and expect to continue to develop generators for this market. In addition, we have also developed DC-to-AC electronic power inverters for use in distributed power generation applications to convert the DC output of these devices to usable AC power for the homeowner or business. We are currently developing, under the California Energy Commission's Public Interest Energy Research Program and with the U.S. Department of Energy's National Renewable Energy Laboratory (NREL), an advanced grid-connect inverter under its Advanced Power Electronics Interface (APEI) Initiative. The objective of the development effort is to design a cost-effective, flexible, readily-manufactured, ready to be commercialized prototype interface that will standardize the interconnection for a modular, scalable range of APEI systems.

There is a developing industry initiative termed “vehicle-to-grid”, or “V-to-G”, to potentially make available for use on the electric utility grid the large amount of energy in battery electric, hybrid electric, plug-in hybrid electric and fuel cell electric vehicles. Under this initiative, protocols, guidelines and electronic and software technologies are being developed to allow for the intelligent transfer of electric power from these to the electric power grid. There are different versions of the vehicle-to-grid concept: 1) A hybrid or fuel cell vehicle, which generates power from storable fuel, uses its generator to produce power for a utility at peak electricity usage times. Here the vehicles serve as a distributed generation system, producing power from conventional fossil fuels; and 2) A battery-powered or hybrid vehicle which uses its excess rechargeable battery capacity to provide power to the electric grid during peak load times. These vehicles can then be recharged during off-peak hours at cheaper rates while helping to absorb excess nighttime generation. Here the vehicles serve as a distributed battery storage system to buffer power.

The V-to-G concept allows such vehicles to provide power to help load balance (valley fill and peak shave) localized grid segments during peak load periods when the selling price of electricity can be very high, and to buffer electricity, including in power outages. We are currently developing inverter technology that we expect will be capable of functioning in this dynamic energy transfer environment when, and if, it develops into a commercial opportunity.

Technology

Our technology base includes a number of proprietary technologies and patents relating to brushless permanent magnet motors, generators and power electronic controllers, together with software code to intelligently manage the operation of our systems.

The typical architecture of a UQM[®] motor consists of a stator winding employing a high pole count configuration, which allows for high copper utilization (minimizing energy loss and cost) and a hollow rotor upon which powerful rare earth permanent magnets are mounted on the outer circumference. The stator is affixed to an aluminum housing containing a mounting ring and bearings, which allows the rotor to be suspended within the stator. Commutation of the machine is accomplished electronically by sensing the position of the rotor in relation to the stator and intelligently pulsing electrical energy into the stator such that the electric field generated by the stator interacts with the magnetic field of the rotor, producing rotational motion (“motor operation”). Conversely, the application of rotational motion to the rotor by an external force results in the generation of electrical power (“generator operation”). UQM[®] machines can be operated in either

a forward or reverse direction of rotation and either in motor or generator mode and can dynamically change from one mode of operation to another in millisecond response time. The hollow design of the rotor permits the packaging of other components such as gears and electromechanical brakes in the interior of the machine. These design features contribute to lower usage of copper and iron and other materials generally (due to smaller package dimensions), reducing manufacturing cost over those for conventional machines of similar power. In addition, the utilization of neodymium-iron-boron (“NdFeB”) magnet material in a wide range of consumer devices such as cell phones, disk drives and medical devices has dramatically improved the availability, performance and price of this material, allowing us to price our advanced motors and controls competitively with lesser performing conventional motors, which we believe will accelerate the rate of commercialization of our technology.

Attributes of our permanent magnet motor technology include brushless electronic commutation, a relatively large air-gap dimension (useful for hybrid electric applications where the motor is integrated with an engine or transmission), the use of powerful rare earth NdFeB magnet material, good heat rejection, low iron and copper content and low mechanical losses. As a result, UQM[®] motors have high operating efficiencies, high power density (high power output to weight ratio) and generally have smaller external dimensions and weight for a given power output, improving packaging.

Attributes of our microprocessor-based digital power electronic controllers include high power operation (up to 500 amps at 400 volts), four-quadrant control (forward/reverse and motoring/generation), reduced switching losses, adaptive switch timing control and controller area network (“CAN”) capability. As a result, UQM[®] controllers have high operating efficiencies, high power density (high power output to weight ratio) and generally have smaller external dimensions and weight for a given power output, improving packaging.

