

## Program Progress Performance Report for University Transportation Centers

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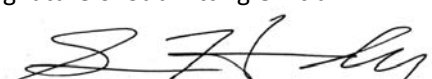
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## ACCOMPLISHMENTS

### *What are the major goals of the program?*

The National Center for Sustainable Transportation (NCST) is led by the University of California, Davis (UC Davis) and brings together the expertise of its consortium members: Georgia Institute of Technology (Georgia Tech); University of Southern California with California State University, Long Beach (METRANS); University of California, Riverside (UC Riverside); and University of Vermont.

The goal of the NCST is to transform the transportation system to improve environmental sustainability nationwide. We aim to provide leadership that produces meaningful action and outcomes by mobilizing innovative and accomplished research teams and partnering with influential individuals and stakeholder groups. To provide this leadership, we are building upon the well-established and highly influential transportation centers in our consortium to develop a self-supporting center that grows influential research and education programs fully integrated with an aggressive program of engagement.

The NCST is:

- mobilizing a network of universities to generate knowledge and tools that address climate change and environmental sustainability in transportation;
- designing and evaluating real-world strategies that contribute to mitigation of GHG emissions and other environmental impacts; and
- delivering knowledge and tools to state DOTs, Metropolitan Planning Organization (MPOs), and local governments to support implementation of these real-world strategies.

### *What was accomplished under these goals?*

The NCST completed the following administrative tasks and research, engagement, and education activities to implement our goals during the reporting period of April 1, 2015 to September 30, 2015:

#### **Administrative Tasks:**

- 1) The NCST hosted four teleconferences with the Executive Committee and a joint Executive Committee and Leadership Council meeting at Annual Meeting of the Transportation Research Board in Washington, D.C. on January 13, 2015
- 2) UC Davis gathered external reviews by academics and agency/industry subject matter experts for the internal proposals submitted for both Federal and Caltrans matching funds. At the completion of the review and selection process, all five of the Federal projects were selected at some level of funding (some slightly less than requested). 11 proposals were submitted for Caltrans funding, of which, seven were selected for

funding. An additional project focusing on freight transportation was funded, with the goal of producing 2 white papers from UC Davis and 3 white papers from USC and UC Riverside. We are in the process of executing the new Task Order agreements with Caltrans, and we expect the new projects to start between Oct. 2015 and January 2016.

- 3) UC Riverside gathered reviews for their Federal and Caltrans proposals. Of the two Caltrans proposals, one was selected for funding. Caltrans is also funding a project to write whitepapers on freight transportation, two of the five white papers in the project will be written by UCR researchers. In addition, UC Riverside will begin two additional projects using Federal funds.
- 4) METTRANS received six proposals for Year 2 Caltrans RFP, of which four were selected for funding. In addition, they received funding for an additional project focused on freight in collaboration with UC Davis and UC Riverside. METTRANS will host their biennial International Urban Freight Conference to be held October 21 – 23, 2015 in Long Beach.
- 5) Georgia Tech has selected projects for Year 2, including federally funded projects and projects funded by the Georgia Department of Transportation.
- 6) The University of Vermont has launched two new federally funded projects, both of which launched in summer 2015.
- 7) The California schools are working together to pursue additional matching funds from the South Coast Air Quality Management District.

### **Research Activities:**

Across the six partner institutions, we planned for 13 White Papers from year 1 Federal and Caltrans funding, as listed below and at <http://ncst.ucdavis.edu/research/white-papers/>. Of these 13 original white papers, nine are complete, and the remaining 4 are in final draft stages. For year 2, we have added an additional five white papers funded by Caltrans focused on the California Sustainable Freight Strategy (CSFS) to be developed as a collaboration between UC Davis, UC Riverside, and University of Southern California. In addition, UC Davis has funded three additional white papers, one in conjunction with UC Riverside and one with Georgia Tech; USC has funded one additional white paper, and CSU Long Beach has funded one additional white paper. Three of the new white papers launched this summer, with the rest starting in the next reporting period.

Of the 33 year 1 research projects (from all campus partners and funding sources), three have been completed. Many of the projects that are still on-going have already produced papers for publication and presentation, as detailed in the sections below. Work continues on the Year 1 Caltrans projects launched last fall, with several receiving no-cost extensions into the next reporting period.

This summer, we conducted a call for proposals and requested external reviews for new

projects funded with both US DOT funds at all schools and Caltrans funds for the California-based schools. This process led to the selection of 9 new US DOT-funded research projects, so far, and 11 new Caltrans-funded research projects using Year 2 funds. Most of these will launch in the next reporting period, though four have already started.

Many research projects involve collaborations across partner institutions, and all projects incorporate technology transfer activities designed to link research to policy and practice. Examples include the following:

The “Climate Adaptation for State DOTs and Local Agencies” project at UVM developed a new framework for conceptualizing the climate adaptation process. In addition to disseminating this work through traditional venues such as the TRB Annual Meeting and the Transportation Research Record, the research team has specifically targeted dissemination to state and local policy makers. These dissemination efforts include presenting with the Vermont State Agency of Transportation at the UVM Legislative Summit which include nearly a third of Vermont’s legislators and 11 state agency representatives and with the Vermont, Washington and New York State Agency/Departments of Transportation as the kickoff of NCST webinar series.

This project also resulted in new relationships with between the University of Vermont and the Washington and New York State DOTs and the Sacramento Area Council of Governments (SACOG). NYSDOT and WSDOT participated in a panel discussion of the project team’s adaptation framework. In addition the project team interviewed representatives of over a dozen transportation agencies across the country while developing this framework, laying groundwork for future partnerships. SACOG will be sharing model data with the team as part of a follow-up NCST funded project entitled “Assessing Network Criticality for Climate Adaptation Planning.”

At Georgia Tech, the Fuel and Emissions Calculator has been validated with real-world data. The online version of the FEC has been launched: [fec.ce.gatech.edu](http://fec.ce.gatech.edu). Their MOVES-Matrix is seeking regulatory approval from EPA. The project team transferred the VT MOVES-Matrix to University of Vermont along with the case study guide, and it developed linkage between VISSIM and MOVES-Matrix for near-real time emissions estimation. The paper has been accepted for presentation at the 2016 TRB conference.

