



CalCars
THE CALIFORNIA
CARS INITIATIVE

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CalCars Response to the California Air Resources Board's Proposed PHEV Conversion Regulations

SUMMARY: The California Cars Initiative (CalCars.org) has been promoting PHEVs for seven years. As a nonprofit technology and advocacy group, we worked to spark the interest in PHEVs. We gained attention through conversions -- our strategy to build public awareness and motivate carmakers to mass produce PHEVs. In 2004 we did the first retrofit in a Corte Madera residential garage, placing our designs into the public domain at PriusPlus.org. We built on the work done by Prof. Andy Frank and dedicated people in the auto and utilities industry and government to advance PHEV concepts. Our advocacy and technology efforts since then have helped bring us to the point where many carmakers are now planning to build PHEVs. From that perspective, **WE NOW URGENTLY PROPOSE** that the California Air Resources Board take one step backward and decide to slow down regulation of aftermarket conversions.

The industry is still so young and small that most innovation is still coming from self-funded, skilled, dedicated, engineers and entrepreneurs. These players and other affected parties have not yet had a chance to fully and productively present and discuss their concerns to CARB. Implementing the proposed rules will drastically slow growth of the conversion industry, and it could prevent further progress with components, software and usability. Only one or two companies may have the deep pockets to comply, and that for one or two hybrid models. Other operating companies and entering entrepreneurs will have extreme difficulty gaining the financing and personnel to handle the up-front deep engineering and testing -- plus the warranties -- that CARB regularly gets from auto manufacturers and, if proposed rules are adopted, will now require from converters.

WE PROPOSE THAT BOARD MEMBERS AT THIS MEETING REQUIRE: that all the companies involved in conversions simply register with CARB, inventory their completed conversions, project their 2009 volume, and make themselves available for a more deliberative process. Failing that, we propose the staff devise a set of graduated rules, suggested in our extended testimony, to require increasing compliance only as each manufacturer sells significant volumes of conversions.

Below we present some detailed justifications, in addition to those we submitted August 1, for this urgent request, along with specific technical and business arguments. We have submitted this new testimony electronically. (We leave to others to re-address the specifics of the regulations about which we testified on August 1.)

Felix Kramer, CalCars' founder, says, "I recognize with much regret that this regulatory process has come so far without including some very important issues. I am sorry I could not be here in person. This week I have been in Washington DC. A key theme of this Presidential Inauguration is cooperative inclusion. The problems we have are so great that we can't solve them unless we work together. That theme reflects the timeless words of Abraham Lincoln's Second Inaugural, which concluded in part, "With malice toward none, with charity for all, let us strive on to finish the work we are in." The eloquence we heard on January 20 continues to evoke Lincoln's approach.

In that spirit, I am presenting for your consideration an update of another Lincoln speech that still inspires us all. In a spirit of humility, I attempt to look at the issues the Board faces today through the prism of almost 300 words written a century and a half ago.

A SACRAMENTO PLUG-IN ADDRESS

Four years and seven months ago, our colleagues brought forth in this state a new breakthrough, conceived in garages, and dedicated to the proposition that all travel should be low carbon.

Now we are engaged in a great transition, testing whether our state, and any other state so concerned and dedicated, can so evolve. We are met in a great capitol of that change. Here a powerful board is poised to make a final resting place for the dreams of those who have fully pledged their livelihoods to that cause.

It is *in no way fitting or proper* that you who sit in judgment should reach a final verdict today. And, in a larger sense, you can not undermine -- you can not regulate -- you can not fallow -- this ground. The brave pioneers, here and globally, who took the first steps have set in motion a transformation, far beyond your power to approve or deny.

The world may little note, nor understand, what you decree here. But it will be shaped by what we do. It is for us, the experimenters, rather, to rededicate ourselves to refine the unfinished solutions which we who first plugged in hybrids have thus far so seriously advanced. It is rather for you, the board, to reflect on the greater task remaining before us all -- that from these early steps we gain increased momentum for that cause for which we have given our full measure of imagination -- so that our past efforts shall *not* have been in vain, that you here highly resolve instead to *encourage* those pioneers, that this nation, in the name of science, shall have a new birth of freedom from oil -- and that innovation of the engineers, by the entrepreneurs, and for the people, shall not perish with the earth.

CALCARS' MORE DETAILED RATIONALE:

It's too early to impose specific regulations

The embryonic aftermarket conversion industry is mainly comprised of promising small startups. So far we see only one hardly-mature mid-sized company with deep enough pockets to have good prospects of complying with CARB's proposed regulations. These proposed rules would require potential conversion suppliers to complete all design, long-term emissions testing and verification, and CARB certifications up-front -- before *any* conversion sales or income -- as well as provide very extended warranties. These new regulations would require existing and yet-to-be-formed small companies to act as if they were large auto companies with substantial technical and financial resources and dramatically slower development cycles.

