

ITS-Davis e-news is the electronic newsletter of the UC Davis Institute of Transportation Studies. Written for alumni and friends, ITS-Davis e-news reports information from ITS-Davis and affiliated campus departments that host transportation-related programs. For previous issues, see the [e-news archives](#).

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► Research Results

TESTING CARS OF THE FUTURE: UC Davis Plug-in Hybrid Takes to the Streets

The UC Davis Plug-in Hybrid Electric Vehicle (PHEV) Research Center's research and outreach programs are off and running: The campus's first PHEV research vehicle was unveiled at a news conference October 30 launching a study of consumer response to plug-in hybrid vehicles. In addition the Center's first plug-in hybrid vehicle driver assessment is complete, and plans are underway for an international conference on plug-in hybrids next summer.

Funded by a three-year, \$3 million grant from the California Energy Commission's Public Interest Energy Research (PIER) program, the center is a magnet for innovative research on consumer response, environmental impacts, and vehicle technology. Its goals are to provide technology and policy guidance to the state, and to help solve research questions and address commercialization issues for PHEVs.

The arrival of the campus's first professionally converted plug-in hybrid, a 2007 Toyota Prius, marks the beginning of the Center's coordinated demonstration; over the next two years, researchers will place 10 plug-in hybrids with 100 local families who will evaluate them for six to eight weeks. This project is supported with an additional \$1.8 million from the California Air Resources Board.



Tom Turrentine speaks at the news conference

With so few PHEVs on the road, little is known about how consumers will use them. Policymakers, energy suppliers and automakers are asking UC Davis to fill in some of the blanks.

“We know that existing hybrids offer environmental benefits and some savings on fuel costs,” said Tom Turrentine, an ITS-Davis research anthropologist who directs the PHEV Research Center. “Plug-in hybrids offer still greater benefits, plus the ability to recharge at home.”



A reporter interviews Dahlia Garas

The vehicle is outfitted with a conversion kit made by Hymotion, Inc., of Canada. The conversion kit includes a 5kWh lithium polymer battery pack connected in series to the vehicle's original 1.3kWh nickel-metal hydride battery. Housed with the new battery pack in the vehicle's spare tire well are an additional battery management system and a charger used to charge the Hymotion battery pack from a 120V standard outlet. The vehicle also uses a prototype data logger designed and built at Argonne National Laboratory. UC Davis is the first to use the device, which will incorporate GPS and vehicle operating data, present it on a screen to the driver and eventually deliver the information to a waiting computer in real-time via cell phone uplink. Eventually, researchers hope a data system will provide useful feedback on real-time cost, emissions, and energy use directly to drivers to determine if and how this data affects drivers.

The California State Automobile Association is playing a key role in the PHEV Center's consumer research by providing roadside assistance and insurance coverage for PHEVs that UC Davis will place with households in Northern California.

Another “first” for the PHEV research Center is recent Ph.D. recipient Rusty Heffner's dissertation on the symbolic meaning of vehicles, which includes a chapter on plug-in hybrids. It is the first research to examine early users' experiences with the yet-to-be commercialized technology. At the time of his research, 25 to 30 PHEV conversions were on the road and Heffner interviewed 23 of these pioneer drivers. He explored how drivers use and recharge their vehicles and sought their feedback on vehicle design, all-electric range, their experience with onboard instrumentation, and their expectations about general benefits and drawbacks of PHEV technology.

“Rusty's research provides an excellent framework for our future driver response surveys,” explains Turrentine.

While these early PHEV drivers may not represent today's typical American car buyer, their behavior and viewpoints offer clues about how consumers will respond to PHEVs once they become commercially available. Many drivers spoke of the importance of all-electric range, for example, and Heffner theorizes that freedom from gasoline is a powerful symbol for them. At the same time, he adds, very high fuel economy, such as that experienced with “blended mode” PHEVs, is a performance measure that may resonate more strongly with the average consumer who has never had exposure to all-electric range.

“As manufacturers, policymakers, and others consider ways to promote PHEVs, they should consider these symbolic meanings and their relevance to the consumer,” Heffner writes.

