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*.

Contents **Issue 18** **March 2004**

Research Results

FROM CRADLE TO GRAVE: Analyzing Lifecycle Emissions with Updated Model


Mark Delucchi

ITS-Davis researcher Mark Delucchi has recently published the much-anticipated Lifecycle Emissions Model (LEM) documentation, which outlines changes to the methods and data in the recently revised version of his air pollution, energy use and greenhouse gas emissions model. Documentation for the original model was published by the Center for Transportation Research, Argonne National Laboratory, in 1993.

The new documents comprise a main report and nine appendices, approximately 950 pages. All are available on the Publications page of the ITS-Davis web site and on Delucchi's faculty web site, both of which are listed below.

"The reports are devoted almost exclusively to documentation of methods and data in the LEM," Delucchi explains.

While it is not the intent to present applications or particular analyses in these reports, he adds that some important findings are provided. For example, contrary to conventional wisdom, his model shows that lifecycle emissions of diesel appear to be greater than those for gasoline, and soy and corn-based fuels are even worse than gasoline and diesel on a lifecycle basis.

Sponsors of Delucchi's LEM

- Oakridge National Laboratory
- Natural Resources Canada
- Pew Center for Global Climate Change
- International Energy Agency
- Energy Information Administration of U.S. DOE
- Propane Education and Research Council

LEM Documentation Available Online

You can download Mark Delucchi's Lifecycle Emissions Model documentation as individual reports from either of the following links:

Publications from 2003
Delucchi Faculty Page

The model calculates lifecycle energy use, air pollutant emissions and CO_2 -equivalent greenhouse-gas emissions for a variety of transportation modes and fuels, including passenger and freight transport, electricity generation, and heating. For transport modes, it analyzes emissions and energy used in vehicle manufacturing and infrastructure construction, as well as for propulsion. It includes input data for up to 30 countries for the years 1970 to 2050, allowing country-specific analyses.

The most significant changes in the updated model regard CO_2 equivalency factors (also known as GWPs), the lifecycle of materials, and biofuels.

"A great deal has changed in the last decade," Delucchi notes. "We've seen market tests of electric vehicles, hybrids are popular with consumers, and alternative fuels such as biodiesel, are entering the scene. We wanted to be able to model for a variety of new factors and inputs."

HYDROGEN PATHWAYS: Adding Perspective to Policy Dialogue

Dan Sperling and Joan Ogden, co-directors of the Hydrogen Pathways program, have been busy sharing their expertise in both federal and state policy circles, adding to the dialogue over how and when we may see a transition to a hydrogen economy.


Joan Ogden

For the last year and a half, Sperling has participated on a National Academies of Sciences committee examining the hydrogen future. The committee report, released last month, concluded that the hydrogen economy was highly compelling and that "A transition to hydrogen … could fundamentally transform the U.S. energy system, creating opportunities to increase energy security through the use of a variety of domestic energy sources for hydrogen production while reducing environmental impacts, including atmospheric CO 2 emissions and criteria pollutants." It called for an expansion in hydrogen R&D to create the opportunity to one day realize this potential, and outlined the significant challenges ahead. (The report may be purchased online from: http://books.nap.edu/catalog/10922.html?onpi_newsdoc02042004)

Ogden presented research on hydrogen infrastructure issues to the National Academies committee. She is also currently active in a U.S. DOE effort to develop consensus on hydrogen costs to establish a baseline for future cost estimates. This group, known as H2A, is comprised of hydrogen scientists and analysts. Ogden heads the H2A team studying delivery strategies for hydrogen.

In testimony before a California Assembly Select Committee hearing shortly after the National Academies report release, Sperling told state lawmakers that his own personal conclusion is somewhat more ambitious, and that we should waste no time in pursuing hydrogen research. "Even more initiative is appropriate and desirable, even broader benefits will likely result, and California is well positioned to be the international leader in moving toward hydrogen," he said. The underlying premise of his conclusion is that hydrogen potentially provides far greater societal benefits than any other major long-term option under serious consideration.