But today's conversions are the product of continuous design refinement and street testing. Many have been financed from a handful of sales by small companies with a few tens of thousands of dollars to work with at any time. The proposed rules will significantly raise the cost of entry, potentially excluding the very entrepreneurial engineers whose innovations established the market in the first place. Tellingly, today's only high-volume converter, Hymotion, was such a small business until it was acquired by battery maker A123 Systems.

Unfortunately, these companies have been too busy developing their technology and products and responding to public demand even to fully recognize, let alone adequately respond to, the developing governmental processes that could so significantly affect their work. Now we expect that too-early regulation will force most or all of these companies to close, halting their continued development work, losing jobs, and promoting stagnation rather than innovation in the industry.

The contraction of these companies will affect their suppliers. Many have promising innovative products but lack the track record and resources to bid for, let alone get, auto manufacturer contracts. Small battery manufacturers, for whom testing and validating their products in real-world vehicles is the sine qua non of engineering and marketing success, will be most affected.

The consequences will not be restricted to California, since some of these companies have been establishing installers or franchisers in other locations in the US and globally. This is a broad industry -- but California is its nerve center, and whatever is decided here will have a huge impact everywhere. And finally: the result will be less opportunity to reduce CO2 by displacing gasoline with electricity.

Let's recognize how important conversions have been

A look back shows the unprecedented impact of the conversions from late 2004-2006: they demonstrated how close we were to real plug-in products from carmakers; they gave utilities and national labs, the California Energy Commission, CARB and the state's air quality districts testbeds upon which to evaluate the benefits and logistics of PHEVs. They prompted the President, the US Department of Energy, Senators, Representatives, Governors, Mayors, and others to endorse this solution as a way to solve key intersecting problems: energy security, CO2 emissions, the future product mix of the auto industry, and costs per mile. They gave elected officials, corporate executives, industry analysts, NGOs and ordinary drivers a preview of a plug-in future. They helped motivate battery developers to focus on the opportunities within the auto industry.

As the technology and solutions evolve, many of these constituencies will still be eager to see and drive PHEVs during the next two to five years until OEM-produced PHEVs are widely available from dealers. They will want PHEVs, as will thousands of citizen-drivers. Hundreds of citizen-drivers have visited our listings at "How to Get a PHEV" at <http://www.calcars.org/howtoget.html> and from there they (and hopefully in the future, thousands more) will find a company to convert their vehicles.

An unrecognized broader implication of the regulations

Regulation now could provide potentially dangerous precedent for regulation of conversions of non-hybrids to plug-in vehicles, both PHEVs and EVs. (See our descriptive page and links about this enormous market at <http://www.calcars.org/ice-conversions/>.)

Though the result of plug-in conversions can of course never provide the optimal efficiency of purpose-designed electrified vehicles that will eventually fill the fleet, retrofit electrification of a vehicle requires only one-fifth the energy required to build a new vehicle. (See "Should We Crush Gas-Guzzlers? Or

Convert Them to Plug In? An Analysis" <http://www.calcars.org/calcars-news/1007.html>). Such conversions -- if extended to conversion of non-hybrids as well -- could at least double the rate of penetration of light vehicle electrification into the fleet, and dramatically speed up displacement of oil and produce significant near- and mid-term reductions in CO2 and petroleum dependency. It will be many years before new plug-in vehicles are a significant percentage of new vehicles -- and the even longer time until the global fleet of vehicles can mostly plug in. And CARB, more than almost anyone, knows we have no time to delay in replacing fossil fuels with low-carbon electricity.

The very aftermarket conversion companies and their suppliers whose existences are threatened or prevented are precisely among the firms we expect to take the lead in ICE conversions. These firms can help create a new industry that could generate many skilled local jobs in every community, and allow even people who can't afford a new vehicle to conserve fuel.

We believe this opportunity has been under-appreciated, with some exceptions, such as former Intel CEO Andy Grove, singer Neil Young, and PHEV inventor Andy Frank, and that they affect the prospects of such far-flung companies as:

- * Efficient Drivetrains Inc in California
- * Electradrive in California
- * EV Power Systems in North Carolina
- * H-Line Conversions in Kansas
- * Hybrid Electric Vehicle Technologies in Illinois
- * Linc Volt in California
- * Poulsen Hybrid in Connecticut
- * Rapid Electric Vehicles in Vancouver

None of these companies are directly involved in or affected by the current regulatory process. But, importantly, they are interested parties, because the regulations the ARB adopts for aftermarket conversions of hybrids could become precedents for their (or other state/federal government agencies) imposing unrealistic or unduly burdensome limitations on entrepreneurial conversions of ICE vehicles in the future.

Learning the lessons of unintended consequences

Though this issue begins on a far smaller scale, it reminds us of what happened when we moved to insufficiently considered massive support for biofuels, invoking cellulosic ethanol but giving us corn ethanol. What happened should at least cause us to move from a greenlight "go" to a yellow "caution-- advance slowly."

