

---

# Plug-In Hybrid Electric Vehicles: San Francisco, CA

September 25<sup>th</sup>, 2007

Brandon M. Belford  
ENVS 662 – Green Design & City Planning



# Agenda

---

- Plug-In Hybrid Vehicles (PHEVs) 101
- The Environmental Impact of Plug-In Hybrid Vehicles
- The Innovation & Regulatory Environment in San Fran
- Initiatives in San Francisco to Facilitate PHEV Growth
- The Impact of PHEVs on the “Green Design” of San Fran

# Plug-In Hybrid Vehicles 101

---

- Hybrid vehicles combine a conventional combustion engine and a rechargeable battery to power electric motors
- This process increases fuel efficiency and lowers GHG emissions
- Plug-in hybrids have the added functionality of being chargeable through an electric outlet
- The majority of PHEVs on the road today are retrofitted Toyota Priuses
- Tesla Motors, along with Honda and the “Big Three” US automakers are beginning to enter & expand the market

# Environmental Impacts of PHEVs

---

- A recent report from the Electric Power Research Institute & the Natural Resources Defense Council concludes:
  - Annual and cumulative GHG emissions are significantly reduced regardless of penetration rate and generation resource assumptions
  - Maximum annual GHG emissions would reach 612 metric tons by 2050
  - Cumulative GHG emission savings between 2010 and 2050 would range from 3.4 to 10.2 metric tons
- Consulting firms and other institutes are conducting similar analysis, to form an industry wide consensus

# Influence of the Silicon Valley

---

- Hotbed of technology and innovation
- Home to the venture capital industry with lots of money to invest in start-ups/innovation
  - 20% of global venture capital is located in Silicon Valley
- Demographic shift in the US during the tech boom with a number of automotive engineers leaving Detroit in search of the “internet gold rush”
- The most successful automotive start-up since Chrysler, Tesla Motors, focuses on plug-in hybrids and is based in the Bay Area

# Influence of the “Governator”

---

- California is historically a very progressive state
- Since Arnold Schwarzenegger has taken office, he has made sweeping changes in the economic and environmental prosperity of the state
- Some of his environmental policies and accomplishments include:
  - Legislation to reduce GHG emissions in California & creation of a trading platform
  - The California Solar Initiative (Million Solar Roofs Plan)
  - The Hydrogen Highway (part of his Strategic Growth Plan)
  - Transportation infrastructure investments to relieve congestion
  - Sponsoring multi-billion dollar proposals to invest in California’s water future

# San Fran has begun to prepare for the adoption of PHEVs

---

- Tesla Motors is already producing the Tesla Roadster, with 600 more sold for delivery in the fall
- Electric utilities are positioned to gain from PHEVs due to increase electricity usage (substitute for gasoline)
  - PG&E is equipping a large portion of their fleet with PHEVs and making large investments to explore additional strategies
- Non-traditional companies are getting involved
  - Hyatt is installing recharging stations to attract a “stylish” crowd
- The questions remains to be answered about what additional investments are needed for recharging station expansion

# Impact on the “Green Design” of San Fran

---

- Minimal transportation infrastructure changes are necessary
- Plug-in hybrid vehicles do not address:
  - Walk ability
  - Efficient use of land (i.e. parking)
  - Congestion
- Plug-in hybrids could potentially increase congestion and weaken the overall public transportation system
  - PHEVs could be a competitive option for B.A.R.T. travelers (Bay Area Rapid Transit)
  - PHEVs could lead to urban decay as more people are “freed” from the city and continue exodus to the surrounding areas

# Photo Gallery

---



# Photo Gallery

---



# Tesla Roadster Performance Specs

---

<b>Style</b>	2-seat, open-top, rear-drive
<b>Drivetrain</b>	Electric motor with 2-speed electric shift manual transmission
<b>Acceleration</b>	0 to 60 mph in approx 4 seconds
<b>Top Speed</b>	Over 130 mph
<b>Range</b>	Over 200 miles
<b>Battery Life</b>	In excess of 100,000 miles
<b>Energy Storage</b>	Lithium-ion battery
<b>Full Charge</b>	As short as 3.5 hours