

ITS-Davis e-news, Issue 39 (September 2009)

ITS-Davis e-news is the electronic newsletter of the UC Davis Institute of Transportation Studies. This report covers news from ITS-Davis and affiliated UC Davis departments. Click here for our [e-news archives](#).

New Initiatives

- [CONSUMER RESPONSE: PHEV Center Partners with BMW on Consumer Study](#)
- [TRANSPORTATION SUSTAINABILITY: New Multi-Year, Multicampus Approach](#)

Sustainable Transportation Center Update

- [HOW GREEN IS OUR VALLEY? STC Report Tracks City Growth Policies](#)
- [GREENER HIGHWAYS: Pavement Center Research Saves Time, Money, Materials](#)
- [STC AWARDS: Faculty Research and Student Dissertations](#)

Research Update

- [LISTENING TO CONSUMERS: PHEV Center Reports Early Results](#)

Education Highlights

- [CONGRATULATIONS, GRADS: December 2008 and March 2009](#)
- [PEOPLE NEWS: Student Grants](#)

ITS-Davis and Campus Highlights

- [ASILOMAR 2009: Hope and Optimism for Successful Climate Policy](#)
- [SPEAKING OF THE FUTURE: UC Davis at Clean Tech Showcase](#)
- [PEOPLE NEWS: Faculty Awards and Accolades](#)
- [SUPER MILEAGE WINNER: Side FX Finds a New Home](#)

New Initiatives

CONSUMER RESPONSE: PHEV Center Partners with BMW on Consumer Study



Some of the PHEV Center researchers, students, and staff with BMW Mini E at Plug-In 2009 (L to R): Ken Kurani, Tai Stillwater, Jamie Davies, Tom Turrentine, Nicolette Caperello, Jonn Aksen, Justin Woodjack, Marilyn Kempster

How do consumers respond to the unique characteristics of electric vehicles? And what is the market potential of these vehicles? Researchers at the UC Davis Plug-in Hybrid Electric Vehicle (PHEV) Research Center at ITS-Davis intend to find out. They have launched a yearlong study of 50 households leasing the new BMW Mini E electric vehicle (EV).

“It’s an unprecedented opportunity to test consumer response to electric vehicles over an extended period of time – a whole year,” explains PHEV Center Director Tom Turrentine. “We’re delighted to have this opportunity to talk with users about their daily experience, their driving habits and their impressions of the cars.”

The 50 volunteer research subjects are among the 450 households in California, New York, and New Jersey leasing the Mini E for one year. UC Davis developed and is administering a sophisticated set of survey tools, including a phone survey, Web-based mapping and daily driving diaries, and in-home interviews. Researchers will analyze the responses and

summarize their findings in a publicly available report. They expect to learn about the households’ recharging behavior, vehicle use relative to other transportation options, and response to electric drive performance and feel. The research will provide insight on the marketability of EVs.

UC Davis is collaborating with Technische Universität Chemnitz (TU Chemnitz) in Germany and Oxford Brookes University in the U.K., which are also studying BMW EV usage, to ensure results can be compared between countries.

Turrentine and research colleague Ken Kurani first studied consumer response to EVs when carmakers demonstrated early EVs in California in the 1990s. Turrentine and Kurani are now expanding those efforts to understand market demand for both EVs and PHEVs. The [results](#) of the PHEV Research Center's first year of studying consumer response to plug-in hybrid vehicles are now public.

The PHEV Center is funded in part by a three-year, \$3 million grant from the California Energy Commission's Public Interest Energy Research (PIER) Program.

TRANSPORTATION SUSTAINABILITY: New Multi-Year, Multicampus Approach

The UC Office of the President has funded a proposal to establish a multicampus, five-year, \$6.5 million research program in transportation sustainability. ITS-Davis Director Dan Sperling is co-director of the program, along with the directors of the ITS units at UC Berkeley and Irvine.