*Table 1: List of Year 1 White Papers*

<b>University</b>	<b>Title</b>	<b>Status</b>
UCD	The Role of Life Cycle Assessment in Reducing Greenhouse Gas Emissions from Road Construction and Maintenance	Completed
UCD	Strategies for Transitioning to Zero-Emission Passenger Vehicles	In Progress
UCD	Strategies for Transitioning to Low-Carbon Emission Trucks in the United States	Completed
UCD	“Actual Results May Vary”: A Behavioral Review of Eco-Driving for Policy Makers	Completed
UCD	Working Toward a Policy Framework for Reducing GHG Emissions in the Transportation Sector	Draft Submitted
UCD	A Funding Compromise Can Set Transportation on Path Towards Sustainability	Completed
UCD	Measuring Land Use Performance: Policy, Plan, and Outcome	Completed
UCD & GT	Future of Passenger Travel Demand in the U.S.	In Progress
UCD	The Effect of Land Use Policies and Infrastructure Investments on How Much We Drive: A Practitioner’s Guide to the Literature	Completed
GT	Eco-Driving to Reduce Emissions (buses)	In Progress
UVM	Challenges and Opportunities for Integrating Climate Adaptation Efforts across State, Regional and Local Transportation Agencies	Completed
UCR	Reducing Carbon Footprint of Freight Movement through Eco-Driving Programs for Heavy-Duty Trucks	Completed
UCR	Managing Roadway Systems to Reduce GHG Emissions and Improve Energy Efficiency	Completed

Table 2: List of Year 2 White Papers

University	Title	Status
UCD & GT	You Can Get There From Here: New Perspectives on Transportation Equity	Launched
UCD & UCR	Environmental Impacts of Autonomous Vehicles	Launched
UCD	Supporting Sustainable Transportation: Redefining State Practices for Allocating Transportation Funding in California	Launched
UCD	Freight Efficiency 1: Maximizing Assets, Off Peak Strategies (Caltrans)	To begin in next reporting period
UCD	Freight Efficiency 2: Collaborative Logistics (Caltrans)	To begin in next reporting period
USC & UCR	Freight Efficiency 3: Information Technology (Caltrans)	To begin in next reporting period
USC & UCR	Freight Efficiency 4: Hub Modernization (Caltrans)	To begin in next reporting period
USC & UCR	Freight Efficiency 5: Planning and Policy Harmonization (Caltrans)	To begin in next reporting period
USC	The Sustainability of Building Affordable Housing in Transit Oriented Developments (TODs) (Caltrans)	To begin in next reporting period
CSULB	Introducing Resilience into the State Transportation Network (Caltrans)	To begin in next reporting period

Table 3: List of Year 1 Research Projects

University	Title	Status
UCD	Exploring Unintended Environmental and Social-Equity Consequences of Transit Oriented Development Using a Spatial Economic Land Use and Activity-Based Microsimulation Model (Caltrans)	Draft Submitted
UCD	Do California Highways Act as Barriers to Gene Flow for Ground-Dwelling Mammals? (Caltrans)	In progress
UCD	Designing and Analyzing Policies for Renewable Fuels	Draft Submitted
UCD	Design and Analysis of Feebate Policies for Sustainable ZEV and Other Low Carbon Vehicle Market Development in California and Other States	Draft Submitted
UCD	The Role of Environmental Concerns, Lifestyles, Mobility-Related Attitudes and Peers' Influence in Affecting Travel Behavior and Aspirations Towards the Purchase of Private Vehicles of Young Adults in California	Draft Submitted
UCD	Bicyclist Behavior in San Francisco: A Before-and-After Study of the Impact of Infrastructure Investments	In progress
UCD	Evaluation of the Combined Effect of Recycled Asphalt Pavement (RAP), Recycled Asphalt Shingles (RAS), and Different Virgin Binder Sources on Performance of the Blended Binder for Mixes with Higher Percentages of RAP and RAS (Caltrans)	In progress
UCD	Program for Vehicle Regulatory Reform: Assessing Life Cycle-Based Greenhouse Gas Standards	In progress
UCD	Structural Determinants of Electric Vehicle Market Growth	In progress
UCD	The Dynamics of Plug-In Electric Vehicles in the Secondary Market and Their Implications for Vehicle Demand, Durability, and Emissions (CARB)	In progress
UCD	The Development of Lifecycle Data for Hydrogen Fuel Production and Delivery (CARB)	In progress
UCD	Potential to Build Current Natural Gas Infrastructure to Accommodate the Future Conversion to Near-Zero Transportation Technology (CARB)	In progress
UCD	Assessment of Critical Barriers to Alternative and Renewable Fuel and Vehicle Deployment (CEC)	In progress



UCD	Accelerating Commercialization of Alternative and Renewable Fuels and Vehicles (CEC)	In progress
UCD	Electric Vehicle Consumers in China (PostDoc)	In progress
UCD	Understanding factors that lead to electric bicycles for Bay Area users with children (PostDoc)	Draft submitted
GT	Strategies for Reducing Emissions from Heavy Duty Vehicles – Online GHG Calculator for Heavy-Duty Vehicles	In progress
GT	Improved Emissions Models for Project Evaluation	In progress
GT	Eco-Driving for Transit Vehicles (including white paper)	In progress
GT	Using Technology to Expand Mobility Options – Innovative Data Collection to Improve Transit Service Assessment	In progress
UCR	Using Connected Vehicle Technology for Advanced Signal Control Strategies	In progress
UCR	Advanced Energy Management Strategy Development for Plug-in Hybrid Electric Vehicles	In progress
UCR	Environmentally Friendly Driving Feedback Systems Research and Development for Heavy Duty Trucks (Caltrans)	In progress
UCR & USC & UCD	Eco-Friendly Intelligent Transportation System Technology for Freight Vehicles (CEC)	Launched
USC	Reducing Truck Emissions and Improving Truck Fuel Economy via ITS Technologies	In progress
USC	Routing Strategies for Efficient Deployment of Alternative Fuel Vehicles for Freight Delivery	In progress
USC	Urban Spatial Structure and the Potential for Vehicle Miles Travelled (VMT) Reduction (Caltrans)	In progress
USC	Spatial dynamics of the logistics industry and implications for freight flows (Caltrans)	In progress
USC	Integrating Management of Truck and Rail Systems in Los Angeles (Volvo)	In progress
USC	Modeling for Local Impact Analysis (Volvo)	In progress
CSULB	Impact of Legislative Mandates on Transportation Workforce Capacity	In progress
UVM	Intercity Travel in Northeastern Non-Metropolitan Regions: What Roles do Information Access and Technology Services Play in Public and Shared Transport Modes?	In progress

*Table 4: List of Completed Research Projects*

University	Completed Projects	Status
UCD	The Application of Permeable Pavement with Emphasis on Successful Design, Water Quality Benefits, and Identification of Knowledge and Data Gaps for Sustainable Transportation (Caltrans)	Completed