The UQM[®] embedded DSP software is the intelligence that coordinates the interaction between the motor and motor controller, as well as interfacing with a vehicle controller. Software control algorithms are a key piece of the Company’s intellectual property portfolio. One aspect of the software is a patented method of control referred to as Phase Timing Advancement that enables UQM[®] motors to deliver both high output torque at low operating speeds and high power at increasing operating speeds. Conventional permanent magnet motor designs are limited to operating at either high torque



*New 90 lb 168 hp
propulsion motor*

at low speeds, sacrificing power at high speed, or vice versa. In most vehicle propulsion applications, high torque is required to launch the vehicle from a standing stop, with a subsequent transition to high power as the vehicle is accelerated to highway speeds. In the majority of conventional internal combustion engine powered vehicles, the transition from high torque to high power is accomplished through the multiple gear changes performed by a mechanical transmission. UQM[®] motors, incorporating phase advance technology, are suited as propulsion drives in electric, hybrid electric, plug-in hybrid electric and fuel cell electric vehicles due to their ability to power a vehicle from a standing stop to highway speeds without mechanical gear changes, thereby eliminating the size, weight, complexity and cost of mechanical transmissions.

We have also developed a technology that allows our permanent magnet motors to achieve a 10 to 1 top speed to base speed ratio. This technology also provides both high torque and high-speed capability in the same machine, but at levels greater than that of other motor technology. Many electric motor applications require high torque capability for starting and low speed operation, but must also achieve high speed. For military vehicles, high torque at low speed translates into obstacle and grade climbing capability, while high speed enables pursuit, dash and evasive maneuvers as well as onroad convoy transport. Many commercial applications have similar requirements. Conventional vehicles achieve the high torque required for launch and low end acceleration and the constant power required for high road speed by using a transmission and multiple gear changes. Prior to this performance breakthrough, UQM[®] systems incorporating phase advance were able to achieve a top speed to base speed ratio of 4 to 1. Electrically propelled vehicles designed around a 4 to 1 limitation sometimes require unwanted gearing and/or have less than desired performance. This has particularly been the case in the more demanding off-highway equipment and military vehicle applications. Providing vehicle developers with electric propulsion systems capable of a top speed to base speed ratio of 10 to 1 overcomes a significant limitation and opens up potential new application opportunities for UQM[®] systems.

We recently have extended the capability of Phase Advance Control by using Adaptive Control techniques. These proprietary software algorithms alter the switching strategy as a function of DC voltage, operating speed and output power, optimizing system performance under dynamic conditions. The result is maximized output and efficiency which decreases fuel con-

sumption in hybrid electric vehicles and increases the range of battery electric vehicles. Adaptive Control also optimizes the output per unit of voltage and current, maximizing the utilization of the onboard stored energy and other electrical devices by extracting power from substantially the entire electrical cycle of the motor. These performance enhancements have increased peak and continuous power output of our standard system by 50 percent and improved efficiency at various operating points by 2 to 8 percent.

In addition, our motor controllers now have user configurable functionality and increased data transmission speeds and response times, improving vehicle capability. Included in this functionality is the ability to switch between torque, speed and voltage control dynamically, which is especially useful for parallel hybrids and generator applications of our technology. For vehicle developers, our new Graphical User Interface provides the means to tailor any UQM[®] system to create the desired driving experience.

During fiscal 2008, we continued the development of a patent pending motor architecture that significantly increases torque density for wheel motors. This technology creates torque in both axial and radial planes of rotation, instead of one or the other as is typical with present motor technology. Innovative powdered iron geometry and winding patterns are utilized to create this output improvement. We believe this technology to be useful in specialized applications that require high peak output torque from a compact motor.

During fiscal 2008 we filed two additional patent applications related to technology developments that have the potential to further improve the performance of our motors. We also began an internally-funded project to increase the functionality of the microprocessor software we use to intelligently control our motor controllers. Some of these enhancements include torque, speed and voltage control improvements that enable more sophisticated hybrid electric operating strategies, refined generator voltage regulation to facilitate improved battery pack management and further improvements in system efficiency and power output through advances in motor control algorithms. In addition to these activities, the U.S. Air Force has contracted us to manage a research and development project in cooperation with Mississippi State University, directed toward the development of high temperature power switching devices using silicon carbide that may lead to improved power handling capability for our motor controllers.

