Testimony to US Senate Committee on Energy & Natural Resources
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Mr. Chairman and members of the Committee, this document supplements and expands upon my oral testimony during today's hearing. Thank you for your invitation to share with you what Phoenix Motorcars is doing to meet the dual challenges of our nation's dependency on oil and global climate change. We join all Americans in applauding your interest in learning about the current status of vehicles powered by the electric grid and the prospects for wider deployment. Based upon our experience in developing an advanced all-electric Sport Utility Truck, we at Phoenix Motorcars are convinced that all-electric vehicles present the best near-term solution to eliminate our dependence on oil and tackle the difficult challenge of climate change. We hope that the information we share with you this morning will be of value as you consider legislation to address these important issues.

Introduction to Phoenix Motorcars

Phoenix Motorcars was founded in 2001 in Southern California. Our mission is to develop best-in-class, zero emission vehicles (ZEV) for the U.S. commercial and government fleet markets initially and then later expanding into the consumer market. Phoenix is headquartered in Ontario, California. Our team of employees has over 300 years of collective experience working on vehicle and alternate fuel programs for leading automotive companies.

After six years of research and development work into full performance battery electric vehicles, Phoenix began the commercialization process of our Phoenix Sport Utility Truck model with the assistance of many strategic partners including Energy CS, Altairnano Technologies, AeroVironment and many other innovative companies. The accumulated effort of Phoenix and our partners has produced a truly best in class electric vehicle that will set the milestone for battery electric vehicles (BEV) to come. A few highlights about our BEV:

- Range of 100+ miles per charge
- Top speed of 95 mph
- High crash test safety rating
- Battery charging in as little as 10 minutes with off-board fast-charging equipment
- $3 cost per charge using the on board charger
- A projected EPA rating of 135 mpg
- 0 to 60 mph in 10 seconds

Phoenix is now set to begin production in the fourth quarter of this year with deliveries beginning in the first quarter of 2009. Our demonstration fleet is currently under build to complete testing prior to vehicle production. These demonstration vehicles use the Altairnano lithium titanate battery and demonstrate a Phoenix BEV's ability to rapid charge and perform in real world applications. The price of the Phoenix SUT and SUV are $47,500 and $54,000 respectively.

Life Cycle Costs

The retail costs of the Phoenix SUT and SUV are a bit higher than their gasoline fueled counterparts, mainly due to the cost of the battery pack. However a comparison of the life cycle cost of electric vs. gasoline shows that the owner of a Phoenix saves a considerable amount of money–with a payback in about 2 years. Per mile, electricity is 1/16th the cost of gas. The owner of a Phoenix BEV who drives 15,000 miles per year can expect to save approximately $4,000 in gasoline costs. Furthermore, BEVs have less than 10% of the moving parts when compared to gasoline powered cars. BEVs don't have pistons, transmissions, engine oil, spark plugs, valves, starters, clutches, distributors, oil filters, fuel pumps, fuel filters, air filters, water pumps, timing belts, fan belts, catalytic converters, or mufflers. No fumes, no exhaust, no smog tests, no oil changes, no radiator flushes, no loud engine, no warm-ups, and no gas lines. Maintenance savings equal about $1500 per year. Coupled with available incentives like California's $5000 tax rebate and the federal $7500 rebate under consideration, and the purchaser of an BEV realizes a payback in less than 2 years.

Phoenix SUT Cost	CARB Rebate Incentive	Proposed Federal Incentive	Maintenance Savings (Annually)	Estimated Fuel Savings (Annually)	Payback Period (in years)
$47,500	$5,000	$7,500	$1,500	$3,900	0.5 years
$47,000			$1,500	$3,900	3 years