It won't be easy, he acknowledged, because transitioning to a hydrogen economy means transforming the automotive and energy industries, and transforming society. But now is the time to start with expanded research in the areas of basic science, vehicle and infrastructure systems analysis, as well as business strategy and policy analysis. Sperling also promoted the idea of strategic and appropriately designed demonstration projects and an R&D plan in support of Gov. Schwarzenegger's Hydrogen Highways initiative.

California 's universities, he said, can play an important role. "Our university system is uniquely positioned to provide basic and applied research and expert advice, and to perform perhaps its most important role: to train the next generation of scientists, engineers, and leaders," Sperling said.

* Sperling's testimony is available as a new ITS-Davis publication.

* Sperling and Ogden offered insight to *Hydrogen and Fuel Cell Letter* publisher Peter Hoffman, in a March cover story that counters the generally negative media coverage of the National Academies report. http://www.hfcletter.com/letter/March04/

HYDROGEN PATHWAYS: 2004 Activities and 2003 Accomplishments

In 2004 the Hydrogen Pathways program will host several major activities to present research methods and results to program sponsors and invited experts. Workshops and advisory committee meetings are scheduled for June and September. Several near-term pilot projects are underway, and researchers expect to submit a large number of conference papers and presentations at key international transportation and fuel cell meetings.


Program Manager Anthony Eggert and Joan Ogden at the ITS-Davis Hydrogen and Fuel Cell Vehicles Open House last October

In addition, UC Davis will offer an increased number of courses relevant to the hydrogen economy, reflecting the interests and expertise of new faculty members with specializations in hydrogen, energy and systems who joined ITS-Davis this past year.

The Institute devoted much of the first year of the Hydrogen Pathways program to planning the research agenda and assembling a diverse team of faculty, graduate students, and researchers. The program and its participants accomplished the following in 2003:

- Contributed over 60 papers and presentations
- Launched an interactive website (www.its.ucdavis.edu/Hydrogen)
- Held a research workshop in March 2003
- Held an Advisory Committee meeting during *The Hydrogen Transition* conference at Asilomar
- Established a 2003-04 research project plan that covers hydrogen production, distribution, markets, and policy, and is comprised of 17 integrated research projects
- Offered a graduate level course on hydrogen in both spring and fall quarters
- Participated in key state and federal government and non-government planning groups
- Opened the UC Davis hydrogen fueling facility in October 2003
- Engaged in over 100 separate outreach activities

Please see the Development Update, below, for information on program funders.

HARD WORK PAYS OFF: UC Davis Has High Profile at TRB

From traffic flow research, to equity in transportation, to asphalt and concrete rehabilitation, UC Davis faculty and students demonstrated the breadth of their research and academic pursuits once again at the 83rd Annual Meeting of the Transportation Research Board in Washington, D.C. At least 20 students and faculty presented papers or posters, or chaired sessions and meetings at the transport industry's international confab, January 11-15, 2004.

ITS-Davis once again hosted a very popular reception during TRB. For the estimated 250 in attendance, the Institute's annual social gathering proved to be the most fun place to be at the time.

See the list of papers presented by UC Davis representatives.

TRANSPORTATION PUBLICATIONS FROM UC DAVIS: Hot off the Presses

Following is the list of new reports and reprints published to date this year. Please see this year's publications page for the most up to date listing.

RESEARCH REPORTS

California 's Hydrogen Highway: The Case for a Clean Energy Science and Technology Initiative. Daniel Sperling. *Testimony Informational Hearing, Select Committee on Air and Water Quality* . ITS-Davis. February 2004. UCD-ITS-RR-04-03.

Chinese Rural Vehicles: An Explanatory Analysis of Technology, Economics, Industrial Organization, Energy Use, Emissions, and Policy. Sperling, Dan; Zhenhong Lin; Peter Hamilton. *ITS-Davis.* January 2004. Publication No. UCD-ITS-RR-04-1.