"The objective is to leverage the substantial capabilities of ITS to design tools, policies, and programs to reduce congestion, oil use, local air pollution, and greenhouse gas emissions, in ways that contribute to economic growth and social well being," note the three co-directors in a public letter announcing the award.

The program will focus on three integrated activities: (1) vehicles and fuels, (2) infrastructure investment and system management, and (3) land use and mobility planning. It will bring researchers together from more than 30 disciplines on six campuses – Berkeley, Davis, Irvine, Los Angeles, Riverside, and Santa Barbara – to seed multi-disciplinary initiatives.

UC Irvine will serve as administrative headquarters. The grant was selected under the University's Multicampus Research Programs and Initiatives (MRPI) through a competitive peer-review process.

Sustainable Transportation Center Update

HOW GREEN IS OUR VALLEY? STC Report Tracks City Growth Policies

Across California's fast-growing Central Valley local governments face competing pressures to develop open space to accommodate population growth while enhancing economic, environmental, and social sustainability. The need is even more urgent as cities and towns respond to SB 375, the nation's first law to control greenhouse gas emissions by curbing sprawl.

In a new UC Davis Sustainable Transportation Center study, "Achieving Sustainability in California's Central Valley," researchers developed a sustainability index based on 50 different measures such as land use and zoning rules, and transportation. The researchers then used that index to study the policies of 100 Central Valley cities and towns. They also conducted case studies of seven cities and offered suggestions for making the region grow green.

Lead author Mark Lubell, an associate professor of environmental science and policy, defines sustainable growth as growth that minimizes environmental impact while meeting goals for economic viability and quality of life, for both present and future generations.

"Our study identified some very serious obstacles to achieving the goal, but also identifies some variables and recommendations that might help, says Lubell." The report's recommendations include the following:

- Stop relying on big-box stores and sprawl for city revenues – even if it means revisiting Proposition 13. Dependence on



Example of ground floor retail with living space above
Photo Credit: Dave Shpak

retail sales tax and new development fee income discourages policies that restrict growth or encourage infill development. Many cities view growth as the only way to balance budgets because Proposition 13 limits property tax increases.

- Act now. State policies should put a high priority on those cities that are now growing fast and may be making irrevocable decisions about their future.
- Focus city general plan updates on sustainability from the start. The vision should encompass environmental, economic, and social issues.
- Establish a city sustainability program with a dedicated budget and staff.
- Keep learning. Help city staff benefit from others' experiences through conferences, training, and online peer networks. Spread knowledge through community meetings. Engage the public and make use of academic experts.

The Sustainable Transportation Center is funded in part by the U.S. Department of Transportation and Caltrans, through the University Transportation Centers program. Additional funding for this study came from the National Science Foundation.

GREENER HIGHWAYS: Pavement Center Research Saves Time, Money, Materials



Pengcheng Fu at work on SR33 in Colusa County, the first Caltrans project using FDR-foamed asphalt

“Reduce, reuse and recycle” apply increasingly to the highway construction and repair approaches used by the California Department of Transportation and local governments, supported by the research and development assistance that the UC Pavement Research Center (UCPRC) provides. The UCPRC, a joint project with UC Berkeley now based at UC Davis, is headed by John Harvey, a professor of civil and environmental engineering at UC Davis.

Conventional rehabilitation of badly damaged highways involves tearing up the old road and trucking the pieces away to a landfill or recycling plant, then using a lot of virgin materials, which take an enormous amount of energy to process, for the new road. In addition to environmental concerns, the estimated cost of rehabilitating the state’s highways this way is about \$1 million per lane-mile.

Now, a pavement recycling technology enhanced by UCPRC research is gaining favor. It combines a process called in-place, full-depth reclamation with foamed asphalt as a stabilizing agent. “FDR-foamed asphalt” as it’s called, is promising because it breaks up the old pavement in place, then reuses it by mixing it with foamed asphalt. In addition to being a greener and less costly way to rehab roads, the whole process takes less time, thus minimizing construction-caused traffic headaches.

