Vol. 3, No. 3

Fall 2007: Stories This Issue

Director's Message Acting Director Mike Cassidy announces new personnel and other changes at ITS.

New Students for Fall 2007 One of the largest classes in memory.

PATH-UTC Conference: Farrell on Sustainable Biofuels: When Technology Outruns Policy

The director of the Transportation Sustainability Research Center told transportation planners and engineers at the PATH-UTC conference that the biofuel industry is undergoing rapid transformation and that public policies need to catch up.

PATH-UTC Conference: Harley on Decadal Changes in Emissions, Overlooked Pollutants that are Gaining Fast

That smell that comes out of bus tailpipes? Its sources was a centerpiece of Robert Harley's presentation. Harley, a Professor of Civil and Environmental Engineering and the most recent addition to the ITS Advisory Council, has been measuring emissions in the East Bay's Caldecott Tunnel for more than a decade. The reason for that smell swirling out diesel engine tailpipes? Aldehydes.

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Director's Message

Michael Cassidy

As Samer Madanat is on sabbatical leave for the coming year, I have the pleasure of stepping in—temporarily—as Acting Director of ITS. Notwithstanding Samer’s repeated claims (to me) that his big shoes are impossible to fill, the Institute continues to move forward, and a number of very positive happenings have transpired in recent months. I’ll take this opportunity to report briefly on just a few of these: they concern additions in senior staff and our library.

As regards the first matter, I’m happy to announce that Tom West has joined the Institute as the new Director of CCIT. Tom comes to us with a distinguished record of service at Caltrans, particularly in the areas of technology application to transport systems. Most recently, he helped lead the Governor’s "Go California" initiative to develop forward-looking transportation and land-use policies for the state.

I’m also delighted to report that Laura Melendy has taken the helm as the new Director of our Technology Transfer Program. Laura too brings with her a rich background in transport. She is an alumna of Berkeley’s graduate program in transportation, she has considerable management experience, and for the last three years she has been Tech Transfer's Communications Director.

Finally, let me call attention to the fund raising campaign now underway for our Harmer E. Davis Transportation Library. Those of us connected in any way with the Institute know what a priceless resource we have in the library—and in its knowledgeable (and helpful!) staff. Perhaps less known to many of us are the library's ongoing efforts to enhance the accessibility of its collection by going digital. These efforts bring new challenges—and added expenses. Thus our fund raising campaign is a call to all of us who have benefited so much from the library: donations are needed now more than ever. (For information on how you can give, see the Library's donations page or the recent article in the ITS Review detailing specific library "wish list" items).

With the fresh perspectives and energies brought by our new center directors, along with the ongoing enhancements to our library, and combined with the continued support of our community at large, ITS is poised to continue its service long into the future. (This assumes, of course, that Samer Madanat doesn't extend his sabbatical and leave me in charge for too long!)

Best regards,
Michael Cassidy

When Technology Outruns Policy: Biofuels Policy Must Go Beyond the Agribusiness Model

The director of the Transportation Sustainability Research Center told transportation planners and engineers at last month's PATH-UTC conference that the biofuel industry is undergoing rapid transformation and that public policies need to catch up.

"Current policies are simply agricultural policies with a new name," said Associate Professor Alex Farrell, referring to federal subsidies for ethanol production. He noted that other industries can't rely on subsidies and mandates, but those in the biofuel industry "assume they'll be helped out."

Ethanol, the biofuel that accounts for about three percent of the nation's fuel, has powerful partisans: President Bush has predicted that ethanol will replace gasoline, and Congress has mandated doubling its production. The corn lobby has successfully wrangled from Congress some $5.7 billion in federal tax credits for Midwest corn growers over the next five years.

Ethanol, or moonshine, seemed a quick fix back in the 1970s when oil prices skyrocketed and long gas lines formed. But moonshine, said Farrell, is "not the answer today."

"My answer is, I like the molecules we have today—hydrocarbons. I could take you right now to 10 or 11 different laboratories right here where they are trying to derive hydrocarbons, not ethanol, from biofuels."

Farrell cited the environmental destruction caused by growing corn, both directly and indirectly. He ticked off soil erosion, the loss of biodiversity, even a large increase in greenhouse gas emissions.

While tailpipe emissions may go down with ethanol, he explained, burning rain forests to make more land available for corn production creates greenhouse gases. "So many greenhouse gases, in fact, that the use of corn-based ethanol leads to higher concentrations, not lower concentrations, of greenhouse gases over an extended period, maybe 30 to 50 years."

Feedstocks that use degraded land or no land require advanced technologies

- Ligno-cellulosic fermentation
- Gasification & synthesis
- Fast Pyrolysis
- Algae

Farrell said the global competition for land use will not permit the large-scale production of corn ethanol. Rather, it will be necessary to create fuel from feedstock grown on degraded or marginal land that cannot be used for growing food.