*Table 5: List of Newly Selected Research Projects*

University	Title	Status
UCD	High Impact Prioritization of Bike Share Program Investment to Improve Underserved Communities' Access to Jobs and Essential Services	To begin in next reporting period
UCD	Highway and Ecosystem Monitoring and Adaptation to Sea Level Rise	To begin in next reporting period
UCD	Stochastic multi-agent optimization model for addressing risk and equity issues in sustainable transportation energy system planning	To begin in next reporting period
UCR	Cloud Forming Potential of Aerosol from Light-Duty Gasoline Direct Injection Vehicles	Launched
UCR	Evaluating the Viability of Dimethyl Carbonate as an Alternative Fuel for the Transportation Sector	Launched
CSULB	Analysis and Optimization Methods for Centralized Processing of Chassis	To begin in next reporting period
USC	Sustainability and Displacement: Assessing the Spatial Pattern of residential Moves near Rail Transit	To begin in next reporting period
UCD	Tracking Land Use Changes That Support Sustainable Mobility (Caltrans)	To begin in next reporting period
UCD	The Impact of Residential Location, Lifestyles and Emerging Technologies on the Travel Behavior and Vehicle Ownership of Young Adults ("Millennials") in California (Caltrans)	To begin in next reporting period
UCD	Warehousing and Distribution Center Facilities in Southern California: The Use of the Commodity Flow Survey Microdata to Identify Logistics Sprawl and Freight Generation Patterns (Caltrans)	To begin in next reporting period

UCD	The Effect that State and Federal Housing Policies on Vehicle Miles of Travel (Caltrans)	To begin in next reporting period
UCD	Dynamic Ridesharing: Simulation of System-Level Travel Effects Using Agent-Based Demand and Supply Models in the Sacramento Region (Caltrans)	To begin in next reporting period
UCD	Using noninvasive genetics to compare how a California freeway affects gene flow in a disturbance averse versus a disturbance-tolerant species (Caltrans)	To begin in next reporting period
UCD	Deployment of Sustainable Fueling/Charging Systems at California Highway Safety Rest Areas (Caltrans)	To begin in next reporting period
UCR	Walking in Fresh Air: Pedestrian Routing with Consideration of Exposure to Traffic-Related Air Pollution (Caltrans)	To begin in next reporting period
CSULB	Introducing the Resilience into the State Transportation Network (Caltrans)	To begin in next reporting period
CSULB	Sustainable Mitigation of stormwater runoff through fully permeable pavement (Caltrans)	To begin in next reporting period
USC	Congestion Reduction through Efficient Empty Container Movement (Caltrans)	To begin in next reporting period
UVM	Advancing Models of Intercity Travel: Overnight Models and Mobile Device Data	Launched
UVM	Assessing Network Criticality for Climate Adaptation Planning	Launched

### Engagement Activities:

The following tables highlight the range of engagement activities including meetings, presentations, sponsored events, and media and online engagement.

*Table 6: List of NCST Presentations*

Date	Title	Speaker(s)	Event	Location
4/8/15	<i>Presentation on the National Center for Sustainable Transportation</i>	Susan Handy, UC Davis	Congressman John Garamendi Transportation Forum	UC Davis Campus

4/29/15	<i>Strategies for Transitioning to Low Carbon Emission Freight Vehicles</i>	Lew Fulton, UC Davis	Caltrans Planning Horizons Seminars	Sacramento, CA
4/30/15	<i>The Impact of Residential Location, Lifestyles and Emerging Technologies on the Travel Behavior and Vehicle Ownership of Young Adults (“Millennials”) in California</i>	Giovanni Circella, UC Davis	California Department of Transportation Lecture/ Seminar	Sacramento
April 2015	<i>Topic: Online GHG Calculator for Heavy-Duty Vehicles</i>	Panel Presentation	Georgia Tech Energy Series, Energy and Urbanization	Georgia Tech
5/14/15	<i>The Impact of Residential Location, Lifestyles and Emerging Technologies on the Travel Behavior and Vehicle Ownership of Young Adults (“Millennials”) in California</i>	Giovanni Circella, UC Davis	UC Davis Postdoc Research Symposium	Davis, CA
5/15/15	<i>The opportunities for shared-use mobility to help California meet its climate goals</i>	Dan Sperling, UC Davis	Legislative Briefing organized by the Natural Resource Defense Council	Sacramento, CA
5/22/15	<i>The Performance and Prospects of California’s Low-Carbon Fuel Standard</i>	Sonia Yeh and Dan Sperling, UC Davis	Controlling Greenhouse Gas Emissions from Transport Fuels Workshop	UCLA
5/28/15	<i>Transportation Futures for Deep Greenhouse Gas Reductions</i>	Caroline Rodier, UC Davis	Caltrans Research Seminar	Sacramento, CA
6/1/15 – 6/3/15	Presentation on NCST engagement best practices, lessons learned, and challenges	Laura Podolsky, UC Davis	CUTC Conference	New Jersey
6/22/15 – 6/25/15	<i>Environmental Quality to Climate</i>	Randall Guensler, Georgia Tech	A&WMA’s 108th Annual Conference & Exhibition Connecting the Dots	Raleigh Convention Center, NC

7/8/15	<i>Effects of cycle-life on the life cycle of EV traction batteries</i>	Hanjiro Ambrose, UC Davis	International Society of Industrial Ecology Conference 2015	Guildford, UK
7/9/15	<i>Using uncertainty analysis to guide LCA System boundary selection: Passenger vehicle GHG emissions as case study</i>	Lindsay Price, UC Davis	International Society of Industrial Ecology Conference 2015	Guildford, UK
7/24/15	<i>Lifestyles, Residential Location, Adoption of Emerging Technologies and Social Networks, Car Ownership and Mobility Choices of Millennials in California</i>	Giovanni Circella, L. Fulton, A. Berliner, F. Alemi, P. Mokhtarian, S. Handy, UC Davis	Frontiers in Transportations 2015 – An Update on Social Networks and Travel	Windsor, UK
8/24/15 – 8/26/15	<i>California's Surface Transportation System: Vulnerabilities, Resilience Options, and Research Needs</i>	Deb Niemeier, UC Davis	California Climate Adaption Conference	Sacramento, CA
8/26/15	<i>Strategies for Transitioning to Low Carbon Emission Freight Vehicles</i>	Lew Fulton, UC Davis	Clean Air Dialog	Sacramento, CA
9/15/15 - 9/18/15	<i>A Novel Blended Real-time Energy Management Strategy for Plug-in Hybrid Electric Vehicle Commute Trips</i>	Guoyuan Wu, UC Riverside	2015 IEEE Conference on Intelligent Transportation Systems	Canary Islands, Spain
9/17/15	<i>Presentation on NCST research and implications to cities and counties</i>	Laura Podolsky, UC Davis	CA State Association of Counties Transportation Committee	Sacramento, CA
9/23/15	<i>Equity Considerations for Bike Share Programs</i>	Susan Handy, UC Davis	Advancing Bicycling in the Capital Region Conference	Sacramento, CA