UC Davis Ph.D. candidate Pengcheng Fu has worked for the last five years with UCPRC director Harvey and research scientist David Jones on sustainable pavement rehabilitation technologies. Fu’s dissertation research, sponsored by Caltrans and funded in part by a grant from the Sustainable Transportation Center, is a key component of a recently completed comprehensive UCPRC project for Caltrans on FDR-foamed asphalt.

Fu’s research identifies important characteristics affecting strength, stiffness, curing, and mixing of foamed asphalt materials. FDR-foamed asphalt has been in use for a few decades, Fu explains, but pavement engineers in the past designed and analyzed it using methods adopted for other pavement materials. Misunderstanding its unique characteristics had led to some incidences of premature failure, he says.

“In our study we did a comprehensive investigation and gave proper consideration to many of the unique features of this material,” Fu explains. These fundamental findings have enabled Caltrans to implement this resource-, energy-, and money-saving road rehabilitation approach with greater confidence and a higher success rate.

Fu credits the support he received from the Sustainable Transportation Center with enabling him to explore some unconventional techniques to study this material. In addition to supporting his research, the STC has provided a seed grant to develop a Web site to enhance researchers’ understanding of this technology, inform pavement engineering practice, and promote discussion of further advances in the technology. The site is expected to be completed in December.

The Center’s work for Caltrans received front page coverage recently in local newspapers including [The Sacramento Bee](#).

STC AWARDS: Faculty Research and Student Dissertations

Each year, the STC offers grants for student dissertations and faculty research projects that advance research and education in sustainable transportation. The following awards were announced for the 2009-2010 academic year.

Dissertation Awards

Peter Tittman, Geography

“Evaluating Life-Cycle Greenhouse Gas Benefits of Biofuel from Forest-Based Biomass”

Yan Xing, Transportation Technology and Policy

“Contributions of the Physical and Social Environment to Bicycling: A Structural Equation Modeling Study”

Faculty Research Grants

Alison Berry

“Improving Soil Infiltration of Runoff and Pollutants along Road Edges by Soil and Vegetation Management Strategies”

Yueyue Fan

“Multistage Network Design for Sustainable Transportation System Planning”

Susan Handy

“An Exploration into the Nature and Formation of Bicycling Preference and Comfort”

Susan Ustin

“Predicting Wildlife Movement Associated with Road and Highway Systems”

Michael Zhang

“The Optimal Coarse Toll for Heterogeneous Commuters in the Morning Commute”

Pat Mokhtarian

“How Do Commuters React to a Temporary Freeway Closure? An Evaluation of the Fix I-5 Project in Sacramento, California”

Research Update

LISTENING TO CONSUMERS: PHEV Center Reports Early Results



The UC Davis Plug-in Hybrid Electric Vehicle Research Center at ITS-Davis has amassed a gold mine of information during the first year of a large study of consumer demand and use of PHEVs. The study, now in its second year, involves 52 households that have borrowed 13 Toyota Priuses converted to plug-in hybrids. The results from the first 34 of these households are summarized in the report, [“Learning from Consumers: Plug-in Hybrid Electric Vehicle \(PHEV\) Demonstration and Consumer Education, Outreach, and Market Research Program.”](#) The report addresses topics from how households handle refueling to how their experiences affect, and are affected by, the opinions of their friends, families, co-workers, and other

members of their social networks. The report was delivered to the California Air Resources Board, the study funder, in July. The research findings were also presented in August at Plug-In 2009, the major U.S. conference on PHEVs and EVs, co-sponsored by the UC Davis PHEV Center.

Education Highlights

CONGRATULATIONS, GRADS: December 2008 and March 2009

December 2008

Obadiah Bartholomy, M.S., Transportation Technology and Policy

Adviser: Andrew Burke

Thesis: "A Technical, Economic, and Environmental Assessment of the Production of Renewable Hydrogen from Wind in California"

Current Position: Project Manager, Sacramento Municipal Utility District

Yi Bian, Ph.D., Civil and Environmental Engineering

Adviser: John Harvey

Dissertation: "Investigation of Fiber Reinforced Polymer (FRP) Dowel Bars in Rigid Pavements"

Current Position: Structural Consultant, S.K. Ghosh Associates, Inc.