Also underway is planning for the first international conference on PHEVs, July 22-24, 2008 at the San Jose Convention Center in San Jose, Calif. Co-sponsors with the PHEV Center are Silicon Valley Leadership Group, Pacific Gas and Electric, Southern California Edison, the California Energy Commission, Sacramento Municipal Utility District and the Electric Power Research Institute.

The conference will feature the latest on research and technology developments; experts from automakers and power companies to talk about PHEVs and how they will connect to and interact with the utility grid; energy and climate analysts to explore the benefits and drawbacks of PHEVs; clean tech entrepreneurs to showcase their economically and environmentally beneficial products and services; and consumer research experts to help the average person understand how this new vehicle technology will fit into their world.

Learn more about the [PHEV Center](#), its [staff](#) and [advisory board](#).

ALUMNI PROFILE: Mark Duvall

Mark Duvall first became interested in PHEVs as a UC Davis Mechanical Engineering student studying with Professor Andy Frank. Duvall's early focus was engine and powertrain design; he worked on the first UC Davis plug-in hybrid electric vehicle, “Ground FX” and participated in the U.S. DOE Super Mileage programs as an undergrad.

Duvall earned his M.S. in Mechanical Engineering from UC Davis in 1994 and a Ph.D. in Mechanical Engineering with a focus on thermoplastic composites manufacturing from Purdue University in 1998. Shortly thereafter, he returned to Davis, to Professor Frank's Hybrid Electric Vehicle Research Center.

Duvall returned to manage a \$5.4 million DARPA (Defense Advanced Research Projects Agency) grant to UC Davis administered through the Sacramento Municipal Utility District (SMUD) on battery-dominant hybrid vehicles. Dr. Frank's lab at the time was home to several interesting research projects, including a plug-in hybrid version of General Motors'

groundbreaking all-electric vehicle, the EV1. UC Davis student teams delivered several winning designs to the U.S. DOE's FutureCar and FutureTruck competitions from Frank's lab, and many of those vehicles, Joule, Coulomb, Sequoia, and Yosemite, are still operating and on display.

Dr. Frank's key contribution has been his consistent belief in plug-in hybrid technology over a long period of time and his support of students' independent thinking, Duvall notes.

"The remarkable thing about this work is that so many different generations of students over 15 years worked toward essentially the same goal. We'd argue about what end to put the engine in, rear or front, and about insignificant details of vehicle design. But we were absolutely, fundamentally, philosophically convinced that we were right about PHEVs," Duvall recalls.

In August 2001 Duvall accepted a project manager position in the Electric Transportation department at the Electric Power Research Institute (EPRI).

"One of the reasons I switched over was that I'd been working on PHEVs for several years, and it was clear that the concept was never going to be commercialized from a university. I felt I needed a broader perch."

It would take support by the utility industry working with automakers to move PHEVs forward, he reasoned. Still, he contends, the student vehicle designs are some of the best PHEV architectures developed to date.

"A single professor and a small group of dedicated students moved the technology from obscurity to a level where they could at least explore, test and evaluate its potential. That's a remarkable accomplishment."

Duvall recently has been promoted to manager of the Electric Transportation program at EPRI, where he is happily ensconced in leading collaborative research projects that are advancing the technology, and serving as EPRI's representative on the UC Davis PHEV Center Advisory Council.



UC Davis FutureTruck PHEV

A PIECE OF THE NOBEL: Sperling Honored for Contribution to IPCC Report

Former Vice President Al Gore got most of the glory here in the U.S. but ITS-Davis's own director, Dan Sperling, is sharing the Nobel Peace Prize honor with researchers from around the world who contributed to this year's Intergovernmental Panel on Climate Change (IPCC) report. The IPCC was named a recipient of the Nobel Peace Prize in October, along with Gore.

Sperling contributed to IPCC Working Group III and is a lead author of Chapter 5, "Transport and its Infrastructure" of the IPCC's, *Fourth Assessment Report: Mitigation of Climate Change*, released earlier this year and recently published in hard copy. The IPCC's final synthesis report is to be released November 17.