Table 7: NCST Sponsored Events

<b>Date</b>	<b>Event Name</b>	<b>Description</b>	<b>Organizer</b>	<b>Location</b>
4/9/15	Integrating Climate Adaptation Efforts across State, Regional, and Local Transportation Agencies	Webinar releasing the first NCST white paper featuring presentation by Lisa Aultman-Hall and Jonathan Dowd with UVM, and special respondents representing WSDOT, NYSDOT, and Vtrans.	UC Davis	Webinar
4/22/15	Transportation Funding at a Crossroads: What will it take to deliver a 21 <sup>st</sup> Century Transportation System?	Policy forum on near and long term transportation funding solutions featuring Steven Cliff (Caltrans) as moderator and presentations by Deb Niemeier (UC Davis), Will Kempton (CA Transportation Commission), and Ron Milam (Fehr & Peers).	UC Davis with SACOG and Caltrans	Sacramento, CA
4/30/15	Strategies for Transitioning to Zero-Emission Freight Vehicles	Webinar releasing NCST white paper featuring presentations by Lew Fulton and Marshal Miller; and special respondents from CA Air Resources Board and CALSTART.	UC Davis	Webinar
5/6/15 – 5/8/15	Transportation for Sustainability – An International Conference	Three-day conference promoting international cooperation and sustainability through transportation systems.	TRB Standing Committee on Transportation and Sustainability	Washington, D.C.
5/8/15	Transportation System Optimization Workshop	Researchers Michael Zhang and Yueyue Fan from UC Davis spoke at this event.	METRANS	USC Campus
5/12/15	Freight and Sustainable Communities Forum	All-day event bringing together local, regional, and state leaders and practitioners from the private and public sector to discuss the expanding role of freight and implications for the economy, environment, and society.	UC Davis, UC Riverside	Riverside, CA

6/11/15	Reducing Life Cycle Greenhouse Gas (GHG) Emissions from Road Construction and Maintenance	Presentation by John Harvey and Alissa Kendall featuring special guest respondents from National Asphalt Pavement Association and Caltrans.	UC Davis	Webinar
7/24/15	Envisioning Automated Vehicles in the Built Environment: 2020, 2035, 2050	This event brought together a mixed group of academics and professionals to discuss the impact of automated and connected vehicles on the built environment, mainly focusing on the Michigan region	TRB	Ann Harbor, Michigan
6/25/15	Eco-Driving to Reduce Emissions – Cars	Presentation by Ken Kurani and Angela Sanguinetti from UC Davis.	UC Davis	Webinar
8/18/15 – 8/21/15	Biennial Asilomar Conference on Transportation and Energy	Biennial conference addressing current energy and transportation issues organized under the auspices of the TRB Energy and Alternative Fuels Committees	UC Davis	Pacific Grove, CA
9/17/15	STEPS Emerging Tech Forum – Biofuels	Forum brought together stakeholders from industry, government, and academia to discuss technical progress to date, deployments, critical barriers, and opportunities to boost production.	UC Davis, CEC	UC Davis Campus

Table 8: NCST Meetings

Date	Purpose and Description:	Location
4/2/15	UC Davis researchers met with leadership from the California Trucking Association to share current research findings, discuss challenges facing industry, and identify future research needs.	UC Davis Campus
4/21/15	NCST Executive Committee Conference Call	NA
5/22/15	UC Davis researchers met with staff from California High Speed Rail Authority	UC Davis Campus
6/1/15	Susan Handy and Dan Sperling met with CalSTA Secretary Brian Kelly and Deputy Director Kate White to discuss NCST activities	UC Davis Campus

	and to solicit input on current and future research questions.	
7/21/15	NCST Executive Committee Conference Call	NA
8/4/15	Researchers from UC Davis and METRANS met with state agency staff, industry leaders, and environmental organizations to discuss Freight Efficiency Strategies Caltrans can incorporate into statewide freight plan.	Caltrans Headquarters, Sacramento, CA
8/6/15	NCST Executive Committee Conference Call	NA
9/17/15	Susan Handy, Laura Podolsky, Giovanni Circella, Gian-Claudia Sciara, and Caroline Rodier met with Mike McCoy and New Executive Director of Strategic Growth Council Randall Winston to provide briefing on travel behavior research and implications for policy in California.	Sacramento, CA
9/23/15	Tom Turrentine, Dahlia Garas, and Laura Podolsky briefed CEC Commissioner Janea Scott and her staff on recent research findings from the PH&EV Research Center with emphasis on EV infrastructure planning and the growing relationship and connection between EV deployment and electricity demand.	Sacramento, CA



Table 9: Media and Online Engagement Summary

MEDIA AND ONLINE ENGAGEMENT	
Media Platform	Activity
YouTube	UC Davis developed a short video highlighting findings from NCST white paper on strategies for transitioning to ZEV trucks in the United States – <a href="https://www.youtube.com/watch?v=G9uLMVlyWSA">https://www.youtube.com/watch?v=G9uLMVlyWSA</a> CSULB conducted interviews with transportation leaders discussing some of the most pressing issues, challenges, and opportunities for creating a more sustainable transportation system and sector at NCST’s Asilomar Conference in the summer of 2015. The interview will be used in the development of a short 5-minute video on the impact of NCST research, which will be completed in November 2015.
Web Page	The main NCST website (ncst.ucdavis.edu) had 3,900 unique visits or “sessions” within this reporting period. On average, each session included the person visiting three different pages on the NCST site, which translates to approximately 11,232 page views.
Online Engagement	NCST manages two active social media accounts to facilitate the dissemination of research results, news, events, and other important updates; and to engage in discussion with policymakers and practitioners who are active on these two social media platforms. Researchers from among the member institutions are actively involved in determining content shared via social media. UVM manages a Twitter and Facebook account. METRANS has Twitter, Facebook, and LinkedIn accounts.

