

## Transportation and Sustainability at Cornell University

Results of a topical lunch, May 13, 2009

Draft notes by Rolf Pendall, City and Regional Planning

### Attendance:

Agrawal, Anurag (CCSF and EEB)

Chabot, Brian (EEB)

Dieterich, David (CCSF)

Donaghy, Kieran (CRP)

Forsyth, Ann (CRP)

Freedman, Matt (Industrial and Labor Relations—Labor Economics)

Levitte, Yael (CU-ADVANCE, CRP field)

McDonald, Megan (Center for Computational Sustainability)

Pendall, Rolf (CRP)

Schember, Helene (CCSF)

Turnquist, Mark (CEE)

Vanek, Francis (CEE)

Zhang, Max (MAE)

### Not attending but interested:

Bento, Antonio (AEM)

Gao, Huaizhu (Oliver) (CEE)

George, Al (MAE)

Nozick, Linda (CEE)

The meeting revealed that there are at least four main clusters of expertise and interest in sustainable transportation research and teaching at Cornell University. (Other connections may also emerge as we publicize the significance of transportation research and teaching at Cornell.) It also suggested that better connections might be built among these clusters to create what one participant (Donaghy) called a “system of systems” approach.

First, there are **energy researchers** whose work involves transportation. Max Zhang (MAE) does work on distributed energy systems; plug-in hybrids; and the impact of airborne particulates and gaseous pollutants on air quality, climate change and ecosystems. Francis Vanek, CEE, studies the use of energy in transportation systems and teaches Future Transportation Technologies and Systems (CEE 4630). The Cornell Fuel Cell Institute (CFCI, <http://cfci.ccmr.cornell.edu/index.html>) does work with very direct application to transportation technology. The university’s initiatives in biofuels also potentially contribute to transportation through development of cellulosic ethanol as a transportation fuel (see <http://www.news.cornell.edu/stories/April09/biofuels.lab.tb.html>).

Second, some researchers do work directly on **vehicles**. Huaizhu (Oliver) Gao (CEE) does work on the efficiency and operation of diesel engines, connecting his work with Max Zhang’s work on pollutants and air quality. Gao has also done work on buyers’ preferences for hybrid vehicles and on transportation’s contribution to ozone/NOx cycles. Albert George (MAE), a specialist in aerodynamics and heat transfer, is one of the

leaders of Cornell's initiative to win the automotive X Prize and more generally "to help develop a new form of automobile that will reduce global non-renewable power consumption and harmful emissions" (<http://www.cornellxp.com/>).

Third, a group of researchers works on the performance and operation of **transportation systems**. Mark Turnquist and Linda Nozick, both of CEE, have specialized in freight systems, especially on the security of freight operations; Turnquist and Nozick also have interests in and have received funding to study natural disasters and transportation and civil infrastructure systems more generally. Francis Vanek, also of CEE, has specialized in energy efficiency of surface freight transportation systems. Kieran Donaghy (CRP) studies logistics and inter-regional trade as part of his broader interest in constructing, estimating, and simulating nonlinear dynamic systems models. Various researchers in Operations Research and Industrial Engineering, especially Huseyin Topaloglu and David Shmoys, conduct research either directly or indirectly applicable to transportation; Topaloglu's recent work has concerned commodity flows and fleet management. Zhang and Vanek both overlap here in their integration of energy and transportation infrastructure, looking to the future in thinking about the relationship between distributed power and vehicles that rely on electricity. The Cornell Center for Computational Sustainability also has the potential to bring researchers together for modeling and simulating transportation systems.

Fourth, a few researchers work on the **built environment and settlement patterns** in ways that directly take account of the relationship between land use, transportation, travel behavior, energy and the environment. Ann Forsyth's (CRP) work on micro-level urban design has developed standard measurements for the characterization of urban form at the scale of blocks and neighborhoods and linked these measurements with levels of physical activity (walking and bicycling). Rolf Pendall's (CRP) work, at the meso-scale of counties and regions, investigates the relationships between density, mixed use, and transportation infrastructure and the ways in which public policies emerge and influence the transportation-land use connection. Antonio Bento (AEM) has published and continues to conduct research linking the built environment with vehicle miles traveled. Matt Freedman (ILR-LE) does work on the spatial mismatch: that is, the ways in which residences of workers (especially low-income and minority workers) fail to align with their employment opportunities. Freedman's work also investigates how social institutions help overcome spatial mismatch.

The wide-ranging discussion generated several ideas about how these currently dispersed activities might be brought together more coherently.

- Most aggressively, a university transportation center might be a goal. UTCs capture a significant amount of research funding, raise visibility of transportation, and perform service for state and federal transportation agencies. The Safe, Accountable, Flexible, Efficient Transportation Equity Act, enacted on August 10, 2005, authorized up to \$76.7 million per year from Federal FY2005-2009 funds for grants to establish and operate up to 60 UTCs throughout the United States. (More information is available at [http://utc.dot.gov/utc\\_safetea-lu.html](http://utc.dot.gov/utc_safetea-lu.html); the full list is worth looking at because it lists the themes undertaken by each UTC.

Eight of the 60 centers have the word “sustainable” or “sustainability” in their titles.) Forty centers were named in the legislation, and another 20 were selected competitively. *Only one of these centers is in New York State*, compared with five in California and three in Florida. Ten centers receive between \$2 million and \$3.5 million per year; 25 receive between \$1 and \$2.5 million annually. Among these 25 are 15 that were designated in the legislation and 10 awarded regionally. Region 2, headed by CUNY, includes New Jersey, New York, Puerto Rico, and the U.S. Virgin Islands. The other centers receive less than \$1 million annually. **The next round of UTCs—if there is one—will be selected after approval of the next big federal transportation bill, expected to emerge in 2009-10.**

- A list of transportation-related courses could be developed and publicized on various university web sites, including a link on the CCSF home page.
- A follow-up meeting among faculty in Civil and Environmental Engineering and City and Regional Planning could help establish the framework for a higher-visibility program in sustainable transportation systems. Strategies may include the development and redesign of course curricula and applications for cluster hires (bridge funding) through CCSF. (Note: Turnquist and Pendall met early in June to begin this conversation, and discussions continued over the summer.)
- A semester- or year-long series of meetings could be devoted to (a) further articulation of a sustainable transportation research and teaching agenda for Cornell, and / or (b) presentations by Cornell and visiting faculty on research connecting transportation, the environment, and society.