



California Public
Utilities Commission

“The Perfect Storm for Electric Vehicle Market Growth in California” Smart Grid Workshop

Pacific Gas and Electric Company
July 15, 2009

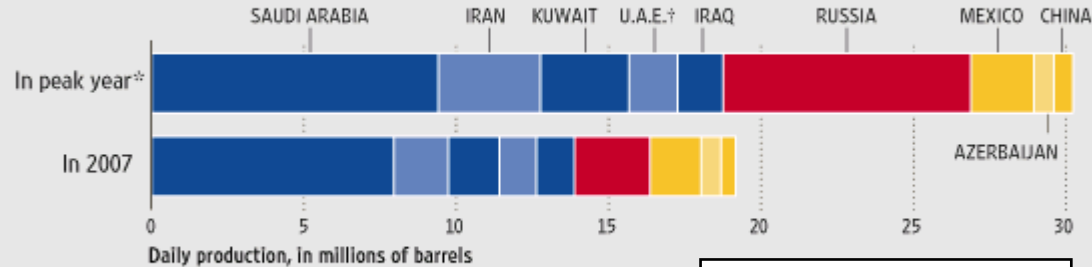


Plug in Electric Vehicles (PEVs) are coming to market



Past Their Peaks

Production at the world's 20 largest oil fields, grouped by country



*Peak production years range from 11 to 61 years after discovery † In Abu Dhabi
Source: International Energy Agency's World Energy Outlook 2008

6/2015 NYMEX Forward Oil Contract @ \$4/gallon

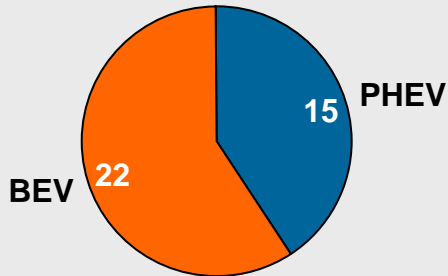


- **The return of +\$3.00 gallon gas**
 - Independent of incentives, battery economics @ 750 kWh are net positive to consumer when gallon of gas +\$3-4.00 a gallon
- **Automobile manufacturers supportive of PEV segment and addressing multiple consumer segments**
 - Performance (Tesla, Fisker, etc...)
 - Family Sedan (GM, Ford, Toyota, etc...)
 - Compact (Mercedes, Nissan, Volvo, etc...)
 - SUV (Ford, Jeep, etc...)
 - Mini-Van (Ford, Chrysler, Bright, etc...)



What is the PEV's Role in the Overall Vehicle Sector?

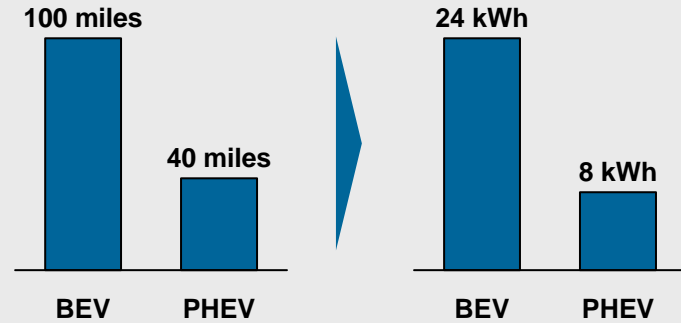
Larger number of BEVs coming to market



of models announced

BEV=(full) battery electric vehicle; PHEV=plug-in hybrid electric vehicle

BEVs have extended range



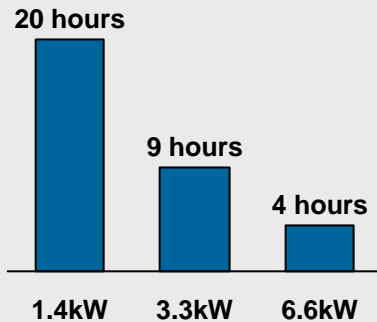
BEV PHEV

Electric mileage

BEV PHEV

Battery size (usable)

BEVs require higher charging capability



Rate of charge

Most BEVs will come with the ability to charge at 6.6 kW

They represent lowest carbon emission impact

Energy Propulsion Platform ¹	G/mi	Lbs/yr	Efficiency vs. CA RFG
California RFG ² Standard	431	11,392	N/A
Hybrid Electric Vehicle	322	8,511	25%
Compressed Natural Gas	302	7,982	30%
PHEV NG/RPS ³	224	5,920	48%
Electric Vehicle NG/RPS ³	124	3,278	71%