UC Davis continues to host a weekly seminar series, available online for UC Davis students and those of other partner institutions. Speakers are invited from government, industry, public interest groups, partner institutions, and other academic institutions. The seminar series is a required course for all first and second year transportation graduate students. The seminars are often attended by UC Davis faculty, staff, researchers, and public attendees in addition to students. Seminars during the reporting period included the following:

- **A New Way of Building, Managing and Financing Transportation Infrastructure** Jonathan Gifford, Professor of Transportation Policy at George Mason University, Director of the Center for Transportation Public-Private Partnership Policy
- **Attitudes Toward Transportation Choices and Parking Policies** Wei-Shiuen Ng, Postdoctoral Scholar, Precourt Energy Efficiency Center, Stanford University
- **Moving Towards Better Measurement and Modeling of Long Distance Travel** Lisa Aultman-Hall, Professor, School of Engineering and Transportation Research Center, University of Vermont

- **Examining Alternative Causal Structures Using a Latent Segmentation Modeling Approach** Naveen Eluru, Associate Professor, Department of Civil, Environmental and Construction Engineering, University of Central Florida
- **Lessons Learned from Spatiotemporal Studies of Freeway Carpool Lanes** Michael Cassidy, Professor, Department of Civil and Environmental Engineering, UC Berkeley
- **Nash-Stackelberg Games in Transportation Networks: Leveraging the Power of Smartphones for Traffic Monitoring and Management** Alexandre M. Bayen, Chancellor's Professor and Director, Institute of Transportation Studies, UC Berkeley
- **Incorporating Behavioral Effects from Vehicle Choice Models into Bottom-Up Energy Sector Models** David S. Bunch, Professor, Graduate School of Management and Institute of Transportation Studies, University of California, Davis
- **UAV's: Designing Battery Powered Flying Vehicles to Support Construction, Agriculture, Mining, and Energy Sectors** Sam Miller, Chief Technology Officer, Skywatch
- **Rural-Urban Connections Strategy: Planning and Transportation Funding for the Rest of the Region** David Shabazian, Principal Program Expert, Sacramento Area Council of Governments

#### **Education Activities:**

- 1) **Sustainable Curriculum Development:** Georgia Tech completed a draft report in September 2014 that summarizes findings with respect to sustainability related-courses at the consortium institutions, textbooks and other teaching resources, models and tools that support sustainable transportation planning, and qualifications required in recent job postings. The report was circulated to all NCST partner institutions for review and comment. Final revisions were incorporated by Georgia Tech and the report was completed in April 2015. The report is available on the NCST website.
- 2) **Online Transit Training:** In the first quarter of 2015 CSULB completed the development and delivery of an online training program for transit operators in conjunction with the Southern CA Regional Transit Training Consortium (SCR TTC). The SCR TTC is a partnership of transit operators and community colleges. The course offered through CSULB and funded through an FTA grant was on Electrical System Diagnosis. The blended course (online and in the classroom) is designed to improve a technician's basic electrical skills and circuit diagnosis. Students work with a Digital Volt-Ohm Meter (DVOM) in actual circuit conditions as well as in virtual simulated conditions. This is a critical component of managing sustainable public transit systems. Online training has met some resistance within the public transit community and this course is a significant step in understanding the market for different delivery methods. However, funding limited the geographic scope of the training and precluded us from developing a robust test bank that truly gauges the skills of the

participant.

During the reporting period, we modified the existing on-line program by developing program code that better tracks user activity on individual pages and increased the test bank. We conducted outreach to transit partners within the NCST network of schools (including campus bus operators) to identify participants for a class based on the revised materials which is scheduled to be delivered starting in September 2015. We will conduct exit interviews with participants to gauge its success. This approach allows us to leverage the earlier FTA grant while creating a learning platform that can be used for other training modules.

- 2) **Professional development courses:** UC Davis partnered with UC Davis Extension on a proposal to Caltrans for the development of two courses for Caltrans staff: SB735 Tools: Evaluating Effectiveness, and Automated Vehicles and the Built Environment.
- 3) **Student travel:** UC Davis funded one travel award for students to present their transportation related research at conferences. Additional travel funds are available for students for 2015-2016, and we expect to help several students present their work at TRB in Washington D.C. in January 2016.
- 4) **Fellowships:** UC Davis also released the call for Dissertation Fellowship proposals for proposals are due November 2<sup>nd</sup>. UC Riverside awarded four NCST fellowship recipients for the 2015/2016 academic year.
- 5) **2015 Summer Student Exchange Program:** UCR CE-CERT, in conjunction with UC Davis ITS, established a student exchange summer research program where graduate students can come and during the summer of 2015 to conduct transportation research.

From September 6th through 20th, Emmanuel Folie from UC Riverside/CE-CERT studying under Professor Akua Asa-Awuku, visited UC Davis. He worked with researchers in the Sustainable Energy Pathways Program, focusing on understanding the critical transition dynamics for alternative fuels and vehicles.

In exchange, from September 13th – 27th, UC Davis sent Yizhan Zhang, studying with Professor Alissa Kendall, to UC Riverside to work in the Sustainable Energy Systems laboratories that researches the production of cellulosic biomass into ethanol and thermochemical conversion of coal and waste into synthetic fuels at CE-CERT.

### *How have the results been disseminated?*

The engagement activities listed above are the main avenues for NCST research dissemination and engagement with stakeholders.

NCST also posts news items regularly on its website and social media accounts. The main NCST website (ncst.ucdavis.edu) had approximately 3,900 unique visits or “sessions” within this reporting period, which is 71% of our website traffic. On average, each session included the

person visiting three different pages on the NCST site, translating to approximately 11,200page views.

*What do you plan to do during the next reporting period to accomplish the goals?*

**Research Activities:**

The Center Director and Program Manager will monitor ongoing projects via quarterly reports to ensure they are progressing on schedule and that products are completed and results disseminated effectively.

Researchers at each of the consortium universities will continue work on the initial series of white papers, most of which have been submitted as complete drafts. We expect most of them to be finalized and released during the next reporting period. In the next period, we will also be launching a second round of white papers.

Research activities at the consortium institutions will include the following (ongoing and new research projects are listed above).

*Table 10: Planned Research Activities*

UC Davis	<ul style="list-style-type: none"> <li>▪ Continue work on Year 1 US DOT funded projects; most should be complete by March 30, 2016.</li> <li>▪ Continue work on Year 1 Caltrans funded projects; all should be completed by March 30, 2016.</li> <li>▪ Continue work on projects funded by the California Air Resources Board (ARB).</li> <li>▪ Continue work on projects funded by the California Energy Commission (CEC).</li> <li>▪ Launch projects for Year 2 US DOT and Caltrans funding.</li> </ul>
METRANS (USC and CSU Long Beach)	<ul style="list-style-type: none"> <li>▪ Continue work on Year 1 US DOT funded projects; most should be complete by March 30, 2016.</li> <li>▪ Continue work on Year 1 Caltrans funded projects; all are expected to be completed by March 30, 2016.</li> <li>▪ Continue work on CEC funded project.</li> <li>▪ Launch projects for Year 2 US DOT and Caltrans funding.</li> </ul>
Georgia Tech	<ul style="list-style-type: none"> <li>▪ Continue work on US DOT and GDOT funded projects; most should be complete by March 30, 2016.</li> <li>▪ Launch projects for Year 2 US DOT and GDOT funding.</li> </ul>
UC Riverside	<ul style="list-style-type: none"> <li>▪ Continue work on Year 1 US DOT funded projects; most should be complete by March 30, 2016.</li> <li>▪ Continue work on Year 1 Caltrans funded projects; all are expected to be completed by March 30, 2016.</li> </ul>