Ryohei Hinokuma, M.S., Transportation Technology and Policy

Adviser: Joan Ogden

Thesis: "Optimization of a Small Wind-Based Hybrid Electrical Grid on the Island of San Cristobal in the Galapagos, Ecuador"

Patrick Huber, Ph.D., Geography

Adviser: Deborah Elliott-Fisk

Dissertation: "The Effects of Spatial and Temporal Scale on Conservation Planning and Ecological Networks in the Central Valley, California"

Current Position: Postdoctoral researcher, UC Davis

Alexander Karner, M.S., Civil and Environmental Engineering

Adviser: Deb Niemeier

Thesis: "Near Roadway Air Quality: Meta-Analysis and Mitigation"

Current Position: Ph.D. student, UC Davis

Kurt Kornbluth, Ph.D., Mechanical and Aeronautical Engineering

Adviser: Paul Erickson

Dissertation: "Hydrogen Enrichment of Landfill Gas for Enhanced Combustion in Internal-Combustion Reciprocating Engines"

Current Position: Director, Program for International Energy Technologies, UC Davis Energy Efficiency Center

Julia Silvis, Ph.D., Transportation Technology and Policy

Adviser: Deb Niemeier

Dissertation: "Connecting Social Networks, Ridesharing, and Mobility: A Spectrum of Seniors' Behavior"

Current Position: Energy Analyst, California Energy Commission

Shailendra Singh, M.S., Civil and Environmental Engineering

Adviser: Michael Zhang

Thesis: "Extracting Traffic Information Using Video Image Processing"

Current Position: Programmer Analyst, Cityon Systems

Zheng Wan, M.S., Transportation Technology and Policy

Adviser: Yueyue Fan

Thesis: "Freight Transportation Planning: Container Transportation Network within China's Yangtze River"

Current Position: Ph.D. student, UC Davis

March 2009

Matthew Seitzler, M.S., Mechanical and Aeronautical Engineering

Adviser: Paul Erickson

Thesis: "The Electrical and Mechanical Performance Evaluation of a Roof-Mounted, One Kilowatt Wind Turbine"

Current Position: Mechanical Engineering Consultant, Spectrum Renewable Energy Engineering

Yan Xing, M.S., Transportation Technology and Policy

Adviser: Susan Handy

Thesis: "What Is It About Davis? A Study of Factors Associated with Bicycling in Davis and Five Comparison Cities"

Current Position: Ph.D. student, UC Davis

PEOPLE NEWS: Student Grants

Two student research groups are receiving *Friends of ITS-Davis* Competitive Research and Project Grants to supplement their studies this fall.

Transportation Technology and Policy (TTP) students **Gouri S. Mishra**, **Jacob Teter** and **Juhong Yuan** propose to characterize and compare the environmental costs of shipping containerized cargo from Asia to the eastern United States along alternative routes.

Civil and Environmental Engineering student **Yuche Chen** and TTP students **Geoff Morrison** and **Nathan Parker** propose to identify the total least-cost pathway for fuel producers to meet the state's new Low Carbon Fuel Standard, which requires a 10 percent reduction in carbon intensity by 2020.

ITS-Davis and Campus Highlights

ASILOMAR 2009: Hope and Optimism for Successful Climate Policy



What a difference two years make. Despite the current global economic downturn, a sense of optimism prevailed at this year's 12th Biennial Asilomar Conference on Transportation and Climate Policy.

In his opening comments, ITS-Davis Director Dan Sperling noted a few of the many significant policy changes that have occurred since the group last met: a more ambitious Renewable Fuel Standard, an accelerated increase in the CAFE standard, California's adoption of a Low Carbon Fuel Standard, groundbreaking climate legislation passed in the House and pending in the Senate, and even more happening around the world with a meeting in Copenhagen in December to replace the Kyoto Protocol of 1997. New leadership in Washington, demonstrated by President Obama's commitment to develop a national greenhouse gas (GHG) emission



standard for vehicles, has set a different tone for the climate debate.