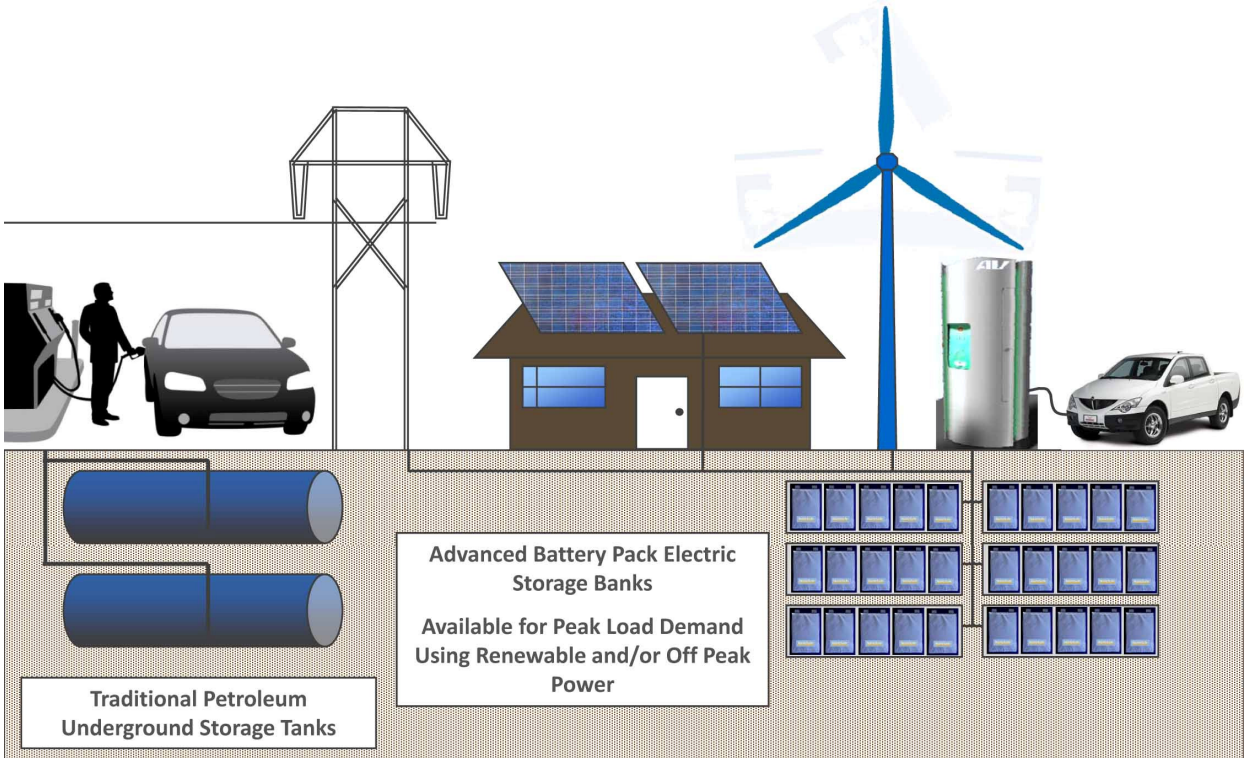
(a) Assumes an average fuel cost of $4.00 per gallon
(b) Based on 15,000 miles per year

Rapid Charge Infrastructure

Phoenix Motorcars is currently the only electric vehicle manufacturer that has safely demonstrated the ability to rapid charge a vehicle in 10 minutes, using fast-charging technology developed by AeroVironment, Inc., which like Phoenix Motorcars is a home grown American BEV technology leader. This unique ability requires industrial 480V 3 Phase power and a 250kW off-board charger that is controlled by the vehicle's battery management system. Because our advanced Li-ion batteries can be fully recharged in 10 minutes with no impact on battery calendar or cycle life, so-called "range anxiety" is eliminated. Our vehicles can be recharged in the same time it takes to fill the tank of a gasoline vehicle. Even with this ability, some utilities have expressed concern about the potential impact on the grid of many Phoenix vehicles "rapid charging" during peak power use. However, duty-cycle studies show that most of our vehicles will be recharged overnight when electricity demand is low. According to the U.S. Department of Energy's National Renewable Energy Laboratory, the large-scale

deployment of plug-in hybrid electric vehicles will have negligible impact on the electric power system which has sufficient available capacity to electrify up to 84% of our nation's cars, pickup trucks, and SUVs for the daily 33 mile driving distance of the average American. For the small percentage of electric vehicles that will be "rapid-charged" at central charging stations, Phoenix has developed a technical solution that will enhance penetration of renewable energy such as solar and wind power, and is based on an electrical storage variation of the traditional gas station model.