	<ul style="list-style-type: none"> <li>▪ Continue work on CEC funded project.</li> <li>▪ Continue work on ARB funded projects.</li> <li>▪ Launch projects for Year 2 US DOT and Caltrans funding.</li> </ul>
Vermont	<ul style="list-style-type: none"> <li>▪ Continue work on Year 1 US DOT funded projects, which should be complete by March 30, 2016.</li> <li>▪ Launch projects for Year 2 US DOT funding.</li> </ul>

### Engagement Activities:

A wide range of engagement activities will continue to disseminate NCST research results and engage relevant stakeholders and policy makers. Some of the activities already planned are shown in the tables below.

*Table 11: Upcoming Presentations*

Date	Title	Speaker(s)	Event	Location
10/7/15	<i>Moving People Tomorrow: New technologies and innovative projects that are shaping the future of transportation.</i>	Dahlia Garas and Laura Podolsky, UC Davis	San Joaquin Valley (SJV) Fall Policy Conference	Yosemite, CA
10/10/15	<i>Local Actions for a Global Impact</i>	Caroline Rodier, UC Davis	California 2030: Local Actions for a Global Impact Forum	UC Los Angeles campus
10/22/15 – 10/25/15	<i>An Investigation of the Residential Locations, Lifestyles and Mobility Choices of Millennials in California, and the Motivations Affecting Them</i>	Giovanni Circella, A. Berliner, L. Fulton, F. Alemi, S. Handy, P. Mokhtarian, UC Davis	Annual Conference of the Association of Collegiate Schools of Planning	Houston, TX
10/23/15	<i>“Roads? Where we are going, we don’t need roads!”</i>	Caroline Rodier, UC Davis	2015 Sacramento Regional American Planning Association Speaker Series	Sacramento, CA
11/18/15	<i>VMT Trends in California and the United States</i>	Giovanni Circella, UC Davis	Planning Horizons Caltrans Seminar Series	Sacramento, CA
12/2/15	<i>Financing Affordable Housing in Amenity-Rich,</i>	Deb Niemeier, UC	Governor’s Office of Planning and Research	Sacramento, CA

	<i>Walkable Locations</i>	Davis	Brown Bag Speaker Series	
1/27/15	<i>Measuring Land Use Performance: Policy, Plan, and Outcome</i>	Gian-Claudia Sciara, UC Davis	Planning Horizons Caltrans Seminar Series	Sacramento, CA
1/1/16	<i>The Role and Position of Local Agencies in Climate Adaptation Planning</i>	Jonathan Dowds, University of Vermont	TRB annual conference	Washington D.C.
3/13/16 - 3/16/16	<i>Measurement Methods: Improvements and New Techniques</i>	Tom Durbin, UC Riverside	2016 CRC real world emissions conference	Hyatt Newport Beach, Newport Beach, CA
4/12/16 - 4/14/16	<i>Powering Possibilities</i>	Tom Durbin, UC Riverside	2016 SAE World Congress	Detroit, Michigan, Cobo Center

Table 12: Upcoming NCST Sponsored Events

<b>Date</b>	<b>Event Name</b>	<b>Description</b>	<b>Organizer</b>	<b>Location</b>
10/6/15	Emerging Leaders in Public Policy and Service Fellowship meeting	This event brought together students, faculty, and staff from UC Davis; non-government organizations, and state agencies to discuss how to better connect research to policy development.	UC Davis Chancellor's Office	UC Davis Campus
10/21/15 – 10/23/15	International Urban Freight Conference	Biennial conference exploring all aspects of goods movement in the world's metropolitan areas.	METRANS	Long Beach, CA
12/3/15	Barriers to Medium and Heavy Duty ZEV trucks	ITS UC Davis will be bringing together leaders from government, industry, and academia to discuss and identify pressing issues and barriers to commercializing medium and heavy duty ZEV trucks.	UC Davis	UC Davis Campus

TBA	NCST Webinar	Webinar on White Paper Topic: “ Managing Roadway Systems to Reduce GHG Emissions and Improve Energy Efficiency: A Focus on Traffic Operations”	Matthew Barth, UC Riverside	Online
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Table 13: Upcoming Meetings

MEETINGS:		
Date	Purpose	Location
10/20/15	NCST Executive Committee conference call	N/A
10/27/15	Meeting with transportation research departments from CEC, ARB, and Caltrans.	Sacramento, CA
10/30/15	Local Government Research Pavement Center meeting – This meeting will bring together local government engineers (both cities and counties), researchers at UC Davis, Caltrans, and local government membership institutions to discuss the creation of a research center at ITS-UC Davis focused on pavement issues faced by local government.	Davis, CA
12/16/15	Researchers from ITS UC Davis are meeting with staff from the California Senate Transportation and Housing Committee to discuss current research efforts.	Davis, CA

Table 14: Planned Media and Online Engagement Activities

MEDIA AND ONLINE ENGAGEMENT	
Media Platform	Activity
YouTube	METRANS will finalize 5 minute video featuring interviews with leaders from government, industry, non-governmental organizations, and academia discussing the most pressing issues, challenges, and opportunities related to advancing a more sustainable transportation system and sector. The video is expected to be released in November 2015. NCST plans to create and post more short videos featuring researchers describing their research, sharing research findings, and discussing implications for policy and practice.
Web Page	UC Davis will continue to keep the NCST main website current. METRANS and UVM also maintain a NCST page on their websites. Georgia Tech will prepare an outreach web page for their fuel emissions calculator for transit vehicles ( <a href="http://fec.ce.gatech.edu">fec.ce.gatech.edu</a> ) for transit agencies explaining the benefits of reducing: 1) idle activity, 2) high speed operations, and 3) hard acceleration operations.