The new national standards have given us "a model for hope, for what can happen when states have the opportunity to lead," said California Air

Dave McCurdy, president and CEO of the Alliance of Automobile Manufacturers, concurred. He said automakers want to engage with all stakeholders. “We’re interested in a new beginning,” and in finding a new way to approach the global problem. McCurdy called this a “political moment” in Washington – a time when energy security and environmental concerns have converged on the national political agenda.



Dave McCurdy

The Asilomar gathering provides the environment for thoughtful discussions on complex issues, far from the political buzz and media microscope; it’s an atmosphere that fosters rich technical scrutiny and debate among experts from academia, industry, NGOs, and government. Despite their diverse views they share a commitment to working toward solutions.

Attendees heard technical presentations on strategies for improving fuel economy and reducing GHG emissions. They heard the latest international fuel use and transportation trends, examined policies to cut carbon content in fuel and reduce vehicle miles traveled (VMT), and touched on freight transportation, which is expected to account for an ever larger share of transport’s energy and GHG emissions. The conference featured evening sessions on the health, air quality and climate impacts of projected vehicle growth in developing countries, and the role of government and industry in stimulating innovation.

The conference closed Friday morning after a rousing review of the previous days’ presentations. Participants offered numerous observations including the following:

- We have to find ways to address the mobility needs of the developing world. Americans buying \$40,000 PHEVs won’t help when there are millions of people who can’t wait to buy their first \$2,000 Tata.
- We must break the fuel-du-jour policy paradigm and promote a portfolio of options – and put our money behind them.
- We are looking for a revolution. But revolutionary technologies face market-entry barriers that probably can’t be surmounted without economy-wide measures like a carbon tax.
- We may need to rethink the role government plays in the commercialization of new, innovative technologies.
- Ultimately, the consumer is driving the majority of the decisions. We have to engage the consumer if we’re going to have an effect on GHG worldwide.
- The technology options in the light-duty sector do not necessarily work in the heavy-duty sector. The heavy-duty sector’s problems cannot be solved with technology and fuels alone; it needs an integrated system design that takes into account the inter-modal nature of goods movement, operations, and logistics.
- Even heroic land use changes over 40 years will have only a small impact on VMT. Pricing is critical; federal and state governments need to support VMT fees to reduce congestion and GHG.
- The motivations behind air quality, energy, and climate policy are health, security, and the environment. Addressing these issues takes leadership and will. It requires stories that motivate. We must listen to how people talk about health, safety, security, and quality of life, and find in those stories the message that will resonate about climate change.

Asilomar is made possible by the generous contributions of many [private companies, foundations and government agencies](#).

SPEAKING OF THE FUTURE: UC Davis at Clean Tech Showcase

ITS-Davis Director Dan Sperling will be the keynote speaker at the [Third Annual Clean Tech Showcase](#), October 16 at Sacramento State University. The showcase is hosted by CleanStart, an initiative of the Sacramento Area Technology Alliance (SARTA) and the McClellan Technology Incubator (MTI) designed to accelerate the development of clean energy technology ventures within the Greater Sacramento Region. Sperling will give a talk on his book, *Two Billion Cars: Driving Toward Sustainability*.

In addition to Sperling’s keynote, the conference features breakouts on

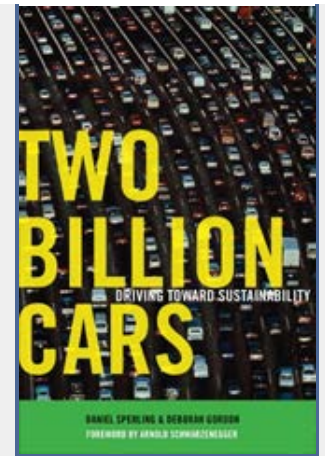


Martha Krebs

four clean tech tracks, including a panel on the Sacramento region's leadership on zero net energy buildings and communities, moderated by Martha Krebs, newly named UC Davis executive director for Energy and Environmental Research Development. Krebs is a recent addition to the campus's growing staff of energy policy and technology experts; she recently directed the California Energy Commission's Public Interest Energy Research (PIER) program.

