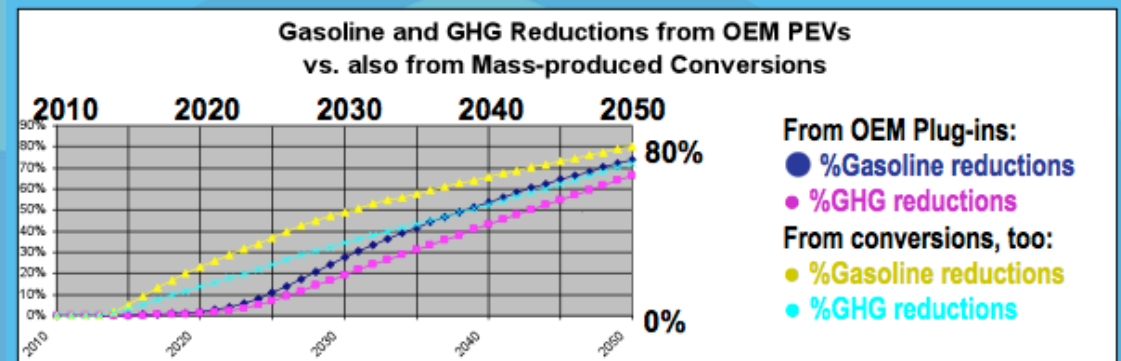


# Plug-in Vehicles & Petroleum's Future

September 27, 2010

Felix Kramer, Founder  
The California Cars Initiative  
[info@calcars.org](mailto:info@calcars.org)



For updated PDF of presentations:  
[www.calcars.org/downloads](http://www.calcars.org/downloads)

*What would it take  
to get transportation  
50% OFF FOSSIL FUELS  
— in 20 years?*



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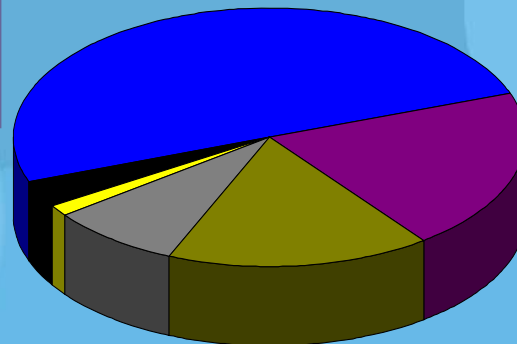
# Electricity isn't just different—it's better than oil

Gasoline	Self Serve
Today's Car	3.00 <sup>9</sup> / <sub>10</sub>
Plug-In Hybrid	.75 <sup>9</sup> / <sub>10</sub>

**1. ECONOMICS: CHEAPER -- electric miles at a quarter the cost**



**2. CLIMATE: CLEANER -- 50% less CO2, even on our half-coal national power grid**



**3. ENERGY SECURITY: DOMESTIC -- Only 1.5% of electricity comes from oil in US**



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[www.calcars.org](http://www.calcars.org)

# Nonprofit Startup: CalCars' successes & challenges

Technology  
(demos)

Advocacy  
(buyers)



2004



2006



2009



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# Plug-In Vehicles & Petroleum's Future

A coalition between the tree-huggers, the do-gooders,  
the sod-busters, the cheap hawks, and the evangelicals.  
– *former CIA Director James Woolsey*



**More @ CalCars  
Photos pages**



**Google's Brin + Page**



**Plug-in drivers with GM's Volt  
Engineer Tony Posawatz**



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Every carmaker interested; races to be first; timetables  
(trackers: [CalCars.org](http://CalCars.org), [PlugInAmerica.org](http://PlugInAmerica.org), [PlugInCars.com](http://PlugInCars.com))

