

Dear Visitors,

Welcome to the UC Davis PHEV Research Center. At the Institute for Transportation Studies we have been analyzing the potential of electric, hybrid electric and plug-in hybrids for two decades. UC Davis is also the home of Professor Andy Frank, who has been credited with developing the PHEV and whose students have won numerous awards with their PHEV designs in hybrid vehicle competitions.

Interest in PHEVs has surged in recent years, since the successful conversion of hybrids to PHEVs by a number of maverick engineers, the rising price of gasoline, and growing concern over climate change. Responding to this growing interest in PHEVs as a solution to CO<sub>2</sub>, the California Energy Commission funded our center in early 2007 for three years and approved a set of first year projects. The center will conduct and fund research that can assess the degree to which PHEVs can help California meet its goals to reduce CO<sub>2</sub> by 80% in the next few decades and at the same time look for ways to accelerate the commercialization of PHEVs. You can look at a description of our projects in our research section. You can also read about our Advisory Council, a coalition of leaders from automotive companies, utilities, governments and other research groups that is guiding the long term research plans of the center.

We are lucky in California to have an electricity sector that has done a better job than many states to develop clean and renewable ways to generate electricity as well as encourage efficient use of that electricity. While there is still much to be done to reduce CO<sub>2</sub> production and waste in the power sector, California has a head start on much of the nation and the world to reduce CO<sub>2</sub> in the electric sector. California has also been a powerful force in reducing toxic pollution from automobiles. But, we have not yet reduced the emissions of CO<sub>2</sub> from vehicles; transport accounts for more than 40% of the CO<sub>2</sub> produced in California.

Therefore, with our relatively low CO<sub>2</sub> electricity, plugging into the grid with cars makes particular sense in California, especially if we plug in at night, when there is less demand on the power grid. And plugging in makes good sense in the rest of the nation to reduce use of petroleum imports and move towards a grid which is less CO<sub>2</sub> intensive.

So how much difference can PHEVs make to reduce CO<sub>2</sub> production? This is both a simple as well as a complex (see our research projects) question. Keeping it simple, I recently analyzed my own travel, to look at what sort of CO<sub>2</sub> reductions a plug-in might make in my situation. I have a long commute and together with my frequent visits to the Sierra Nevada, we drive our primary car about 24,000 miles a year. And for a long time, I did that travel in a 1991 Volvo that got about 19 miles to the gallon. I checked on fueleconomy.gov website and found that I was creating about 21 tons of CO<sub>2</sub> per year. In 2005, we were lucky enough to buy a 2006 Prius, and that brought my CO<sub>2</sub> down to 8 tons per year.

If I were able to shift 33% of my Prius travel to the electric grid in California (called the PHEV utility factor), I would drop my CO<sub>2</sub> to a little over 6 tons, and if I could shift 66% to electric travel, that would drop to a little over 4 tons. That would be better than 80% improvement over my old Volvo. Then I would need to figure out how to drive less.

However, getting that PHEV is complex. It means new types of batteries must be proven and mass produced, auto companies have to take the risk to make and sell a new and more expensive

type of car in a competitive market, buyers will have to have a practical location to charge their vehicle, will be willing to pay higher purchase prices, and owners will have to choose to plug-in at night and as often as possible to get to that 66% reduction in CO<sub>2</sub>.

The center is dedicated to a scientific exploration of how to make that 66% reduction happen. We are studying PHEV batteries, vehicle designs, consumer response to PHEVs, policy and business plans to make PHEVs possible. Please check in often at this site and we will offer the latest news and science on PHEVs.

Sincerely,

Dr. Tom Turrentine  
Director, PHEV Research Center