The majority of our research and development activities are the result of projects contracted with and funded by customers, for which we typically retain intellectual

“During fiscal 2008 we filed two additional patent applications related to technology developments that have the potential to further improve the performance of our motors.”

property rights in the resulting technology developed. Customer funded development activities are recorded in our financial statements as contract services revenue and the associated development costs are shown as cost of contract services.

In recent years, we have focused our research and development activities on the development of commercial products and production engineering activities to lower the cost of manufacture, as well as enhance the performance and capability of our systems, as opposed to basic research in the field. We believe our future growth is dependent, in part, on the continued advancement of our technology portfolio and our ability to commercialize our technology in additional product applications and markets. Accordingly, we expect to continue to pursue additional customer funded programs and to selectively invest in internally funded development projects to accomplish these objectives.

Manufacturing

It is our primary objective to become a major manufacturer of electric motors, generators and power electronic power systems that incorporate the Company's proprietary technology and to supply these products to electric, hybrid electric and fuel cell electric vehicle OEMs and/or their Tier 1 suppliers. We have established and are continuing to expand our manufacturing capability and presence through a planned technology progression driven by key customer demands to address future vehicle requirements.

In 1998, we established our volume manufacturing operation with the launch of production of wheelchair motors for Invacare Corporation and achieved ISO 9002 quality certification. During fiscal year 2002, we produced over 10,000 of these motors and were recognized for our quality and on-time delivery performance.

In March of 2006, we began the volume production of vehicle auxiliary actuator motors for Lippert Components. This production is performed on a highly automated, flexible, mixed model assembly system which is computer controlled and monitored for quality assurance and consistent performance. The development and installation of this assembly system by our organization was instrumental in demonstrating our manufacturing know-how and capability to existing, as well as potentially new, vehicle OEM and Tier 1 supplier customers. We recently received an additional order for auxiliary actuator motors from Club Car, Inc. that are produced on this assembly system.

In September of 2006, we began the volume production of DC-to-DC converters for Eaton Corporation as

part of their hybrid electric power system for the heavy truck market. We designed and installed a manufacturing cell for these electronic boxes that includes the robotic application of sealant, sixteen hours of burn-in cycling between hot and cold temperature extremes, pressure testing for cooling leaks and complete functional testing.

Over the last several years we have established a production engineering group with decades of manufacturing design and production experience, much of which is specific to the automotive industry. Today, this team consists of nearly twenty professionals. In the last two years we have made significant improvements in manufacturing systems, facilities and space utilization and we have adopted the Advanced Product Quality Planning ("APQP") automotive quality procedures.

In order to insure our cost competitiveness, we have adopted a manufacturing strategy for the near term of designing all product components and then sourcing these parts with quality suppliers. Final assembly, testing, pack-out and shipping of the product are performed at our Frederick, Colorado facility. We have established relationships with many high-quality, low-cost suppliers, including a number of international companies. Future plans are to continue the development and introduction of more advanced and automated manufacturing systems which we believe will ensure our competitiveness in new and emerging markets.

With the successful introduction of electric auxiliary motors and power electronic boxes currently in production vehicles, we are now turning our attention to the volume production of high power generators and electric propulsion systems. We believe that the Company is well positioned to leverage its technology and pursue significant production programs with major OEMs and/or their Tier 1 suppliers.

Our Opportunity

We have developed a range of products including electric propulsion systems, generators, motor controllers and other power electronic products that we believe are ideally suited to the emerging markets for electric, hybrid electric and fuel cell electric vehicles and the distributed power market.

