

Moving Beyond The “Chicken or the Egg” Problem: Electric Cars & Charging Stations



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The Impetus

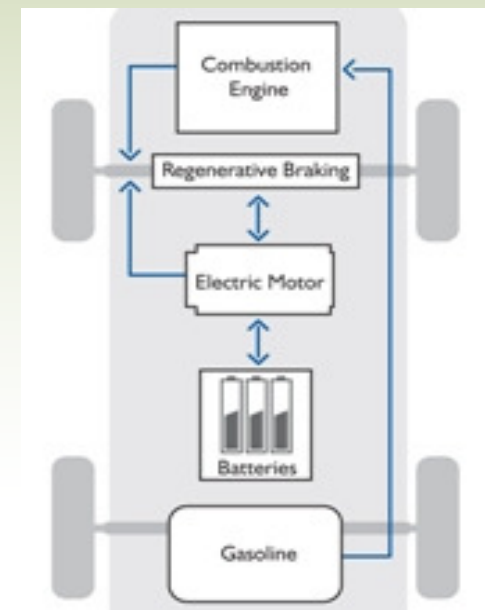
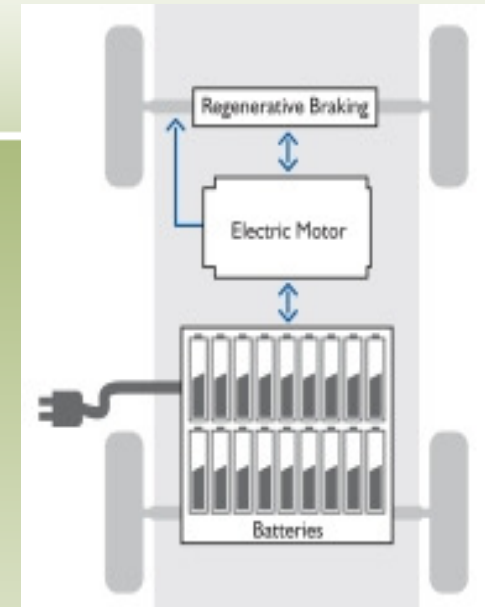
- Unpredictable Gas Prices
 - Relatively Recent Hybrid Car Phenomenon
- National Security Issues
- Growing Climate Change Concerns
- 2007: GM Surrendered it's Title As the World's Top-Selling Car Maker to Toyota

The 1903 Columbia
Mark LX Electric
Runabout



Why Electric?

- Electric v. Internal Combustion Vehicles
 - What Powers the Engine
 - Tailpipe Emissions
- Variations on the Electric Vehicle
 - Battery Electric
 - Plug-In Hybrids
 - Hybrids
 - ALL use electricity from the grid to displace petroleum use in transportation



California Was Ahead of the Curve...Again

- In the early 1990's, CARB mandated electric car sales by major automakers
- Result...
 - Chrysler TEVan, Ford Ranger EV, **GM EV1**, Honda EV Plus
- A Further Result...
 - A BIG fight from automakers
- The Cancellation of the EV1:
 - Rick Wagoner's Admitted Worst Decision during GM Tenure



The Issue

- The Players:
 - (1) Automakers
 - (2) Consumers
 - (3) Upstart Car Charging Service Station Companies
 - (4) Government
- Competition is Picking Up Fast
 - Automakers like Toyota, who previously focused on hybrid models, are now displaying concept electric cars at U.S. auto shows
 - Goal in China → Become the Leading Producer of Hybrid & All-Electric Vehicles within 3 Years
 - Can Detroit afford to invest in a new type of car now, without the infrastructure already in place?
- The Technology Gap
 - Without numerous, convenient places for drivers to plug-in/re-charge electric cars, there is no incentive for buyers

Where We Are Today

- Technology Standoff between (1) Electric Car Technology and (2) the Availability of Charging Stations *Appears* to be Over
 - Major Advancements in Both
 - Chevy Volt, Tesla Roadster, & BYD
 - Networks already appearing in U.S. Cities
- President Obama: Reducing Energy Consumption is a Centerpiece of his Energy Policy
 - Goal: 1 mil. electric cars on the road by 2015

Happy Medium?



Car Charging Station Companies

Better Place

- Single Station Cost: \$500,000
- Software analyzes a car's battery life, then directs it to appropriate place
 - Charge battery or, depleted batteries can be swapped for charged ones
- Already linked with: San Francisco, Israel, Denmark, Australia, Canada & Hawaii to build charging stations there

Coulomb Technologies

- 2 Parts of the Company:
 - Selling the stations to Municipalities and Parking Lot Owners as Capital Equipment
 - Selling charging access to drivers as a subscription service
- The ChargePoint & Smartlet Networks
 - Stations are individually controlled by a wireless network that provides authentication, usage monitoring, & real-time controls
 - Single Station Cost: \$1,000-2,000

Car Charging Station Companies, Con't.

eTec

- Partnered with V2Green to study the feasibility of charging vehicles in 10 minutes
 - Funded by the DOE
- Proven Minit-Charger system
- Also evaluating the costs & benefits of using bi-directional fast-charging operations



Big Boost from Washington

- In Mid-March, 2009, President Obama launched a \$2.4 billion program to boost the development of electric vehicles
- Electric Cars in the Stimulus Package
 - Tax credits
- Department of Energy Funds



Obstacles

- Garages vs. Registered Drivers
- Power Grid Capacity
 - Conflicting studies
- Batteries
 - Domestic Production
 - Supply v. Demand
- Ultimately, Time for a Switch in Colloquialisms:
 - From “Chicken or the Egg” to “It Takes a Village”

Around the U.S.



- Project Get Ready
 - Goal: Accelerate Electric Car adoption by Helping Communities Create Multi-Year Plans for Adoption
 - Working initially with 3 U.S. Cities
 - Creating a “Menu” of Techniques to Address Common Barriers
- Green Freeway
 - Could be the Longest Distance U.S. Drivers Could Travel with such Easy Access to Alternative Fuel
 - If approved, construction could start as early as this summer
- Chicago
 - First to Use Solar Power in Charging Stations

Bottom Line

- Even if ALL Electric Vehicles are recharged from coal-based electricity, there is still an environmental improvement over regular cars
 - The total impact on electrical generation depends on WHEN vehicles are charged
- The Timing is Right & the Ball has started to Roll
- Need for fast advancements in Battery Production

PLUG-INS: EMISSION COMPARISON

The chart below shows total carbon dioxide emissions when different energy sources are used to power a light-duty sedan. The totals, which are based on projections for 2010, include emissions from the mining and transport of coal, oil, or uranium (for nuclear power) and the transmission and storage of electricity.