Today, gasoline stations rely upon underground liquid petroleum storage tanks. When the driver realizes she's low on fuel, she simply pulls into a conveniently located gas station and purchases a desired amount of fuel for her vehicle. The capital cost of storage and dispensing equipment at these gas stations typically exceeds a million dollars. But, if one also considers the external costs associated with groundwater contamination, smog and its associated disease and property damage, the total cost of each service station is millions of dollars.



The electric vehicle "rapid charge" station concept developed by Phoenix follows a similar model but with a fraction of the capital cost and none of the external human health and environmental cost. Instead of petroleum storage tanks to hold gasoline and diesel, multi-megawatt battery banks will be installed below or above ground to fill the need for daily electric vehicle charges. These batteries can be recharged from the utility grid during off-peak distribution times (such as in the middle of the night), from solar panels, wind power or other electricity power generation methods. An electric vehicle driver finding her vehicle in need of a quick charge will pull into a charging station, connect the charging cable to the vehicle, and begin transferring energy from the stationary battery bank to the electric vehicle

battery. The same credit card system we use today in gasoline stations will be used to purchase the charge and return the driver back on the road in a matter of minutes.

This charging station model will provide real benefits to electric vehicle owners as well as to federal and state governments. Batteries will present no lingering environmental concerns for the sites they are located on. Rapid charging stations will hasten and assist mass adoption of electric vehicles and will create synergy for the adoption of renewable electricity from wind and solar technology. Battery banks at recharging stations also will provide a second life for older vehicle batteries no longer suited for transportation but which are still viable for stationary applications. Battery banks will feed energy back onto the energy grid under certain conditions. Cost of the energy can be regulated and controlled domestically, on US soil. In this way, batteries will provide power sources distributed across the nation that can be deployed as temporary power sources during emergencies.

Forecast for Future

Phoenix has received over 600 orders from fleet customers and more than 20,000 individual reservations. These orders represent billions of dollars in domestic production. Among those placing orders are: City of Fresno, City of Santa Monica, Waste Management, and Clark Pest Control. We are also on the GSA list and have begun discussions with numerous federal agencies interested in greening their fleets.

Our current business plan sets the following sales targets for both the fleet and consumer markets:

2009: 2,500 vehicles
2010: 10,000 vehicles
2011: 51,000 vehicles

Challenges we Face

Phoenix BEVs incorporate the following core technologies: BEV integration, vehicle drivetrain, accessory components, battery systems, battery tray, vehicle integration module, battery management system, drive-by-wire, climate control operations, and vehicle certification. While some of these components are common to traditional ICE vehicles, the market and supply chain for batteries and electric motors is still in its infancy and is limited. This is especially true here in the United States. And the cost for these essential components is still not competitive. The Center for Automotive Research estimates battery costs alone add $7,000 to $10,000 per vehicle.

Past Attempts to Address EVs

In order to overcome these barriers to market and to promote energy independence for our nation, Government must take bold steps to adopt an alternative fuel policy agenda that places BEVs front and center and elevates them to at least the same level if not higher as other alternative fuels supported in the past.

Nearly 32 years ago, in the face of our last energy crisis, Congress passed the Electric and Hybrid Vehicle Act of 1976, which declared that the era of the electric vehicle had arrived and that it was the policy of Congress to:

(1) encourage and support accelerated research into, and development of, electric and hybrid vehicle technologies;

(2) demonstrate the economic and technological practicability of electric and hybrid vehicles for personal and commercial use in urban areas and for agricultural and personal use in rural areas;

(3) facilitate, and remove barriers to, the use of electric and hybrid vehicles in lieu of gasoline and diesel-powered motor vehicles, where practicable; and

(4) promote the substitution of electric and hybrid vehicles for many gasoline- and diesel-powered vehicles currently used in routine short-haul, low-load applications, where such substitution would be beneficial.