Online Engagement	UC Davis will continue manage NCST's two social media accounts. UVM will continue manage its Twitter and Facebook account; and METRANS will continue to manage its Twitter, Facebook, and LinkedIn accounts.
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In addition to presentations described above, weekly ITS-UC Davis seminars will continue with support from the NCST, including the following seminars:

- **Fuel Tax Incidence and Policy** Erich Muehlegger, Assistant Professor, Department of Economics, UC Davis
- **Biofuels: Need, Land, Carbon, and Development** Lee R. Lynd, Paul E. and Joan H. Queneau Distinguished Professor in Environmental Engineering Design, Adjunct Professor of Biological Sciences, Dartmouth College
- **Motive Power for Railroads** Andreas Hoffrichter, Research Fellow in Railway Vehicles, Warwick Manufacturing Group, University of Warwick
- **Caltrans' Sustainability, Livability and Economy Goal** Steven Cliff, Assistant Director, Sustainability, California Department of Transportation
- **Working at the Intersection of Science, Policy and Politics / West Coast Sustainable Transportation Policy Update** Colin Murphy, Climate Policy Advocate, NextGen Climate America
- **We Used to Be Like China: How California Is Achieving the Seemingly Impossible - Clean Air, Economic Progress, Vibrant Development - and, While at It, Setting the Stage for Deep De-Carbonization of Transportation** Alberto Ayala, Deputy Executive Officer, California Air Resources Board
- **Why Is It So Difficult To Implement Sound Freight Policies?** Jolanda Prozzi, Program Manager, Research Scientist, Environment and Planning, Texas A&M Transportation Institute

#### Education Activities:

Georgia Tech finalized the sustainable transportation curriculum review, which was published in April 2015. The project team also plans to prepare two journal manuscripts based on the report. In addition, the team will organize a webinar on sustainable transportation curricula. The team has developed course syllabi for two of the eight-to-ten courses planned, and remaining syllabi will be developed based upon the final report and input gathered during the webinar.

UC Davis will be working with UC Davis Extension on the development of two courses for Caltrans staff (SB735 Tools: Evaluating Effectiveness; Automated Vehicles and the Built Environment) and will deliver these as one-day courses, one each in northern and southern California, in 2016.

UC Davis and UC Riverside offered graduate students the opportunity to spend a portion of the summer at the other institution working with faculty and graduate students on selected



projects. The purpose of this exchange was to build collaborations between the schools and to give students exposure to new research methods and approaches not used at their own schools. This past summer's exchange was valuable for the students and faculty involved, and provided a useful learning experience for staff supporting the exchange. We hope to expand this summer exchange to include all the campuses that are part of NCST for summer 2016.

UC Davis will offer fellowship grants for incoming students for the 2015/16 academic year based on new student applications. UC Davis will review the proposals for 2015/16 Dissertation Grants, due November 2<sup>nd</sup>, 2015, and will select and process those fellowships. UC Davis will continue to award travel grants to students who are presenting transportation related research at appropriate conferences and events.

During the next reporting period, METTRANS (CSU Long Beach) will modify the existing on-line training program by developing program code that better tracks user activity on individual pages and increases the test bank. We will extend the reach of the training by offering it throughout the NCST network of schools and transit partners (including campus bus operators) and conduct exit interviews with participants to gauge its success. This approach allows us to leverage the earlier FTA grant while creating a learning platform that can be used for other training modules.

## **PRODUCTS**

All research is on-going; however, examples of products deployed and/or developed in NCST-funded projects from the past twelve months are described below.

### **TOOLS/INSTRUMENTS**

1. The online GHG Calculator for Heavy Duty Transit Vehicles developed by Xu, Guensler and Rodgers at Georgia Tech is now live at: [fec.ce.gatech.edu/bus](http://fec.ce.gatech.edu/bus)
2. The Android application "Commute Warrior," developed as a part of the project "Innovative Data Collection to Improve Transit Service Assessment," was deployed in Spring 2014: <http://transportation.ce.gatech.edu/commutewarrior>

### **PEER-REVIEWED PUBLICATIONS**

1. Akanser, A., Elango, V., A. Grossman, R. Sadana; K. Poddar, Y. Xu, and R. Guensler. Commute Warrior: An Android Application to Collect Longitudinal Travel Survey Data. 2015 Transportation Research Forum. Atlanta, GA. March 2015.
2. Akanser, A., V. Elango, A. Grossman, Y. Xu, and R. Guensler (2015). "Sidewalk Scout: Crowdsourcing Android Application for Collecting Sidewalk Condition Data." 2015 Transportation Research Forum. Atlanta, GA. March 2015.
3. Dowds, Jon and Lisa Aultman-Hall. Barriers to Implementation of Climate Adaptation Frameworks by State DOTs. Forthcoming in Transportation Research Record.
4. Frackelton, A., and R. Guensler (2015). "Pedestrian Project Prioritization Incorporating App-Collected Sidewalk Data." 94th Annual Meeting of the Transportation Research

- Board. Washington, DC. January 2015.
5. Fu, L. and M. M. Dessouky. "A Modelling Approach for Dynamic Headway Control" submitted to IEEE Transactions on Intelligent Transportation Systems.
  6. Grossman, A., and R. Guensler (2016). "Outreach Associated with Pedestrian Infrastructure Research in Atlanta on Improving Accessibility." 95th Annual Meeting of the Transportation Research Board. Washington, DC. January 2016.
  7. Guensler, R. H. Liu, X. Xu, Y. Xu, and M. Rodgers (2016). "MOVES-Matrix: Setup, Implementation, and Application." 95th Annual Meeting of the Transportation Research Board. Washington, DC. January 2016.
  8. Kari, D., G. Wu, M. Barth (2014) "Development of an Agent-Based Online Adaptive Signal Control Strategy Using Connected Vehicle Technology", in Proceedings of the IEEE Intelligent Transportation Systems Conference, Qingdao, China, October 2014.
  9. Khoeni, S., V. Elango, Y. Xu, and R. Guensler (2015). "Generating Sidewalk Networks Using Roadway Network and Parcel Polygon Data." 94th Annual Meeting of the Transportation Research Board. Washington, DC. January 2015.
  10. Li, H., H. Liu, X. Xu, Y. Xu, and R. Guensler (2016). "Benefits from Reducing Local Transit Service Deadheading: An Atlanta Case Study." 95th Annual Meeting of the Transportation Research Board. Washington, DC. January 2016.
  11. Liu, H., Y. Xu, R. Guensler, and M.O. Rodgers (2015). "Developing Vehicle Classification Inputs for Project-Level MOVES Analysis." Transportation Research Record. Number 2503. pp. 81-90. National Academy of Sciences. Washington, DC. 2015.
  12. Liu, H., Y. Xu, M.O. Rodgers, C. Toth, and R. Guensler (2015). "MOVES2014 Project-Level Sensitivity Analysis: Impacts of On-road Fleet Composition and Operation Aggregation on Emission Results." Air and Waste Management Association, 108th Annual Meeting Proceedings (CD-ROM). June 2015.
  13. Mu, S. and M. M. Dessouky "Control Rules for Dispatching Trains on General Networks with Multiple Train Speeds," Conference Proceedings Transport Research Arena 2014, Paris, France, 2014.
  14. Qi, X., G. Wu, K. Boriboonsomsin and M. Barth. A Data-Driven Reinforcement Learning-Based Real-Time Energy Management System for Plug-in Hybrid Electric Vehicles with Charging Opportunities. Transportation Research Record, 2016 (accepted)
  15. Qi, Xuewei, Guoyuan Wu, Kanok Boriboonsomsin, Matthew Barth. "Evolutionary Algorithm Based On-Line PHEV Energy Management System with Self-Adaptive SOC Control." 2015 IEEE on Intelligent Vehicles Symposium, Seoul, Korea. June 28 – July 1.
  16. Xu, X., H. Liu, Y. Xu, M. Hunter, and R. Guensler (2016). "Estimating Vehicle Emissions using VISSIM and MOVES Matrix." 95th Annual Meeting of the Transportation Research Board. Washington, DC. January 2016
  17. Xu, Y., F. Gbologh, D. Lee, H. Liu, M.O. Rodgers, and R. Guensler (in press). Assessment of Alternative Fuel and Powertrain Transit Bus Options using Real-world Operations Data: Life-cycle Fuel and Emissions Modeling. Applied Energy Volume 154, Number 15. pp. 143-159.
  18. Zhang, Yihang and P. Ioannou, 'Combined Variable Speed Limit and Lane Change Control for Highway Traffic' submitted to IEEE Conference on Decision and Control 2015.

