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# Battery Electric Vehicle Here Today



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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



# 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



# 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



# 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



# 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

# 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



# 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



# 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



# 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

# 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