The Act created a new loan guarantee program to encourage the commercial production of electric and hybrid vehicles. The new program authorized DOE to guarantee principal and interest on loans for the purposes of:

(1) research and development related to electric and hybrid vehicle technology;

(2) prototype development for such vehicles and parts thereof;

(3) construction of capital equipment related to research on, and development and production of, electric and hybrid vehicles and components; or

(4) initial operating expenses associated with the development and production of electric and hybrid vehicles and components. See 15 U.S.C. §2509.

Unfortunately, the loan guarantee program utterly failed. Since the passage of the Act in 1976 (following an over-ride of President Ford's veto), precious little has been done to help create the market for BEVs. This is not to say that the Congress has not tried. In fact, since 1976, various Congressional committees have convened more than 40 hearings and received tens of thousands of pages of testimony from the automobile industry, academia, government laboratories, government agencies and other experts seeking an answer to the same question we face today: how can our Nation break our addiction to petroleum? A sampling of these various Congressional hearings follow:

November 24, 1979: Hearings on Storage Batteries for Electric Vehicle Applications;

March 7, 18, 1980: Hearings on World Auto Trade: Current Trends and Structural Problems;

April 15, 1980: Hearing on Automotive Average Fuel Economy Standards;

May 2, 1980, Hearings on Automotive Technology and Fuel Economy Standards;

May 28, 1980: Hearings on National Automotive Research Act;

July 17, 1985: Hearings on Rollback of CAFE Standards and Methanol Vehicle Incentives Act of 1985;

September 14-16, 1988: Hearings on the Global Environmental Protection Act of 1988;

May 2, 1989: Hearings on Global Warming and CAFE Standards;

September 7, 1989: Hearings on Motor Vehicle Efficiency Act of 1989;

January 11, 1990: Hearings on Alternative Fuels

September 23, 1990: Hearings on Electric Vehicle Technology and Commercialization;

October 24, 1990: Hearings on Energy Policy Implications of the Middle East Oil Crisis;

February 21, 1991: Hearing on Motor Vehicle Efficiency Act;

April 26, 1991: Hearings on Global Warming and Other Environmental Consequences of Energy Strategies;

May 16, 1991: Hearings on HR 1538, National Electric Vehicle Act of 1991;

June 11, 1991: Hearings on Electric and Hybrid Vehicle Technologies;

May 11, 1993: Hearings on Status of Domestic Electric Vehicle Development;

September 29, 1993: Hearings on Alternative Transportation Fuel Additives;

June 30, 1994: Hearings on Electric Vehicles and Advanced Battery R&D;

June 14, 2000: Hearings on the Clean Air Act: Environmental Benefits and Impacts of Ethanol

January 2, 2001: Hearings on National Energy Policy: Conservation and Energy Efficiency;

March 21, 2001: Hearings on the Clean Air Act Oversight Issues;

May 30, 2001: Hearings on Innovative Environmental Technologies;

June 22, 2001: Hearings on National Energy Policy: Conservation and Energy Efficiency;

June 12, 2001: Hearings on Effect of Federal Tax laws on the Production, Supply and Conservation of Energy;

July 18, 2001: Hearings on National Energy Issues;

December 6, 2001: Hearings on Corporate Average Fuel Economy (CAFE) Reform;

January 24, 2002: Hearings on National Security, Safety, Technology, and Employment Implications of Increasing the CAFE Standards;

June 2, 2002: Hearings on Department of Energy's Freedom Car: Hurdles, Benchmarks for Progress and Role in Energy Policy;

March 5, 2003: Hearings on The Path to a Hydrogen Economy;

March 6, 2003: Hearings on Energy Use in the Transportation Sector;

March 3, 2004: Hearings on Reviewing the Hydrogen Fuel and Freedom Car Initiatives;