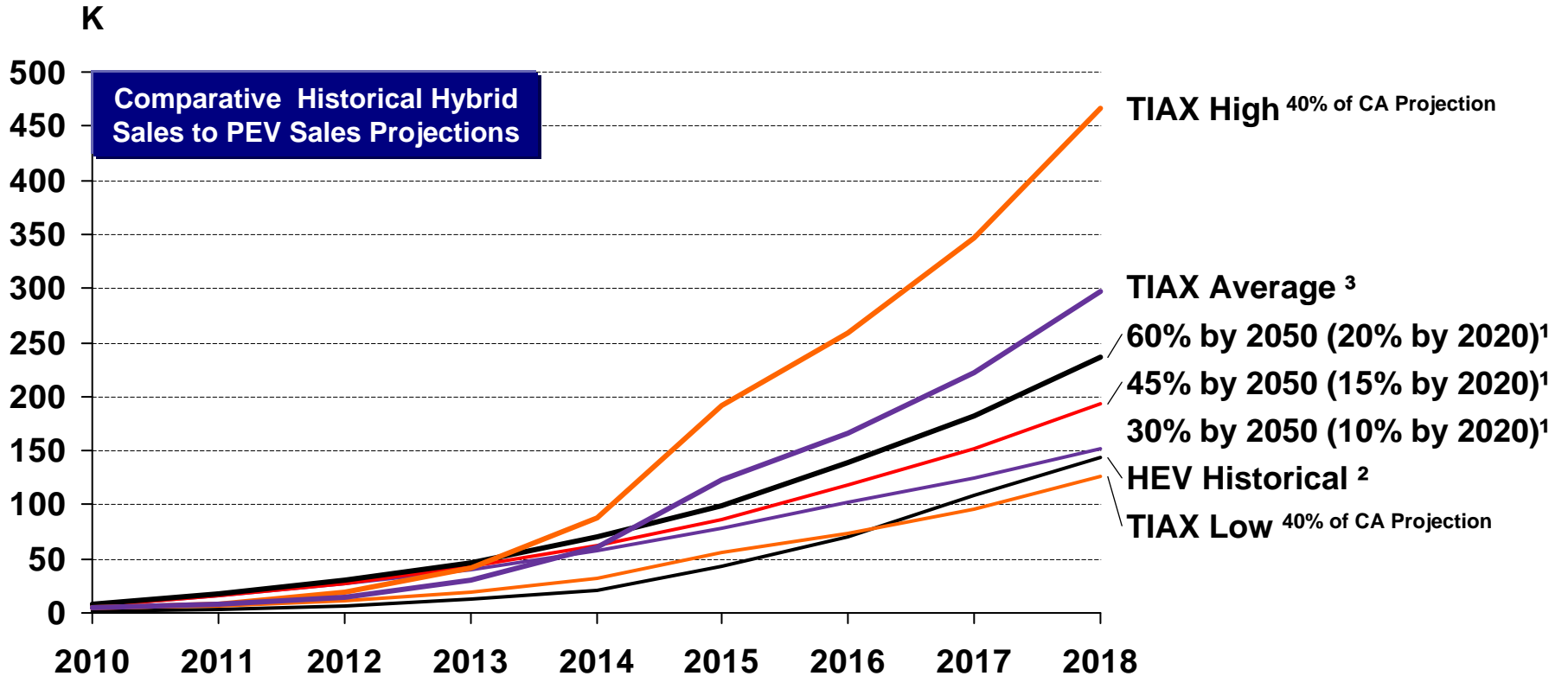
¹ Full Fuel Cycle Assessment: AB1007, CEC/TIAX June 2007 - @ 12,000 miles/yr

² Reformulated Gas Standard

³ NG/RPS: Generation mix 80% combined cycle natural gas, 20% renewable portfolio standard target



Cumulative PG&E Service Territory PEV Market Adoption?



¹ Assumes 10 million annual new car light duty sales, CA receives it's fair share of 12%, 40% reside in PG&E's service territory