Hybrid electric passenger vehicle sales have grown substantially since their introduction in the North American market in 2000, achieving sales of 324,318 units in 2007 and over one million units since their introduction. As a result, the fuel economy and emission benefits of hybrid electric technology are broadly understood by consumers worldwide. This, in concert with record oil prices, tax credits for hybrid electric ve-



DC-to-DC converter



Vehicle auxiliary actuator motor

hicle purchasers, stricter government emission regulations and a growing environmental consciousness, has generated market demand for this class of vehicle. Until recently, passenger vehicle makers have elected to develop their own hybrid electric systems and components, either individually or in cooperation with Tier 1 automotive suppliers; however, we have recently supplied our propulsion systems to two international automotive manufacturers as part of their electric and hybrid electric vehicle development activities. Should either of these automakers elect to utilize our products in future model launches, it would have a material impact on our future rate of growth. We are also in discussions with an international Tier 1 automotive supplier regarding generators for use in hybrid electric vehicles.

In addition to the passenger automobile market, vehicle makers of all types have been evaluating the potential of applying hybrid electric technology to their vehicle platforms. Of these manufacturers, agricultural, construction and medium and heavy-duty truck builders have been the most active, driven by the performance and fuel economy advantages available from this technology, the availability of large amounts of onboard and exportable power and stricter diesel emission mandates.

During the second half of this fiscal year, International Truck and Engine Corporation, a Navistar Company, announced that it was the first company to enter line production of hybrid electric commercial trucks, introducing the International® DuraStar™ Hybrid, a diesel electric medium-duty truck. Similarly, Peterbilt Motors Company, a division of PACCAR Inc., announced plans for full production of its Model 330 and Model 335 medium-duty hybrid trucks at its manufacturing facility in Ste. Therese, Quebec, Canada in the summer of 2008, and Freightliner Trucks, a division of Daimler Trucks North America LLC, has introduced its Business Class® M2e hybrid truck. All of these truck manufacturers use the Eaton Corporation hybrid electric system and related electronic products. In addition, in March 2008, Caterpillar, Inc. introduced the D7E crawler tractor incorporating an electric drive system for track-type tractors with an electric system that provides power to electric auxiliaries so that no engine belts are required. We believe that these industry developments signal the beginning of a potentially large-scale deployment of electric propulsion and related electronic products into markets other than mass-market passenger automobiles. Should these products receive broad customer acceptance, as we expect they will, potentially substantial opportunities will likely develop over time for our company and other similarly situated companies that have developed technologically advanced products in anticipation of the emergence of these markets.

The operating characteristics of electric motors for vehicle propulsion are different from those of more conventional industrial motors. Propulsion motors ideally deliver high levels of torque efficiently at slow rotational speeds and possess the ability to transition from high torque to high speed over a relatively constant power curve allowing, in many cases, the elimination of conventional transmissions. Our proprietary propulsion systems have been specifically developed for these applications and deliver exceptional torque and high rotational speeds in a compact, energy efficient machine. We believe that our portfolio of propulsion systems, power electronic controllers and related electronic products has well positioned our company to compete effectively in these emerging markets. Electric and hybrid electric vehicle makers to-date have generally adopted a 340-volt electrical system to deliver the energy from the battery pack to the electric components and vice versa. Conventional gasoline vehicles generally have a 12-volt electrical system that operates dashboard instruments, lights, horns, etc. The higher electrical system voltages of electric and hybrid vehicles are creating opportunities for companies, such as ours, to enter the automotive market with a wide range of under-the-hood auxiliaries. These products include generators and motors to drive water, oil and power steering pumps, air conditioning compressors and cooling fans that operate at the new higher voltage.

These industry developments, as well as the potential production requirements of our existing customers, will require us to invest a substantially greater amount of financial and human resources in fiscal 2009 and beyond in the commercial launch of products. Specifically, we currently expect to potentially double the size of our production engineering group and to significantly increase the level of our capital expenditures for manufacturing equipment and tooling, and potentially for the expansion of our manufacturing facility in Frederick, Colorado. We believe these investments are necessary to support our strategy of aggressively rolling out automotive certified products to satisfy our customers' requirements as these new market opportunities emerge and expand.

As the markets for these advanced vehicles continue to emerge and expand into additional vehicle platforms over the next several years, we expect to experience potentially rapid growth in our revenue coincident with the introduction of electric products by our customers. In parallel to these activities in emerging markets, we expect to continue to pursue additional production opportunities for our proprietary technology in existing markets where the performance of our products can provide our customers with a competitive advantage in the markets they serve.