February 9, 2005: Hearings on Improving the Nation's Energy Security: Can Cars and Trucks Be Made More Fuel Efficient?;

May 15, 2005: Hearings Public Policy Options for Encouraging Alternative Automotive Fuel Technologies;

July 28, 2005: Hearings on Automotive Technologies and Energy Efficiency

October 20, 2005: Hearings on U.S. Foreign Policy, Petroleum and the Middle East

May 17, 2006: Hearings on The Plug-In Hybrid Electric Vehicle Act of 2006

March 7, 2006: Hearings Energy Independence

October 3, 2007, Hearings on Energy Storage Technologies: State of Development for Stationary and Vehicular Applications;

January 3, 2007: Hearings on Transportation Sector Fuel Efficiency;

After 32 years of hearings and debate it is time for action. Today, our Nation is perilously dependent upon foreign oil to fuel our cars and trucks. In June of 2008 the Energy Information Administration reported that in 2007 we imported 12 million barrels of foreign oil each day. With crude hovering at $100 per barrel Americans sent $120 million per day of their hard-earned wages to foreign countries. This dependency poses both a security risk and an economic crisis never before experienced by our Nation. The urgent nature of the problem compels Congressional intervention to finally catalyze the market for electric vehicles. No other near term automotive technology offers the ability to immediately end dependence on foreign oil, drastically cut smog and global warming emissions, and avoid a massive decades-long investment in new fuel distribution infrastructure.

Phoenix Motorcars understands that Congress is appropriately reluctant to legislate winners and losers among competing technologies. However, battery electric vehicles should be the one exception to this rule. It is the only technology that can solve our problem of petroleum dependency and global warming emissions within 10 years. The battery technology enabling high density energy storage has finally arrived and is steadily improving. The supply infrastructure to refuel the vehicles exists in every home and business across the Nation. At the very least, Congress must give electric vehicles equal treatment with the other alternative fuel options. With the right mix of market incentives, an historic opportunity exists to change fundamentally our transportation paradigm away from petroleum and toward electricity supplied from renewable sources.

It is only with decisive action by the Congress will our Nation finally begin to solve its twin Achilles Heels of dependence on foreign oil and runaway carbon emissions. The time for more hearings, more debate, and more study has passed. Meaningful legislative action is needed.

How Government Can Assist

Cost is the principal barrier to rapid adoption of BEVs. Our vehicles cost about $15,000 more than their gasoline counterparts largely because economies of production in battery manufacturing and vehicle integration have not yet been achieved. This incremental cost is a big barrier to commercialization of the technology because data show that consumers will not pay extra for more fuel efficient vehicles unless the pay-back is 2.5 years or less. The pay-back must be relatively immediate or consumers will not pay the higher price. This means that BEVs with incremental costs upwards of $15,000 may not sell and manufacturers, facing an uncertain market, will not produce them.

Phoenix Motorcars is pleased that the House passed a tax credit for plug in vehicles in the energy extenders bill earlier this year. But this tax credit does not go far enough. Phoenix Motorcars believes that a key to accelerating the adoption of BEVs is to foster fairer competition among the various alternative fuels within the Federal Government's existing fuel diversification policy framework. Electric vehicles currently receive less incentives than other alternative fuel vehicles even though they release no pollution, require no massive investment in new fuel infrastructure, and cause no price disruptions in our food supply.

Following are a number of additional tools that Congress should provide to help expedite the commercialization and wider deployment of battery electric vehicles in the near future.