"What we're going for is an industry that produces biofuels with no or little arable land."

As examples, he pointed to the use of stover (the leaves and stalks of corn or soybean plants left in fields after harvest) and municipal solid waste as biofuels that can be produced without using land needed for growing food. He predicted that with advanced production technologies using feedstocks other than corn or sugar cane, the costs of feedstock will go down, but capital costs will go up, at least initially.

"The technological drive is in exactly the right direction and one in which policy should be going," he added.

Some European countries have moved more quickly to apply biofuel mandates and require sustainable biofuel sourcing requirements. Even in the U.S. there have been several bills in Congress aimed at implementing better rules and policies.

He concluded by telling the audience

- that the biofuel industry will probably become much larger but be quite different from what it is today;
- that today's biofuel producers have opportunities to begin the transition to a sustainable industry;
- that advanced biofuel research will rely on wastes and residues, cellulosic crops suited to degraded land, and factory-produced biofuels such as algae; and
- that public policies are beginning to move from agricultural support to environmental performance and rural development.

Ooo-ooo, That Smell: An Overlooked Set of Pollutants Is Gaining Fast

When Lee Schipper, visiting scholar at the Center for Global Metropolitan Studies and former Director of EMBARG, made his introduction for the session on alternative fuels at the PATH-UTC Conference, he commented on the stinky exhaust he was forced to inhale as he bicycled to the conference's Berkeley Marina site behind an AC Transit bus.

The source of the stench was a centerpiece of Robert Harley's presentation, the third in the series. Harley, a Professor of Civil and Environmental Engineering and the most recent addition to the ITS Advisory Council, has been measuring emissions in the East Bay's Caldecott Tunnel for more than a decade. The reason for that smell swirling out diesel engine tailpipes?

Aldehydes are among a set of major air pollutants that have been overlooked with all the attention on passenger cars emissions and their role in air pollution problems, he explained.

West Fan Room

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Aldehydes have been overlooked in many discussions of the impacts of vehicle emissions.

"One is the question of gross polluters. Over time, as vehicles have become cleaner, what we're left with is not a uniformly distributed problem, but a few broken, malfunctioning, high-emitting vehicles that contribute a big proportion of pollutants.

"Historically, we thought that 10 percent of the vehicles were responsible for half the emissions. That distribution has gotten more skewed so that a small percentage of vehicles on the road are responsible for three-quarters of the pollutant emissions."

Diesel emissions from freight traffic are also a big problem, he said, and they "have really been neglected in the past relative to the effort devoted to gasoline and passenger vehicles. Especially in areas where there are rapidly growing parts, the amount of increase in diesel truck traffic and the corresponding burden on surrounding communities are really unconscionable."

Another question is how this plays into current concerns about climate change, he said.

Beyond CO2 there are other important pollutants that need to be accounted for: nitrogen oxides, which lead to urban smog as well as increases in global background ozone levels, and soot particles are two more examples of climate-forcing emissions from motor vehicles.

Because of improvements in fuel efficiency and engine technologies, light-duty gasoline vehicle NOx emissions have dropped steadily at the rate of about seven percent a year, enough to more than offset the increased amount of fuel burned over that time.

Not so for diesel. "The diesel shows a much lower slope over time. . . . So that actual NOx emissions from diesel are roughly unchanged."

Fine particles, or PM2.5, a class of particulates that can be inhaled deeply into the lungs, is another concern. There has been some progress with those, as well.

Now, for that smell. It comes in part from aldehydes, a subset of a larger group of pollutants known as volatile organic compounds (VOCs).

"These include unburned fuel and partial oxidation products. We worry about these pollutants because they contribute to urban smog. If you look at the emission inventories, they say that gasoline engines dominate diesel as a VOC source."

So what did Lee Schipper smell?

"It's not the particles. We're finding large amounts of aldehydes in diesel emissions, and that is a concern. They are toxic and acid-smelling. Furthermore, Harley added, they are not measured properly in federal regulatory measurements so that they are 'largely invisible.'

"Finally, aldehydes are a significant source of aldehydes, which are reactive, toxic and malodorous."

PDF of article
A Diverse Group of New Students

ITS welcomed its largest group of graduate students in recent memory this fall. The 37 grad students pursuing Masters or Phd degrees hail from eight countries including the United States.

The largest contingent is U.S. students, who number 15 and come from seven states, including seven from California. Florida, Ohio, Oregon, South Carolina, West Virginia and Virginia are also represented.

Foreign students include eight from China, five from South Korea, three from India and two from Greece. An additional three are natives of Turkey, France and Lebanon.

Most have received graduate research positions with ITS professors and researchers, and are well on their way through the first semester. For photos of the newbies, go here.

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