"The fact that the IPCC has earned the recognition that this award embodies, is really a tribute to your knowledge, hard work and application," IPCC chair Rajendra Pachauri wrote to all contributors the day the award was announced.

"It's a great honor for all of us who have worked for years to study the link between transportation and climate change," said Sperling. "I never dreamed I would ever be able to claim a tiny piece of the Nobel."



Dan Sperling, ITS-Davis Director

FEATURED PUBLICATION: Do Motor Vehicle Users in the U.S. Pay Their Way?

Mark A. Delucchi

Transportation Research A, accepted for publication, June 2007

Governments in the U.S. spend over \$100 billion annually on road infrastructure and services to drivers. Taxes and fees help pay for these services. Delucchi's paper compares these government expenditures with the corresponding user tax and fee incomes. He identifies different ways one can tally the expenditures and income, including a variety of "indirect" expenditures and payments. He finds that current motor vehicle tax and fee payments to government fall short of government expenditures related to motor-vehicle use by approximately 20 to 70 cents per gallon of all motor fuel.

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Sustainable Transportation Center Update

STC SPONSORS THREE CONFERENCES

On the Road to Sustainability: From Research to Practice

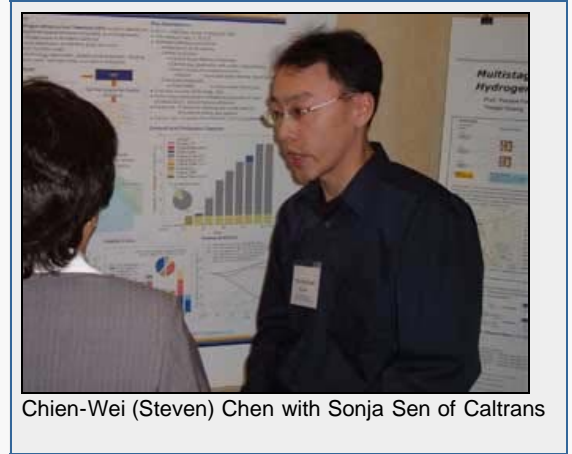
"On the Road to Sustainability: From Research to Practice" the first annual California PATH-University Transportation Centers conference, drew federal, state and local government officials, private industry leaders and consultants, NGOs and researchers to Berkeley, Calif. last month.

The UC Davis Sustainable Transportation Center was a co-sponsor of this conference, which examined sustainable transport from all angles—technology, policy, planning, engineering, social and environmental impact, economics and finance—and drew from experiences in the United States and abroad. See www.uctc.net/path-utc for details.

Five ITS-Davis faculty members made presentations:

- John Harvey, UC Davis Pavement Research Center: "Increasing the Environmental Sustainability of Transportation Infrastructure: Key Issues, Current and Future Work"
- Allison Berry, UC Davis Road Ecology Center: "Developments in the Field of Road Ecology"
- Joan Ogden, Co-director STEPS Research Program, ITS-Davis: "Hydrogen as Transportation Fuel: Near and Long Term Prospects"
- Susan Handy, Director, UC Davis Sustainable Transportation Center: "Evidence-Based Strategies for Increasing Active Travel"
- Dan Sperling, Director, ITS-Davis: "AB 32 and the Transformation of Transportation"

Six students presented posters: Changzheng Liu (CEE), Jonathan Weinert (TTP), Ryan McCarthy (CEE), Yongxi (Eric) Huang (CEE), Zhenhong (David) Lin (CEE), and Chien-Wei (Steven) Chen (TTP). In addition, recent grad Raghavender Palavadi Naga (CEE) presented a poster.



Chien-Wei (Steven) Chen with Sonja Sen of Caltrans

Walk/Bike California 2007

The STC was a presenting sponsor of the third biennial Walk/Bike California conference, hosted by the California Bicycle Coalition in association with California Walks, and held on the UC Davis campus in September. Approximately 400 people attended.

Many UC Davis students volunteered to keep the conference running smoothly and STC Director Susan Handy gave a plenary talk. "I looked at what the research tells us about factors that influence walking and biking," said Handy.