- Congress should not cap the tax credit for BEVs at $7,500. The existing proposed tax credit of up to $7,500 for qualified plug-in hybrid electric drive vehicles consists of a base credit of $2,500 for each qualified plug-in hybrid electric drive vehicle plus $400 for each kilowatt hour of battery capacity above 4 kilowatt hours. As structured, the credit treats BEVs the same as hybrid-electric vehicles even though BEVs eliminate the use of gasoline entirely, have zero emissions, and are more costly, all due to their larger battery packs which eliminate the need for internal combustion engines. By lifting the $7,500 cap for BEVs only, Congress would provide greater incentives for the production of all-electric vehicles because the cost premium would be substantially reduced. Thus, the Phoenix Motorcars SUT, which uses as 35kWh battery, would qualify for a $15,000 credit. The Tesla sports car, which uses a 53kWh battery, would qualify for a $22,000 credit. Due to their higher cost, BEVs will have a much smaller market penetration in the next few years when compared with PHEVs unless they receive tax credits proportional to their larger battery size and energy-independence benefit. Raising the tax credit limit for BEVs would require additional funding for the legislation, but not by a substantial increment given the low-volume production which is projected over the next five years.

- Congress should bring electric vehicles charged with solar, wind, or other renewable electricity, into the Renewable Fuels Standard program under Section 211 of the Clean Air Act. The Energy Independence and Security Act of 2007 amended the RFS created by the 2005 Energy Policy Act

by requiring refiners to ramp-up production of ethanol to 36 billion gallons by 2022. The RFS program provides for credit trading between refiners subject to the RFS standard. Certain other fuels that are not even blended into gasoline also qualify for credits, including biodiesel and biogas. However, renewable electricity used to fuel BEVs currently is not included in the RFS. By making renewable electricity eligible under the RFS, the Congress would encourage more investment in solar, wind, and other renewable energy sources to recharge electric vehicles. In turn, petroleum refiners subject to the RFS mandate would have more options available to satisfy the RFS mandate by purchasing credits generated by solar and wind electricity. This, in turn, would help alleviate some of the economic pressure to divert corn crops to the production of ethanol. The diversion of 25-35% of the domestic corn crop to ethanol production is a prime factor in the recent increase in global food prices.

- Congress should mandate government fleet purchases of BEVs, with particular emphasis on Air Quality Control Districts with severe ozone non-attainment issues to leverage the co-polluton reduction benefits of BEVs. This could be accomplished by revising the alternative fuel vehicle (AFV) fleet program created by the Energy Policy Act of 1992. The AFV fleet program was intended to reduce our dependence on foreign oil by forcing government agencies, oil refiners and energy utilities to buy alternative fuel vehicles. By legislating market demand, the AFV fleet program was expected to induce the automobile industry to manufacture AFVs at scale, thereby leading to a gradual conversion of our Nation's vehicle fleet to AFVs. Unfortunately, as with the loan guarantee program of the Electric and Hybrid Vehicle Act of 1976, the AFV program has failed. The only mass-produced alternative fuel vehicle technology inspired by the program is a $100 change to the fuel system of gasoline vehicles to enable so-called E85 "flex-fuel" capable vehicles. Ninety-eight percent of the Federal Government's AFV purchases in 2006 were E85 flex-fuel vehicles that run on ethanol only a tiny fraction of the time due to limited ethanol delivery infrastructure. By mandating that a specified percentage of government AFV purchases be all-electric vehicles, the Congress would create the kind of market demand first envisioned by the 1992 Energy Policy Act.

- Congress should include BEVs in any future CO2 cap & trade program thereby monetizing their lifetime CO2 benefits and creating additional value that would reduce their high incremental cost. CO2 allowances could be awarded to BEVs at the point of initial sale under a "lifetime bonus allowance set-aside." We suggest an initial bonus allowance set-aside ratio of 4:1. Under the bonus concept, certain valuable technologies are allocated allowances at a ratio greater than one allowance to one ton of CO2 reduced or sequestered. The bonus concept is consistent with the Carbon Capture & Storage provisions of the Lieberman-Warner bill. Using EPA data, we estimate that a single Phoenix Motorcars SUT or SUV eliminates roughly 35 tons of CO2 over 150,000 miles as compared to an average light-duty gasoline powered vehicle at 20 miles per gallon, a CO2 emissions rate of 19.4 pounds/gallon, and the national average CO2 content of the electric grid. At a projected allowance price ranging between $22 and $61 per ton in the year 2020 under various future cap and trade scenarios, monetizing the lifetime CO2 reductions of BEVs under a bonus allocation of 4:1 would reduce incremental cost by roughly $3,000 to