The Sacramento region is an emerging hub for the nation's clean energy technology, commercialization, and public policy. The region already boasts nearly 100 clean tech companies that provide solar, wind, biofuel, and energy-efficient technology.

Read a CleanTech Showcase [interview](#) with Sperling.



PEOPLE NEWS: Faculty Awards and Accolades

Bryan Jenkins, professor of agricultural engineering, co-director of the California Biomass Collaborative and director of the UC Davis Energy Institute, has received the 2009 Johannes Linneborn Prize for "outstanding contributions to the development of energy from biomass." Jenkins accepted this prestigious European award in June at the 17th European Biomass Conference in Hamburg, Germany.



Bryan Jenkins accepts Linneborn Prize in Germany

Chris Knittel, an associate professor of economics at UC Davis, almost became a household name thanks to media coverage this summer of two timely studies. In late July, a New York Times editorial cited his calculations that technical progress which could have increased automobile fuel economy by nearly 50% since 1980 has been focused instead on increasing vehicle size and horsepower, so that fuel economy improved by only 15%. Knittel estimated that the Obama administration's target of reaching 35.5 miles per gallon by 2016 is eminently feasible.

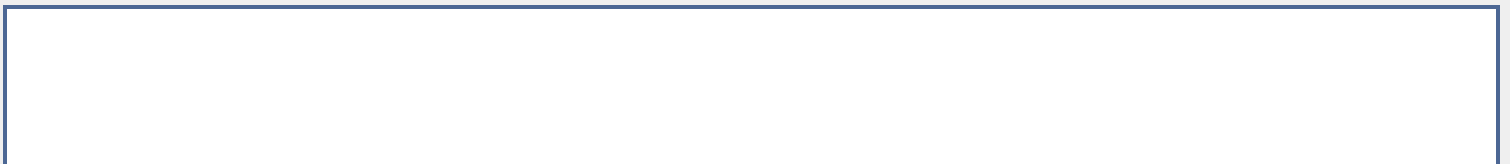


Chris Knittel

In mid-August, Knittel released new findings suggesting that the federal government's Cash for Clunkers program was "an expensive way to reduce carbon." Once again he was cited in the Times and featured in numerous other newspapers. Calculating the value of a carbon credit and the average rebate, he determined "the lowest cost to remove one ton of carbon from the environment was \$237. More likely scenarios produced a cost of more than \$500 per ton, even when we accounted for reductions in pollutants other than greenhouse gases." Most policies in Europe and the U.S. aim for costs of less than \$50 per ton.

In mid-August, Knittel released new findings suggesting that the federal government's Cash for Clunkers program was "an expensive way to reduce carbon." Once again he was cited in the Times and featured in numerous other newspapers. Calculating the value of a carbon credit and the average rebate, he determined "the lowest cost to remove one ton of carbon from the environment was \$237. More likely scenarios produced a cost of more than \$500 per ton, even when we accounted for reductions in pollutants other than greenhouse gases." Most policies in Europe and the U.S. aim for costs of less than \$50 per ton.

SUPER MILEAGE WINNER: Side FX Finds a New Home





Is it a bike? A boat? No! It's a car. It's "Side FX," an early 1990s Super Mileage Contest-winning car built by UC Davis students. The car has been languishing in storage but will soon have a new home. The fleet team at AAA Northern California, Nevada & Utah refurbished and restored Side FX over the summer. It will be on display at AAA's new headquarters building when it opens this fall in Walnut Creek.

Professor emeritus Andy Frank, whose legendary UC Davis vehicle design program produced Side FX and an impressive family of contest-winning cars, reports that Side FX was featured in the August, 1992 issue of *Road and Track*; it held the official U.S. Super Mileage Contest record of 3313 mpg for 10 years.