It was fitting that the conference was held on the UC Davis campus, where bicycles are the primary and preferred mode of transportation, and in Davis, the nation's first city to institute bicycle lanes 40 years ago.

In conjunction with the conference, [Ted Buehler](#), a TTP master's student who researched Davis's bicycling history for his thesis, hosted a forum on the 40th anniversary of bike lanes in Davis. Buehler brought together many of the civic activists and engineers who worked in the 1960s to design and build the city's first bike lanes and who had not been together for 35 years.

"We had a good time hearing their stories, about all the trouble they had getting the idea approved, and all the fun they had building them, and watching their children and grandchildren enjoy using the lanes," Buehler said.

Asilomar 2007

STC was a co-sponsor of the [11th Biennial Asilomar Conference](#), "Transportation and Climate Policy."

Please view the [Event Overview](#)



Faculty Research Grants

STC has awarded five faculty research grants:

Alison Berry

"Modeling Habitat Fragmentation in Relation to Road Systems: A Tool for Transportation Planning in California"

Susan Handy

"The Davis Bicycle Studies"

Ken Kurani

"Studies in Consumers and Automotive Fuel Economy: A Qualitative Field Test of the Effects of Driver Feedback on Automotive Fuel Consumption"

Pat Mokhtarian

"Structural Equation Modeling of Desired Travel Amounts"

Michael Zhang

"Dynamic Congestion Pricing Considering Spatial Interactions of Queues"

Fall Class: Public Transit Policy and Management

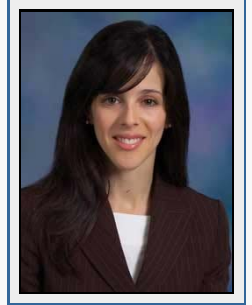
STC is funding a fall quarter class in Public Transit Policy and Management, an overview of public transit policy issues along with practical instruction in the application of analysis used in managing and assessing transit service. Topics include long-range transit corridor planning, service planning and scheduling, performance evaluation, fare policy, labor relations, and organizational issues. A group project provides an opportunity to apply the course content to a current transit issue and to present the findings to local officials.

Education Highlights

NEW TO CAMPUS: ITS-Davis Welcomes New Faculty

ITS-Davis welcomes three new faculty members and researchers.

Alissa Kendall is an assistant professor in Civil and Environmental Engineering. Her research interests draw on a life cycle perspective to provide a foundation and common theme for modeling sustainability across a range of engineered systems. Current research directions in the transportation sector include modeling new and innovative materials and designs for improved efficiency of highway infrastructure, life cycle assessment of alternative transportation fuels, and geography and mode choice effects on energy consumption and environmental impacts of multi-modal freight networks. She received her Ph.D. in Civil and Environmental Engineering and Natural Resources and Environment from the University of Michigan, Ann Arbor.



Alan Meier, a senior scientist at Lawrence Berkeley National Laboratory, is a new research faculty member who is dividing his time between LBNL and the UC Davis Energy Efficiency Center, where he is engaging in research projects, teaching a course on energy efficiency, and leading seminars. His research has focused on understanding how people (and machines) use energy and the opportunities to conserve. His research on standby power use in appliances—1% of global CO₂ emissions—led him to propose an international plan to reduce standby in all devices to less than 1 watt, which has now been endorsed by the G8 countries. At UC Davis, Meier is concentrating on measuring and reducing the “off-test” fuel consumption of motor vehicles. He is also examining approaches to improving fuel economy in trucks. He is editor of the journal, *Energy and Buildings*, and the magazine, *Home Energy*, author of many

articles and two books, *Supplying Energy through Greater Efficiency* and *Saving Electricity in Hurry*.

Sonia Yeh, research engineer, currently holds joint appointments with ITS-Davis and the Lawrence Livermore National Laboratory. Yeh's research interests focus on the role of technological, economic, and social changes on future energy demand, air emissions, and environmental outcomes. Much of her work has involved applying tools such as risk analysis, decision analysis, and uncertainty analysis to policy issues that intersect with energy, transportation, environment, and public health. Yeh is working with Mark Delucchi to substantially expand and revise the Lifecycle Emissions Model (LEM) to analyze the California Air Resources Board's proposed climate change mitigation strategies.