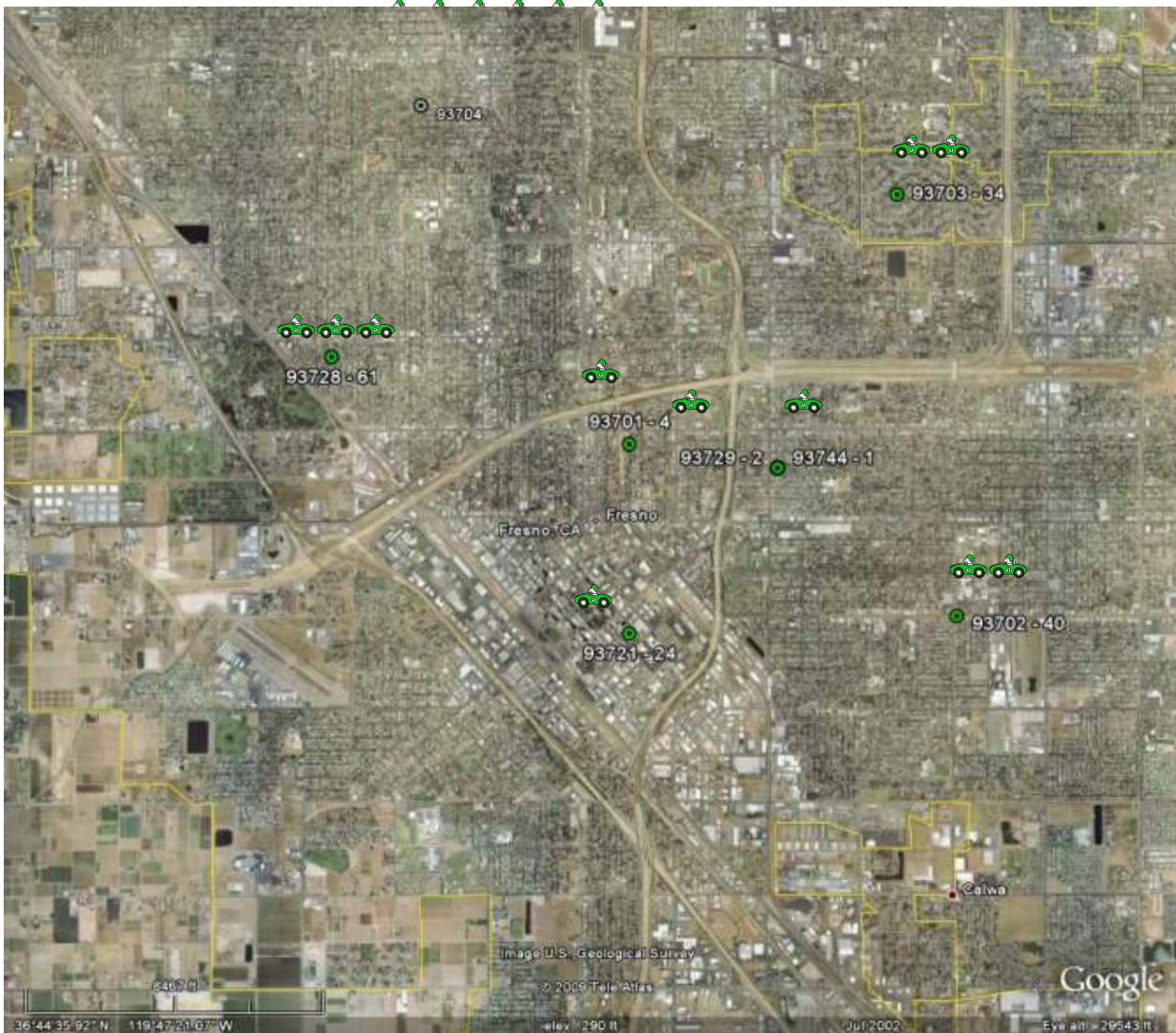
² Shift HEV historical sales data (starting 2000) by 10 years to compare with PEV projections (HEV market started in 2000; PEV market will start in 2010)

³ Average of TIAX High and TIAX Low

Plausible Game Changers

- CA buys more than its fair share (27% vs. 12%)
- Increased car sales
- Increased federal/state incentive mechanisms (tax credits, HOV policies)
- Changing consumer behavioral norms (commodity and statement)
- Battery technology advancement
- Acceleration of peak oil window

HEV Density “2004-08”– A Tale of Two Cities



Fresno CA:

- New Registrations: 83K
- HEV Registrations: 2K
- 2.4% of light duty purchases HEVs
- HEV zip code median: 11

Berkeley CA:

- New registrations: 14K
- HEV registrations: 2.5K
- 18% of light duty purchases HEVs
- HEV zip code median: 212

= 25 HEVs

- Beginning as early as 2010, California is likely to be a major focus of initial mass marketing of a new generation of electric vehicles
- Electric vehicles will have the potential to provide significant environmental and economic benefits
- Now is the time for the Commission, utilities, utility customers, auto manufacturers, vendors and other stakeholders to establish overall policies, rates, and incentives in the electric sector to ensure that electric infrastructure and customer services needed to support the market penetration of electric vehicles.