

CARB Presentation

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EV's & PHEV's and Scheduled dates of introduction (Battery Tech. news) ---13 serious car companies plus many other major un-announced programs

Formula for Success

Battery makers are racing to develop lithium-ion cells to power new generations of plug-in hybrids and electric cars. Their challenge: find the right chemistry for different types of cars that will maximize longevity, power, capacity and safety.

DEVELOPER	CHEMISTRY	EXPECTED VEHICLE	WHEN	
A123	Doped lithium nanophosphate	Chevy Volt electric Saturn Vue plug-in hybrid ▶ Think City electric	2010 2009 2009	
Compact Power (LG Chemical) NEC	Manganese spinel	Chevy Volt electric ▶ Nissan electric	2010 2010	
Panasonic EV Energy Johnson Controls/Saft	Lithium nickel cobalt aluminum oxide (NCA)	Toyota plug-in hybrid† Mercedes S400 hybrid ▶ Saturn Vue plug-in hybrid	2010 2009 2009	
Hitachi	Lithium manganese oxide	future GM hybrids ▶	2010	
Commercially available lithium-ion cells	Lithium cobalt oxide and others	Tesla Roadster electric ▶	2008	
Altair Nanotechnologies	Lithium titanate spinel (anode)	Phoenix electric ▶	2008	
Lishen	Lithium iron phosphate	Miles X5500 electric ▶	2009	
EnerDel	Lithium manganese titanate	Think City electric ▶	2009	

*According to industry sources.

Proposed CARB ZEV Rules

- EV's and PHEV's are now planned for production by most of the Car companies
- Petroleum Displacement and green house gas emissions are the most critical issues facing our society.
- So why not go back to the original ZEV mandate numbers proposed by CARB

Suggestions for rules change

- Slight change in ZEV Definition
- Define ZEV as Vehicle Zero Emission Miles or All Electric Range AER
- AER achieved only on the UDDS cycle
- ZEV Credits determined only by AER or by Useful Battery kWhrs Since this represents Petroleum Displacement!
- Battery Warranty in PHEV's should follow the rules used when Catalysts were introduced ---Phased-in over a reasonable period of years

Conclusion

- CARB should lead the Industry and the World on Petroleum Displacement by Using Batteries which are no longer an issue!!
- CARB should use the **successful formulas of the past** to structure the new ZEV rules with **vehicle numbers** that will make a difference in time to avert impending **Petroleum Depletion Consequences**
- Don't forget to include additional credits for **Solar and Wind personal home charge energy!!** Fits Solar Initiative

New UCDavis PHEV that will run on 200 sq ft of **Sunshine-- 40mi/day**
and a little Ethanol
Can be **ZERO gasoline or diesel Now!!!** And zero net CO2



Solar charging "Trinity" at GM proving grounds June 2007