NEW TO CAMPUS: Welcome New Students

The transportation graduate student community at ITS-Davis continues to demonstrate healthy growth, as we have now topped 100 students across all programs!

“We are excited about the diverse experiences and perspectives that our students bring to the Institute, and are constantly renewed by their energy,” says TTP Chair Pat Mokhtarian. “In very many ways, they teach each other -- and faculty -- as much as faculty teach them.”

ITS-Davis welcomes the following new students:

Brenda Chang, TTP	Amine Mahmassani, TTP
Yi-Ru Chen, CEE	Sinnott Murphy, TTP
Erdem Coleri, CEE	Laura Poff, TTP
Asish Gautam, TTP	Carlos Reyes, CEE
Abbas Ghandi, TTP	Nananko Tenjin, TTP
David Kashevaroff, MAE	Seth Warren, CEE



ACTIVE OFF-CAMPUS: Internships Enrich UC Davis Experience

Students enhance their classroom and research lab experience by participating in a range of internships and extracurricular learning opportunities throughout the year. Over the last year and into this fall, students have participated in a variety of activities:

Kevin Eslinger
China Academy of Transportation Science (Beijing)

Kristin Lovejoy
Cambridge Systematics

Bryan Jungers
California Energy Commission
Vehicle Design Summit at MIT

David McCollum
Research Experience in Carbon Sequestration (RECS) program
Argonne National Laboratory (Washington, D.C.)

Michael Keteltas
Caltrans Division of Research and Innovation

Michael Nicholas
Global Energy Decisions

Zhenhong (David) Lin
U.S. Environmental Protection Agency

Nathan Parker
TIAX, LLC

Nicholas Linesch
UC Office of the President

Darius Roberts
China Academy of Transportation Science (Beijing)

ITS-Davis and Campus Highlights

ACCOMPLISHMENTS: Eggert Named ARB Advisor

ITS-Davis's own Anthony Eggert has been appointed advisor for science and technology policy for the California Air Resources Board.

Eggert, who earned his Master's Degree in Transportation Technology and Policy in 2001, has spent the last eight months in Washington, D.C. as advisor on energy policy to the Office of Federal Governmental Relations for the UC Office of the President. From 2002 to 2006, Eggert was associate research director for the Hydrogen Pathways research program here at the Institute. Before that, he was a project engineer then manager for the Ford Motor Company at the California Fuel Cell Partnership.

"I can honestly say that I owe much to the excellent education from ITS-Davis" Eggert wrote in an e-mail to colleagues.

Way to go, Anthony!



Anthony Eggert, right, with Norm Bryan, of ITS-Davis Board of Advisors

SETTING DIRECTION: Board of Advisors Meets in Late October

The Institute welcomed its Board of Advisors to campus for its annual meeting October 30.

At a pre-meeting dinner October 29, Sacramento policy makers including Jim Boyd (CEC), Tom Cackette (CARB), Kip Lipper (Senator Perata), and Larry Orcutt (Caltrans) spoke about the state's climate change, alternative fuels, and transportation policies and the role of ITS-Davis in providing valuable research to support the state's activities. Advisors also attended the [Plug-in Hybrid Electric Vehicle Research Center media event](#) the day of the meeting.



ITS-Davis Board of Advisors

EAST MEETS WEST: Tongji University Delegation Visits UC Davis

Building on the solid relationship between UC Davis and Tongji University of Shanghai, China, a delegation from Tongji spent the day meeting with ITS-Davis researchers, students and university officials to discuss opportunities for collaboration on transportation research.