$8,500. Making BEVs eligible for lifetime CO2 bonus allowance set-asides within the CO2 cap and trade system at least until economies of production scale are achieved would create a direct incentive for OEMs to produce BEVs and would reduce incremental cost by monetizing their CO2 reduction benefits. By capturing the discounted value of the total amount of avoided CO2 emissions over the lifetime of a BEV, the incremental cost of BEVs could be reduced and the technology could enter the market more quickly. The lifetime CO2 reduction benefits could be monetized through a prepaid forward contract approach, under which the buyer of a commodity stream over time prepays the seller for the entire stream up front. This prepaid forward contract approach is often used in energy markets, such as natural gas volumetric production payment contracts, which enable energy traders to hedge price risk. As applied to BEVs the prepaid forward contract approach would enable the estimated income stream from the CO2 allowances generated each year over a specified period to be monetized, discounted to present value, and transferred at the vehicle point-of-sale. The associated "income" from the sale of the lifetime pollution reduction benefits would be revenue neutral.

- Congress should consider creating a government-backed battery-guarantee program, which was suggested by David Sandalow of the Brookings Institute in his book "Freedom from Oil."

- Congress should increase investment in advanced technologies, namely advanced battery development.

Final Observations

Loan guarantees, basically direct subsidies to large OEMs, will not create the necessary competitive market conditions to foster innovation to create truly advanced vehicles, like the Phoenix Motorcars SUT and SUV. This kind of subsidy program did not work with the 1976 Electric and Hybrid Vehicle Act, nor did it work more recently with the 2005 Energy Policy Act, Title 17 of which had a similar $2B loan guarantee program for "production facilities for fuel efficient vehicles, including hybrid and advanced diesel vehicles." Tellingly, none of the Big 3 applied for loan subsidies under either of these programs.

It is also doubtful that massive retooling really is necessary to produce electric vehicles at scale. The basic components of both the Phoenix Motorcars SUT and SUV, for example, the body, electric motor, and battery pack are produced and supplied by third-party vendors. The same is largely true for the Chevrolet Volt, the motive power for which will be supplied by an electric motor and a battery pack produced and supplied by third parties who have the expertise and manufacturing know-how in electric motors, power electronics, and battery chemistry. Therefore, Phoenix Motorcars does not perceive a true need to retool drive train manufacturing facilities to produce electric vehicles like the Volt, because the engines and mechanical transmissions are entirely eliminated with electric vehicles. Instead, Phoenix Motorcars believes it would be far more effective if Congress would implement market-based measures such as those advocated previously in this testimony.

One-hundred years ago, there were dozens of American automobile manufacturers who were primarily vehicle integrators not unlike Phoenix Motorcars, Tesla, Miles Electric, Zap Electric, and the

handful of other entrepreneurial companies today who are working on the commercialization of electric vehicles. Much like the start-up companies of today, these early pioneers assembled bodies and engines produced by independent third-party suppliers. This fostered innovation and enabled start-up firms to enter the market with minimal barriers. If you had a better idea you could find the capital and run with it. Steam-powered, electric, and gasoline-powered automobiles all competed for predominance. While petroleum-based transportation ultimately won the day, and dozens of competing American firms were consolidated into three, many believe that this was only because petroleum was cheaper than electricity and was more capable of being stored.

Today, we are witnessing a total reversal of the underlying fundamentals that drove transportation toward petroleum. No longer is gasoline cheaper than electricity. In fact, depending literally on the day, it is four to five times more expensive than electricity. And, as we have come to learn, its true external cost in the form of national security costs, human health costs, and climate costs, make petroleum far more costly than electricity. Finally, as our electricity is supplied by ever-more diverse forms of generation, from solar, wind, biomass, natural gas, nuclear, and coal, electricity-based transportation is the ultimate fuel diversifier.