REPRINTS

Air Quality. Niemeier, Debbie A.; Britt A. Holmen. In *Handbook of Transport and the Environment. Handbook Vol. 4., Chapter 4*. January 2004. Publication No. UCD-ITS-RP-04-3.

Amenity and Severance. Handy, Susan. In *Handbook of Transport and the Environment. Handbook Vol. 4., Chapter 7*. January 2004. Publication No. UCD-ITS-RP-04-4.

Assessing Impact of Urban Form Measures on Nonwork Trip Mode Choice After Controlling for Demographic and Level-of-Service Effects. Rajamani, Jayanthi; Chandra R. Bhat; Susan Handy; Gerritt Knapp; Yan Song. *Journal of the Transportation Research Board. No. 1831:Travel Demand and Land Use 2003.* January 2004. Publication No. UCD-ITS-RP-04-01.

Cleaner Vehicles. Sperling, Daniel. In *Handbook of Transport and the Environment.* Handbook Vol. 4. Chapter 10. January 2004. Publication No. UCD-ITS-RP-04-5.

Composite Exhaust Emissions Rates: Sensitivity to Vehicle Population and Mileage Accural Assumptions. Niemeier, Debbie; Tom Kear. Journal of the Transportation Research Board. No. 1842: Energy, Air Quality and Fuels; Energy and the Environment. Transportation Research Board. January 2004. Publication No. UCD-ITS-RP-04-8.

Environmental Externalities of Motor Vehicle Use. Delucchi, Mark A. In *Handbook of Transport and the Environment.* Handbook Vol. 4., Chapter 23. January 2004. Publication No. UCD-ITS-RP-04-7.

Markets for Fuel-Cell Auxiliary Power Units in Vehicles. Nicholas Lutsey; Brodrick, Christie-Joy; Sperling, Dan and Dwyer, Harry. *Journal of the Transportation Research Board.* No. 1842: Energy, Air Quality and Fuels; Energy and the Environment. Transportation Research Board. January 2004. Publication No. UCD-ITS-RP-04-9.

The Health Effects of Motor Vehicle-Related Air Pollution. Delucchi, Mark A; Donald R. McCubbin. In *Handbook of Transport and the Environment*. Handbook Vol. 4., Chapter 22. January 2004. Publication No. UCD-ITS-RP-04-6.

UPlan: A Versatile Urban Growth Model for Transportation Planning. Johnston, Robert A.; David R. Shabazian; Shengyi Gao. *Journal of the Transportation Research Board. No. 1831: Travel Demand and Land Use 2003.* January 2004 Publication No. UCD-ITS-RP-04-02.

Publications can be ordered by fax, e-mail or mail. Some are now available online. ITS-Davis is in the process of getting all research reports in downloadable pdf format online.

Ordering information: http://www.its.ucdavis.edu/publications
E-mail: itspublications@ucdavis.edu
Fax: 530-752-6572
Mail: Publications, Institute of Transportation Studies, UC Davis,
One Shields Avenue , Davis , CA 95616-8762

| ITS-Davis Home | Top | *e-news* archives |

Education Highlights

SOWING SEEDS: ITS-Davis Grads Branch Out to Diverse and Challenging Careers


TTP Chair Pat Mokhtarian in action with a class

Since the Institute of Transportation Studies became an organized research unit in 1991, more than 100 students have graduated from UC Davis's multidisciplinary transportation program with undergraduate and advanced degrees. To their new careers as scientists, professors, policy makers, advocates and researchers they have taken perspectives unmatched by few, if any, other universities. They possess a unique blend of technology and policy insight, fostered by their exposure to the Institute's comprehensive program that combines academics, research, and outreach.