**BYD** BYD AUTO  
Build Your Dreams

*selling in China*

**CHEVROLET** **OPEL** *Cadillac* **GM**

*Volt 2010; Converj next; Ampera; blended PHEV SUV?*

**BRIGHT** AUTOMOTIVE™ **HYUNDAI**

**TOYOTA**

*mid-2012*

**HONDA**

*2012*

*Karma 2010, Nina 2012*

**FISKER**

**Ford**

*2012*

*2005 prototypes*

**PERSU** mobility **SUZUKI**

**JAGUAR**

**VOLVO**

**MITSUBISHI** MOTORS

**aptera**

**Audi**

**SAIC**

*if & when?*

**CHRYSLER**

**RENAULT**

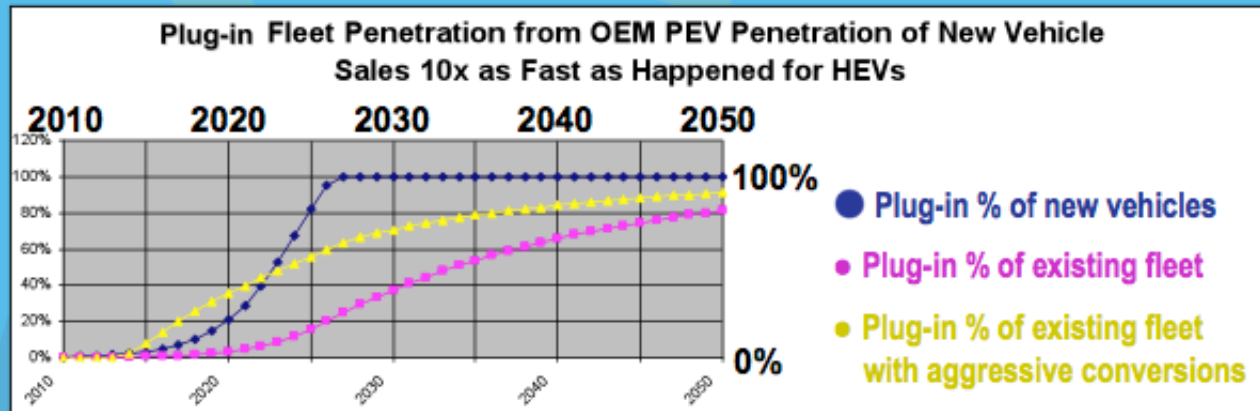
**NISSAN**



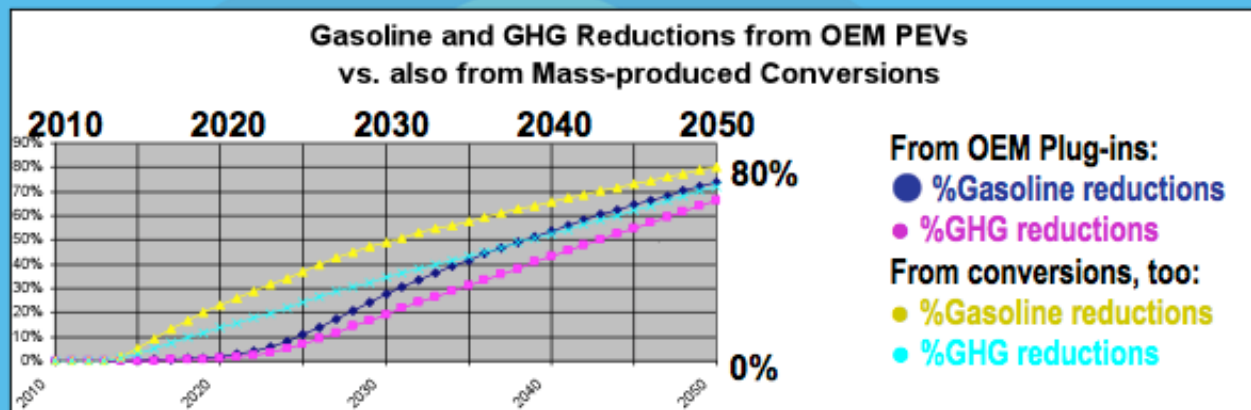
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## For impacts, retrofits many of 250M vehicles



Virtually all near- and mid-term oil consumption benefits come from retrofits for a 10-20 years.



Maximum long-term CO2 reduction requires a combination of new vehicles, retrofits, and sustainable biofuels.



## Next: Companies Can "Fix" Millions of Gas-Guzzlers



*HEVT's Ali Emadi,  
CalCars' Felix Kramer,  
Intel's Andy Grove,  
Efficient Drivetrains'  
Andy Frank*



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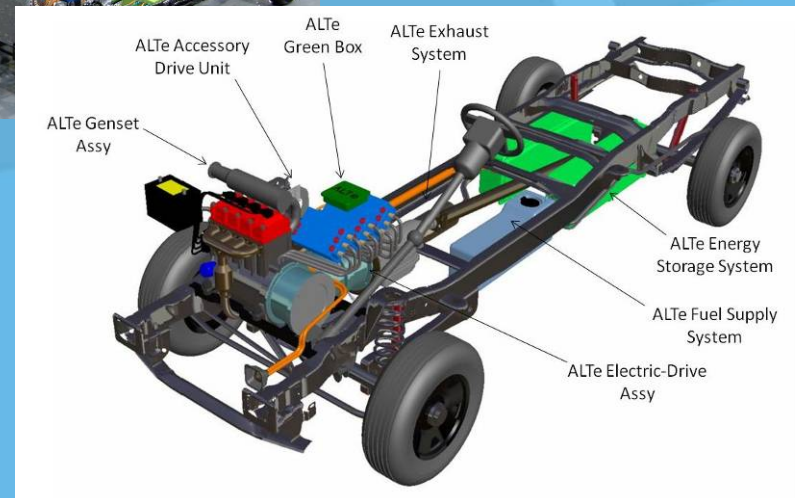
## ALTe, LLC

- Staffed by auto industry and Tesla alumni
- Modular approach for vehicles from 2,000 lb to 16,000 lb
- 80% - 200% better fuel economy
- \$25,000 drivetrain replacement
- Customers/contracts/nationwide installer network
- Aim: 90,000+/year powertrains annual volume
- Applied for \$100M DoE ATVM Loan, closing equity investments

Engineering and mass producing Series PHEV and EV complete powertrain conversion kits and platforms



F-150 pickup and ParkingSpot van at June launch of new 185,000 sq.ft. Michigan facility



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## Rapid Electric Vehicle Technologies, Inc.