Remember the Energy Policy Act of 2005? It increased the amount of biofuel (usually ethanol) that must be mixed with gasoline sold in the United States to 4 billion gallons by 2006, 6.1 billion by 2009, 7.5 billion by 2012 -- and 30 billion gallons by 2020. The European Union followed with similar targets. We can only list the consequences that have been directly and indirectly linked with this decision, which include the belated recognition of the negative energy balance of corn ethanol and the overestimated near-term prospects for cellulosic ethanol; the lack of greenhouse gas benefits; the impact on corn, feed and human food prices; global deforestation and water impacts; the boom and bust in Midwestern farm states and the subsequent bankruptcy of ethanol companies; and periodic food riots in locations around the world. To its credit, Europe recognized the error and stepped back; we still struggle with bad legislation and inappropriate incentives.

The Staff and Executive Officer have prematurely concluded there are no negative impacts

The Staff Report: Initial Statement of Reasons for Proposed Rulemaking for Plug-In Hybrid-Electric Vehicles on page 28 says, "The proposed amendments to the Exhaust and Evaporative Test Procedures are not expected to have a noticeable impact on the status of California business creation, elimination, or expansion."

In the Notice of Public Hearing, we read, "The Executive Officer has made an initial determination that the proposed regulatory action would not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons. In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action would not affect the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses within the State of California, or the expansion of businesses currently doing business within the State of California."

CalCars believes that although the companies involved have not yet made their case effectively, the difficulties these regulations cause will in fact have very significant impacts in these areas and in the development path for plug-in vehicles. We believe the Board needs to allow more time to explore these issues.

As a non-profit organization, CalCars has encouraged the aftermarket companies and their suppliers (especially battery manufacturers) to form a trade association. That way an organized constituency can quantify the value and jobs it provides, demonstrate that it is part of a supply chain that needs to be encouraged, and characterize the significant social and environmental benefits it delivers, and cooperatively to come up with workable solutions. We hope this will happen in the coming months.

We accept the magnanimous offer in the Notice of Public Hearing

There we find, "Before taking final action on the proposed regulatory action, the Board must determine that no reasonable alternative considered by the board or that has otherwise been identified and brought to the attention of the board would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action." We appreciate the Board's recognition that there may be alternative solutions; we propose the Board consider those we present.

THEREFORE WE PROPOSE THAT BOARD MEMBERS AT THIS MEETING REQUIRE: that all the companies involved in conversions simply register with CARB, inventory their completed conversions, project their 2009 volume, and make themselves available for a more deliberative process. . CARB can then engage in a dialogue with all the stakeholders, just as it has for many years with automakers, to ensure a process that makes sense to all and takes into consideration the very different state and form of the conversion industry and its players.

We appreciate your growing support for plug-in vehicle solutions, and hope that you can come up with a solution where all the players win. Now, one more point...

CalCars' fallback position: if CARB *must* regulate now...

We understand that CARB is concerned about the durability of warranties following conversions, either from vehicles requiring repairs that are not made, or conversions that are not engineered with sufficient rigor and testing. These are legitimate concerns, but so far we are talking about only several hundred

conversions in the entire world. We support an approach that enables companies to start small and improve their products and their support services as they grow. The benefits of encouraging this so-far-almost-exclusively-entrepreneurial conversion industry far exceed the risk.

However, if CARB does go ahead, we present an example of a graduated regulation scheme could continue to allow grass roots innovation by holding compliance costs to around \$500 per already-sold conversion -- a high but not insurmountable hurdle:

* A company enters the conversion business by presenting CARB with an engineering proposal showing how it will avoid increased criteria pollutants; it then shows a running prototype. Each completed conversion is subject to an ordinary end-user smog test for that model of unconverted vehicle. Buyers sign a contract acknowledging the level of warranty accompanying the product, accepting a level of risk for an 'experimental' conversion, and perhaps committing to periodic smog tests by owners that are not otherwise required of SULEV vehicles for several years.

* After selling 10 conversions, the manufacturer explains how the now-current version(s) avoid mechanical, reliability, and emissions problems, and shows on paper how the system preserves known OEM OBD functionality.

* After selling 100 systems, one vehicle undergoes the most basic manufacturer emissions testing, and the conversion manufacturer shows how known OEM On-Board Diagnostic System (OBD) functionality is both preserved and enhanced with similar capabilities warning of conversion components needing service.

* After selling 1,000 systems, the company complies with CARB's whole set of production conversion rules.

Note: Under such a regulation plan, for conversions to prove preservation of OEM OBD functionality, CARB would have to require some cooperation from auto manufacturers, who would need to provide aftermarket conversion companies with internal details of how their OBD systems comply with emissions regulations. Alternatively, the conversion companies could collaborate on building a database of discovered OBD functionality for each vehicle model, similar to the reverse-engineered Prius and Escape CAN bus information currently available at <http://www.eaa-phev.org> -- but this approach would work only if CARB were to allow compliance with this aftermarket industry database as proof of preservation of OEM OBD functionality.