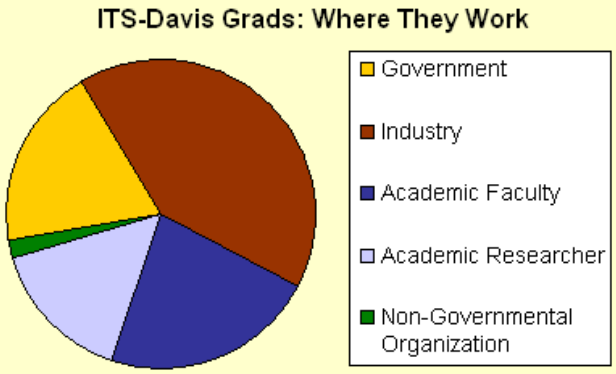
ITS-Davis alumni are designing and building next-generation cars, trucks, buses and trains, and the roads on which they travel. They're researching and developing the fuels on which vehicles run. They're researching, developing and advocating for the policy that frames the environmental footprint of vehicles. And they're studying the behavior of the people who drive the vehicles and the impacts of driver behaviors and decisions on communities and quality of life for all.

Students from around the world come to UC Davis and the Institute to study. Sometimes they take their skills back to their countries or to other countries to effect change in mobility globally, or they remain in the U.S. contributing to this country's cultural palate.

The largest proportion of graduates, 41 percent, have gone on to work in private industry, in companies as diverse as Ford, Nissan, UTC Fuel Cells, Fehr & Peers, and Nokia. The second-largest proportion, 22 percent, are professors in colleges and universities including UC Davis, University of Illinois at Chicago, Georgia Tech, James Madison University, University of Arizona, University of Maine, Clemson University, and Chung-Hua University, Taiwan. Nineteen percent are working in government agencies

including the California Energy Commission, Caltrans and California Air Resources Board, U.S. EPA, and the Federal Highway Administration. Fifteen percent are academic researchers, and a handful are working in non-governmental organizations and advocacy groups.

In this and future issues of e-news, we profile alumni who are putting to practice the skills they learned at UC Davis.



JOLANDA PROZZI
Transportation Technology and Policy, 2000


Jolanda Prozzi

Before Jolanda Prozzi officially graduated from UC Davis in May 2000, she had already received a Master's Degree in Commercial Sciences from the University of Stellenbosch (South Africa), traveled the world, and worked in the public and private sectors. Since receiving her second master's in Transportation Technology and Policy (TTP) from ITS-Davis she has traveled the country, worked again in the public and private sectors, and is now settled into academia as a research associate at the Center for Transportation Research, University of Texas at Austin.

Prozzi conducts applied research in transport economics, with a special emphasis on freight planning and policy, and energy and environmental policy analysis. She says her TTP coursework at ITS-Davis prepared her well for her chosen career path, which has included consulting, policy work and research.

“Being a policy analyst requires a multidisciplinary approach,” she explains. “My studies at UC Davis enabled me to look at transportation systems from a broader perspective,” to understand the effects of policy decisions on transportation systems.

Prozzi chose the TTP program at UC Davis – resulting in a commuter marriage for some time – specifically because it was non-traditional. Unlike many other universities' transportation programs, the ITS-Davis program was not limited to engineering courses. “It was really a privilege to have so many options. I was able to tailor my academic program to exactly the areas I was interested in. I almost had a crisis choosing from all these courses and departments in my area of interest,” she says, now laughing.

She focused on economics and environmental policy, and credits her experience in South Africa and coursework with Scott Roselle in development economics with preparing her for an opportunity that she says “fell in my lap.” Before she knew it, she was working as a consultant transport economist for the World Bank and completing her thesis remotely.

After a year and a half at the World Bank, she realized that she'd rather be doing the work herself than evaluating consultants' work, so she took a position as a transportation analyst at the private consulting firm, Cambridge Systematics. “My work with Dan Sperling, who was also my advisor, helped me secure the job at the consulting firm.” Her ITS-Davis experience and contacts from working on a series of reports on transportation in developing countries funded by the Pew Center on Global Climate Change helped her make the change, she says.