Visiting from Tongji:

Yongsheng Li, Executive Vice President, Tongji University
Zhenyu Li, Vice Dean, College of Architecture and Urban Planning
Decun Dong, Vice Dean, College of Transportation Engineering
Xiaohong Chen, Vice Dean, College of Transportation Engineering
Zhigang Yang, Delegate of the Dean for the College of Automotive Engineering
Qian Guo, Deputy Director, International Exchange and Cooperation Office

Presenting for ITS-Davis:

Bob Kerr, Assistant Vice Provost, International Alumni and Development
Joe Krovoza, Director, Development and External Relations
Yunshi Wang, Director, UC Davis China Center for Energy and Transportation
Jason Ni, Ph.D. candidate ITS-Davis

ITS-Davis Director Dan Sperling, along with other faculty and students joined the delegation for lunch.

STEPS TO THE PEOPLE: Policy Briefing in Sacramento

Researchers from the Sustainable Transportation Energy Pathways (STEPS) Program hosted an alternative fuels policy briefing in October at CalEPA. Presenters offered the most up-to-date information on transportation fuel alternatives such as hydrogen and biomass fuels, and advanced hybrid vehicle technology.

IN MEMORY: ITS-Davis Remembers Paul MacCready and Dr. Henry Gong

ITS-Davis fondly remembers two wonderful contributors to clean energy:

Paul MacCready, Ph.D. was best known as an aeronautical engineer and inventor who loved to design unique flying and rolling machines, and will be remembered for his lifelong commitment to building more energy-efficient vehicles of all types. He created the first successful human-powered airplane, the Gossamer Condor, and helped design both the GM Sunraycer solar car, and the Impact, which later became the GM EV1 electric car, all of which are now in the Smithsonian Institution. He is also remembered as a founder of AeroVironment, a southern California company that produces electronic equipment, fast charging systems for industrial vehicles, and surveillance aircraft. He was designated the “engineer of the century” by ASME.

ITS-Davis remembers him fondly as a founding member of our Board of Advisors: His wise counsel benefited ITS-Davis from 1994 until his passing in the late summer of this year. In a letter to MacCready’s family, ITS-Davis Director Dan Sperling wrote: “Paul was a visionary and a creator in an age that needs thousands more like him.”

Henry Gong, M.D. was a member of the California Air Resources Board. A physician who specialized in pulmonary health, Dr. Gong brought to the board a unique insight into the health effects of air pollution. In a statement, ARB Chair Mary Nichols said: "He would often cite data from his health studies in helping guide his fellow board members to passing protective public health regulations on everything from tougher diesel regulations to more stringent air quality standards. All of us who breathe California's air owe a debt of gratitude to Dr. Gong as one of the state's true clean air champions."

EXTRA! READ ALL ABOUT IT! ITS-Davis and UC Davis Researchers in the News

Tom Turrentine and/or Dahlia Garas, October 31, in *The Sacramento Bee*, *San Francisco Chronicle*, *Automotive World*, and others, and October 30 on numerous network affiliate television and radio stations throughout northern California, following the UC Davis PHEV Center news conference.

Student Nic Lutsey, October 21, in the *San Diego Union-Tribune*, on differences between Canada's and the U.S.'s approach to regulating greenhouse gas emissions from vehicles.

Dan Sperling, October 18, in *Time Magazine*, on the Toyota Prius design team, part of the magazine's Heroes of the Environment series.

Dan Sperling, October 13, in *The Sacramento Bee*, on the state's proposed low carbon fuel standard and other strategies for reducing greenhouse gas emissions.

Dan Sperling, October 11, in *Time Magazine*, in an article on General Motors' new electric drive vehicle technologies.

Mark Delucchi, October 9, in the *Baltimore Sun*, on his new research paper that compares spending on roads and highways with collections of highway-related taxes and fees.

Deb Niemeier, October 7, in *The Sacramento Bee*, in an op-ed on the UC system uninviting Harvard President Lawrence Summers to speak privately to UC Regents.

Dan Sperling, October, in *Consumer Reports*, in an article on fuel cell vehicles and hydrogen infrastructure.

Joan Ogden, September 3, on *National Public Radio*, in a special program on energy, Discovery Park, produced by Purdue University.

Dan Sperling, in early August, in numerous California and national papers, on the release of the proposed implementation strategies of California's low-carbon fuel standards, the report he co-authored with UC Berkeley's Alex Farrell, and a team of UC Davis and UC Berkeley researchers.