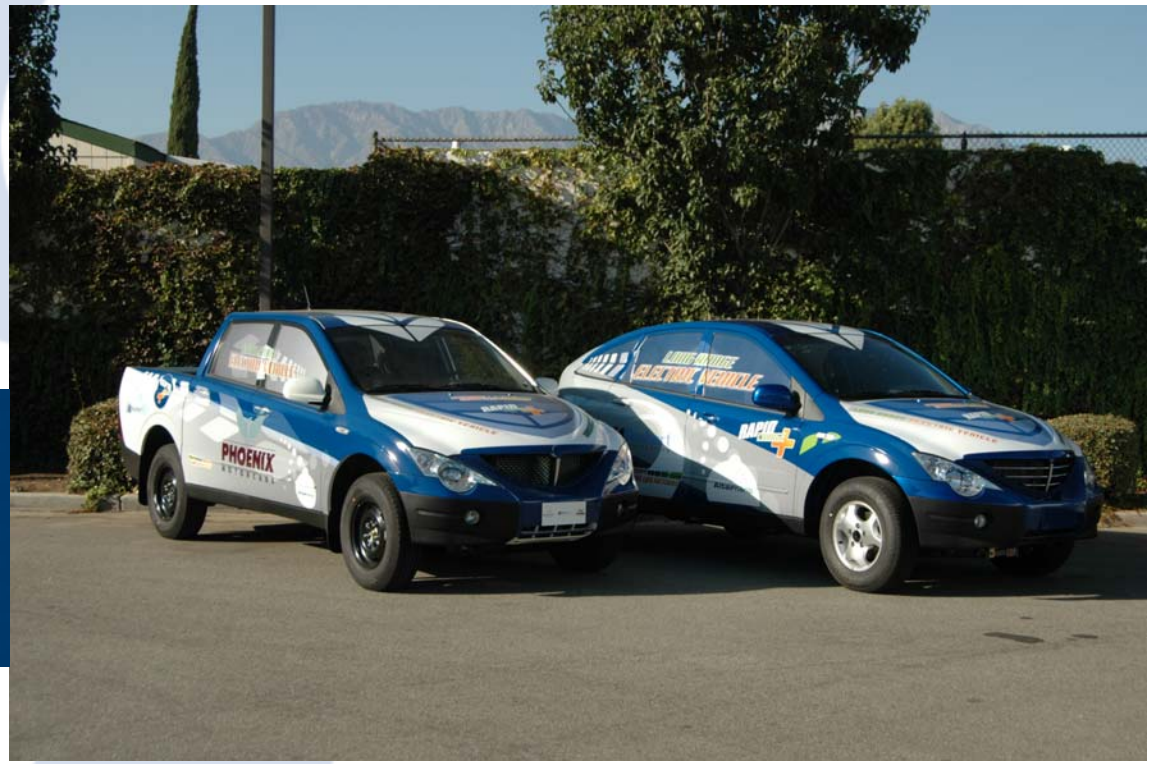
Battery Electric Vehicle Here Today

PHOENIX MOTORCARS

Altairnano



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Battery Electric Vehicle

Full Speed Electric Vehicle

- Current Emissions Profile
  - Zero Emissions, Toxins, and Green House Gases
  - Emissions emitted from electricity generation for charging
    - lowest during non-peak hours - residential 220 outlet
    - highest during rapid recharging – industrial
    - On board charging creates charging alternatives
- Projected Emissions Profile
  - Continued Zero Emissions, Toxins, and Green House Gases
  - Decrease in emissions emitted from electricity generation when renewable energy is used for charging

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Battery Electric Vehicle

- Alternative Fuel Production
  - –Advanced Battery Technology ready and in production
  - –Electricity readily available
  - –Charging infrastructure in place for current vehicles
  - –Improvement in charging station capabilities
  - –Capable of using renewable energy sources to charge
- Alternative Fuel Distribution
  - –Charging Power readily available in every home
  - –Rapid Charging Infrastructure added to current infrastructure
  - –Rapid Charging Fuel stations needed