Prozzi looks back at her UC Davis years fondly. “I had a very positive experience at ITS-Davis. The staff was supportive, my advisor was supportive, and all the faculty were excellent.”

With her UC Davis thesis complete, public and private sector experience on her resume, and the commuter marriage growing old, Prozzi opted to move to Austin, where her husband is on the faculty. She accepted her current position at UT in December 2001.

What's her next step? “I've realized with research that you need a Ph.D., and although I don't really see myself going back full time to do it, I may be back! I'm evaluating my options.”

DAVIS HOSTS ANNUAL UCTC CONFERENCE

As this issue of *e-news* comes online, ITS-Davis students are busily preparing for the 10th annual University of California Transportation Center Student Conference, March 11-13. The conference brings together transportation students and faculty from across the UC system to hear and make presentations, exchange ideas, and socialize. Likely presentation topics include travel behavior, infrastructure planning, toll collection, air quality, air and rail transportation, security and finance, alternative fuels, and pavement research.

Sponsored by both the U.S. Department of Transportation (DOT) and Caltrans, UCTC maintains an active program of basic and applied research conducted by University of California faculty and graduate student assistants. All transportation-related programs across the UC system are eligible for research and educational funding from the center. In addition to UC Davis, the primary campuses involved in UCTC activities are those at Los Angeles, Irvine, and Berkeley.

SPARE TIME? WE'VE GOT WORK TO DO! Students' Propane Bus Conversion A Hobby

What do ITS-Davis students do in their free time? Why, they convert vehicles to run on alternative fuels, of course! Chris Congleton and Tod Kershaw, both TTP students, and Kurt Kornbluth (Mechanical & Aeronautical Engineering), have converted a '57 Chevy school bus to run on propane, also known as LPG. Kershaw had previously converted his ‘61 Dodge to propane and also has an old Mercedes that he runs on biodiesel, so this project was a relative snap.

The conversion process took only a few days, although professionals can convert a vehicle in a day or less, Kershaw says. “We removed the gas


Chris Congleton welds under his LPG conversion bus project

tank, the fuel pump, fuel lines and carburetor, and installed a new (used) propane fuel tank and components." The cost of all the parts totaled about $1,000.

This isn't just any old school bus. It was previously converted into an RV of sorts, which Congleton calls a vintage "Skoolie." Like many UC Davis students, Congleton's primary transportation mode is a bicycle, so he uses the Skoolie for storage and occasional outings when the bus carries "a community of people" to an event or retreat.

The primary driver for their project was their concern about air pollution. The converted bus's emissions are about one-third of its original emissions. In addition, they note, more than 90 percent of propane sold in the U.S. is domestically produced or comes from Canada.


Tod Kershaw and Chris Congleton

Development Update

FRIENDS MAKE A DIFFERENCE: 2003 Kickoff a Success

Friends of ITS

Thanks to 57 donors, *Friends of ITS-Davis* raised nearly $45,000 during its inaugural year to support student fellowships and student projects. Credit goes to a generous matching gift program established by an initial $20,000 pledge from General Hydrogen.

"It was down to the wire, but we received 20 donations of $1,000 each to complete General Hydrogen's matching gift pledge," explains Associate Director of Development Renee Pearl.

The Institute thanks the following donors who contributed $1,000 to meet the match:

- Anonymous faculty member
- Geoffrey and Shelagh Ballard
- Norm and Cathie Bryan
- Andy and Mary Jean Burke
- David Burwell
- Paul Craig
- Michael Hart
- David Hosley
- Sotiris Kolokotronis
- Paul and Judith MacCready
- Kathleen McBride
- Peggy Otto
- Neil Otto
- Jake Peters and Katherine Hardiman
- Norm Rogers
- Larry Rudwick
- Diane Simon
- Gary Simon
- Charley Soderquist
- Dan Sperling and Patricia Davis

To learn more about *Friends*, visit the just-launched web site, http://www.its.ucdavis.edu/foits/ completed with the helpful input of *Friends* co-chairs Joshua Cunningham and Trish Hendren. The site is designed to offer a growing number of alumni services and to help alumni to stay connected with each other and the Institute. Through the web site alumni can view alumni notes, easily update their contact information, or make a gift to the *Friends* program.