[rapidelectricvehicles.com](http://rapidelectricvehicles.com)  
Vancouver British Columbia

- Developing partnerships with Canadian dealers.
- All-electric and PHEVs starting with Ford trucks and SUVs.
- Contracts pending with public and private fleets.
- Seeking investment funding.



**REV 300ACX**

Pure Electric

[Vehicle Details](#)

Max Speed: 100mph / 160 kmh  
Range: Up to 200 km's  
Acceleration: 0-100 <7 seconds  
Charge time: 3.5 hrs at 240V



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# Hybrid Electric Vehicle Technologies, Inc.



World's First Plug-in Hybrid Electric Pickup Truck, [hevt.com](http://hevt.com) Chicago IL

- Founder: IIT Prof. Ali Emadi, leading power electronics expert.
- 40 million trucks/buses in U.S; 2 million added annually.
- F-150 prototype design scales to F-250, 350, school and transit buses.
- Simple payback: 2-5 years.

- Uniquely converting America's most popular pickup truck, the Ford F-150, to a plug-in hybrid; more than 15 months of testing.
- Up to 30 miles all-electric range; up to 40% MPG improvement as a hybrid (beyond all-electric range).
- Up to 90 tons of CO2 savings in 12 years; V2G capability; increased low-speed torque for better towing.
- ESTIMATED COST IN VOLUME PRODUCTION: \$15,000 OR LESS.
- Seeking investment funding.



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## Raser Technologies

[Rasertech.com.com](http://Rasertech.com.com)

Provo, Utah

- Retrofit Hummer H2
- Precedent: General Motors provided technical support/contact with engineers.
- 40-mile range series PHEV developed with FEV
- Promotion for Raser's Traction Drive System; commercial plans unclear



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## Bright Automotive

[Brightautomotive.com](http://Brightautomotive.com)  
Anderson, Indiana

- Interim demonstration of technologies in future Bright "IDEA."
- Platform is VW Transporter (world vehicle, not in U.S.)
- Company beginning first prototype.
- Future partnership with VW possible.
- Rocky Mountain. Inst. spinoff



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[www.calcars.org](http://www.calcars.org)



## Efficient Drivetrains Inc.

[efficientdrivetrains.com](http://efficientdrivetrains.com)  
San Francisco-  
Sacramento region

- CoFounder & CTO Prof. Andy Frank, UC Davis, inventor of modern PHEV.
- Working with car/truck OEMs, conversions, first-tier suppliers to embed innovative drivetrain system designs, components -- parallel, series, and retrofit technologies.



- Patent portfolio: hybrid fundamentals, continuously variable transmissions, energy management systems.
- Projects in U.S., Europe, and Asia : two-wheeler, V2.0 parallel PHEV drivetrain for light and medium duty, inline CVT, CVT integration, and controllers.
- 2008/2009 operations funded from customer revenues.
- Seeking \$2-3M in expansion funding now.



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## Poulsen Hybrid, LLC



[poulenhybrid.com](http://poulenhybrid.com) Shelton, CT

\$8,600 suggested retail price (before tax incentives) for complete Poulsen Hybrid System installed with 4.5 kWh Lithium-ion batteries, wheel motors and brackets.

- Conversions for the most popular compact cars & SUVs.
- 20-30 mile battery assisted range matches 70% of US daily commutes.
- Four-hour local installation.
- Business model scales to convert tens of thousands/year.
- Creates green authorized installer jobs in communities everywhere.



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## What will it take to start now?

### **End Business As Usual (BAU):\***

- Equalize tax incentives
- Drive Star — “built” environment /prize/ local jobs
- Carbon price NOT enough!
- Europe: \$7/gallon; China \$5

### **Smartest/best uses for resources/technologies/facilities**

- Hydrocarbons “sequestered”
- Geothermal
- Switch sides: R&D, investments, contributions



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[www.calcars.org](http://www.calcars.org)

[www.calcars.org/ice-conversions.html](http://www.calcars.org/ice-conversions.html)

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THE CALIFORNIA CARS INITIATIVE — 100+ MPG Hybrids

POPULAR: [Convert Big Gas-Guzzlers to Plug In \(24 slides\)](#) | [Endorse "Big Fix" Campaign](#)

**Plug-In Hybrids Use Cheaper, Cleaner, Domestic Energy**

**Quick Takes**

- [All about Gas-Guzzler Conversions](#)
- [Carmakers' Plans for New PHEVs](#)

**09/23/10:** [Events Rundown: National & California Plus New Global Campaigns](#)

**09/15/10:** [Our Take on Progressive Auto X Prize as Winners Are Announced](#)

**09/10/10:** [Time Running Out for Plug-In Owners & Drivers Community -- Key Missing Piece](#)

**08/30/10:** [Finally: Draft EPA Stickers for New Plug-Ins -- And All Cars](#)

**08/27/10:** [September Events: Vancouver - Houston - Michigan](#)

**08/23/10:** [Gas-Guzzler Conversions & The Urgent "Plan Z" We May Face Someday](#)

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