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Battery Electric Vehicle

Projected Market Share

- Current Conditions
  - –Limited by availability of produced vehicles
  - –Low Speed Electric aka Neighborhood Electric
  - –Urban Electric Vehicle – option available however not for sale due to current regulations
  - –Full Speed Electric Vehicle
- Current Market Structures
  - –Limited to infrastructure outside base charging stations
    - Rapid charging fuel stations
    - Renewable energy sources
  - –Not limited by demand, local governments using electric vehicles now, want to add to,replace current inventory, or understand they are a viable source of an alternative fuel vehicle

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Battery Electric Vehicle Challenges

Technical

- Vehicle and Battery Technology already available
- Rapid Charging Infrastructure improvement and availability
  - Fleet management
  - Upgrade current structures in California
    - Increase power outlet
    - Upgrade different connector types
  - Increase number of charging station locations
    - Universities, Shopping Centers, Freeway Routes, and Industrial Parks
- Continued improvements in Battery, Battery Packs, and Charging
- Match Renewable Energy Sources to Charging Stations
- Increase development of Renewable Energy Sources

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Battery Electric Vehicle Challenges

Economics

- In order to meet consumer requirements, advanced technologies require higher cost which are passed on to consumer
  - Incentives, Grants, and Tax Credits
    - Continue for Purchases
    - Utilizing renewable energy as a charging station
    - Establishing and updating charging stations
- Manufacturing is cheaper outside USA

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Battery Electric Vehicle Challenges

Regulatory

- Create additional vehicle class to meet public and industrial needs
  - Urban Speed Vehicle Classification
    - No weight restrictions
    - Limited use (45 mph speed)
    - Range limited 75 miles
    - Increased Safety requirements means safer than Low Speed Vehicle
    - Vehicle not available due to regulated weight restrictions

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Battery Electric Vehicle Government Role

- Create a third useful vehicle class
- Create incentives/funding for renewable energy as a source for charging vehicles
  - Vacaville, CA sets a prime example
    - –20 City vehicles
    - –100 residential vehicles
    - –Powered by Solar energy from City Hall Solar Panels,
    - –funding provided by some transportation grants
- Create monetary support for non-peak hour charging
- Media support, public awareness for incentives and charging infrastructure
- Rewards in additional funding to air districts who meet air quality standards before regulated deadlines

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Battery Electric Vehicle Production

- Potential use as Alternative Fuel Vehicle
  - Capable of meeting 2010 and beyond clean air requirements early
  - Available on board charging creates charging alternatives
- Potential limitations
  - Limited by charging infrastructure
  - Cost to consumers without incentives
  - Infrastructure not there
- Current Projections
  - Sport Utility Truck for fleets - available April, 2007
  - Future increase for sale to consumers by 2008
  - Low speed vehicles currently available

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Battery Electric Vehicle Fuel Cost Comparison

Sport Utility Truck/Sport Utility Vehicle

- Full State of Charge = $3.50 for 136 miles
  - Price per kwh does not increase
  - New battery technology will increase range per charge
- Price per gallon = $3.50 for range (22-28 miles)
  - Price per gallon will change
  - Demands for cleaner gasoline vehicles will decrease range per gallon

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Battery Electric Vehicle

Zero Emissions Vehicles

- Low Speed Battery Electric Vehicle
  - –Restricted by weight regulation (less than 3,000 lbs.)
  - –Limited use because of speed, range and payload
  - –Minimal Safety requirements
  - –Cost ($8,000 – 12,000) currently on market

- Full Speed Battery Electric Vehicle
  - –No weight restriction
  - –Meets Full size vehicle safety requirements
  - –Long Range, computer limited speed, useable payload
  - –Unlimited Use private and fleet uses
  - –Cost $45,000 available early 2007

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