Gifts to *Friends* can be made anytime using the form available on the web site.

BROAD SUPPORT: Hydrogen Pathways Thrives on Partnerships

A number of corporate and government contributors have renewed their support for the 2004 Hydrogen Pathways program. ITS-Davis is grateful for the support from its 2003 Program Sponsors:

- Air Products and Chemicals, Inc.
- BP America Inc.
- ChevronTexaco
- ConocoPhillips
- ExxonMobil Research and Engineering
- Honda R&D Americas, Inc.
- Hyundai Motor Company
- Nissan Technical Center North America
- Shell Hydrogen (U.S.)
- TOTAL
- Toyota Motor Sales, U.S.A, Inc./Toyota Motor Corporation
- U.S. Department of Energy
- U.S. Department of Transportation

In addition, the Institute has received substantial guidance from numerous experts in academia and industry including: University of Michigan; University of California, Berkeley; Imperial College; PG&E; South Coast AQMD; California Air Resources Board; TIAX; National Hydrogen Association; Electric Drive

Transportation Association; Schatz Energy Group; Humboldt State University; and others.

| ITS-Davis Home | Top | *e-news* archives |

ITS-Davis and Campus Highlights

NEW FACES: INSTITUTE WELCOMES…

ERNIE HOFTYZER, MANAGEMENT SERVICES OFFICER


Ernie Hoftyzer

Ernie Hoftyzer transferred to ITS-Davis in January from the Art and Art History Department where he was responsible for coordinating many of the academic functions within that department and supervising the office staff. As the Institute's chief administrative services officer, Hoftyzer is responsible ITS-Davis's financial administration and human resources. He has worked on campus for seven years, primarily in a bookkeeping capacity for a number of academic departments. A UC Davis graduate, Hoftyzer earned his degree in History in 1991.

JONATHAN HUGHES, HYDROGEN PATHWAYS PROGRAM MANAGER


Jonathan Hughes

Jonathan Hughes is supporting the education and outreach components of the Hydrogen Pathways program, and will manage future vehicle, infrastructure, and demonstration projects. He has a Master's Degree in Materials Science and Engineering from Cornell University, and a B.S. in Mechanical Engineering from Duke University. Previously, he interned in product engineering and manufacturing at General Motors – Delphi Harrison Thermal Systems, and served as a management consultant for Marakon Associates, where he advised clients in industries ranging from semiconductors to pharmaceuticals packaging.

LEARNING OPPORTUNITIES: Seminars Open to All

Each quarter, ITS-Davis sponsors weekly seminars on Thursday from 12:05 – 1:00 p.m. in Kemper Hall, Room 1065. Coffee, tea, and cookies are served. View the current schedule.

The John Muir Institute of the Environment Road Ecology Center also holds weekly seminars on Tuesday from noon – 1:00 p.m., Plant and Environmental Sciences (PES) Building, Room 3001. The series is intended to help develop an integrated understanding of the ecological effects of roads, and to apply these findings to policies that encourage environmentally sound transportation systems. For more information, visit http://johnmuir.ucdavis.edu/road_ecology/index.html

DECREASING OUR BOTTOM LINE: Linking Urban Form with Physical Activity

In November, Prof. Susan Handy gave a plenary talk at the National Physical Activity Conference in Freemantle, Western Australia. Her talk, “Making the Link Between Urban Form and Physical Activity: Perspectives from City Planning,” examined findings from the field of travel behavior research on the impact of the built environment on walking and discussed movements within city planning that may help to increase levels of walking. Concerns over the growing obesity epidemic have focused new attention on the role that city planning and community design play in encouraging or discouraging physical activity.

| ITS-Davis Home | Top | *e-news* archives |