## **OTHER PUBLICATIONS**

1. Barth, M., G. Wu, K. Boriboonsomsin (2015) “Intelligent Transportation Systems for Improving Traffic Energy Efficiency and Reducing GHG Emissions from Roadways”, National Center for Sustainable Transportation, August 2015.
2. Boriboonsomsin, K. (2015) “Reducing Carbon Footprint of Freight Movement through Eco-Driving Programs for Heavy-Duty Trucks”, National Center for Sustainable Transportation, August 2015.
3. Cruz, J., G. Macfarlane, Y. Xu, M.O. Rodgers, and R. Guensler (2015). “Sustainable Transportation Curricula.” A National Center for Sustainable Transportation Report. Georgia Institute of Technology. Atlanta, GA. March 2015.
4. Grossman, A., Akanser, A., Li, H., Guensler, R. (2015). Atlanta: Crowd Sourced Data Collection with Apps for Sidewalk Quality. Smart Cities Day Conference. Marseille, France (35 attendees). September, 2015.
5. Grossman, A., A. Shaw, P. Pratyaksa, A. Greenwood, R. Guensler, and Y. Xu (2015). “Use of Mobile Technologies in Attracting K-12 to Transportation.” ABG20 Webinar: How Mobile Technologies Impact the Transportation Workforce. TRB ABG20 Education and Training Committee (126 attendees). July, 2015.
6. Guensler, R., Y. Xu, A. Sheikh, H. Li, S. Khoeini, R. Donahey (2015). “Atlanta I-85 HOT Lane Carpool Survey: Initial Analysis of Individual Questions.” Presentation to the managed Lanes Committee at the 94th Annual Meeting of the Transportation Research Board. Washington, DC (60 attendees). January 2015.
7. Lade, Gabriel E. and C.-Y. Cynthia Lin. (2015). Mandating green: On the design of renewable fuel policies and cost containment mechanisms. Working paper, University of California at Davis. URL:  
[http://www.des.ucdavis.edu/faculty/Lin/mandate\\_cost\\_containment\\_paper.pdf](http://www.des.ucdavis.edu/faculty/Lin/mandate_cost_containment_paper.pdf)
8. Lade, Gabriel E. and C.-Y. Cynthia Lin. (2015). The design and economics of low carbon fuel standards. Working paper, University of California at Davis. Revise and Resubmit at Research in Transportation Economics. URL:  
[http://www.des.ucdavis.edu/faculty/Lin/LCFS\\_Review\\_paper.pdf](http://www.des.ucdavis.edu/faculty/Lin/LCFS_Review_paper.pdf)
9. Li, H., H. Liu, Y. Xu, and R. Guensler (2016, accepted). “Performance of Multiple Emissions Reduction Alternatives for Transit Fleets: A Real-world Operations Perspective.” 95th Annual Meeting of the Transportation Research Board. Washington, DC. January 2016.
10. Mudrinich, S., R. Guensler, and A. Grossman (2015). “Atlanta’s Hotel District: ADA Transition Plan.” A Georgia Tech Honors Program Special Project. Georgia Institute of Technology. Submitted to the City of Atlanta. Atlanta, GA. May 2015.
11. X. Qi, G. Wu, K. Boriboonsomsin, M. Barth. A Novel Blended Real-time Energy Management Strategy for Plug-in Hybrid Electric Vehicle Commute Trips. 2015 IEEE Conference on Intelligent Transportation Systems

## POSTERS

1. Akanser, A., V. Elango, A. Grossman, Y. Xu, Q. Chu, and R. Guensler (2015). "Sidewalk Scout: Crowdsourcing the Collection of Sidewalk and Ramp Defect Data." Georgia Department of Transportation and Georgia Transportation Institute Research Poster Session. Atlanta, GA. September 22, 2015.
2. Akanser, A., Elango, V., R. Sadana; Y. Xu, and R. Guensler (2015). "Commute Warrior Android App for Real-time Travel Monitoring and Electronic Travel Diary Surveys." Georgia Department of Transportation and Georgia Transportation Institute Research Poster Session. Atlanta, GA. September 22, 2015.
3. Grossman, A., A. Akanser, A. Frackelton, C. Toth, and R. Guensler (2015). "Innovative Technologies for Sidewalk Assessment." Georgia Department of Transportation and Georgia Transportation Institute Research Poster Session. Atlanta, GA. September 22, 2015.
4. Guensler, R. H. Liu, X. Xu, Y. Xu, and M.O. Rodgers (2015). "MOVES-Matrix: Setup, Implementation, and Application." Georgia Department of Transportation and Georgia Transportation Institute Research Poster Session. Atlanta, GA. September 22, 2015.
5. Li, H., Y. Xu, S. Khoeni, V. Elango, R. Guensler (2015). "Generating Sidewalk Networks from Roadway Network and Parcel Data." Georgia Department of Transportation and Georgia Transportation Institute Research Poster Session. Atlanta, GA. September 22, 2015.

### **WEBSITE(S) OR OTHER INTERNET SITE(S)**

UC Davis created and is hosting the NCST website <http://ncst.ucdavis.edu> and continues to update it with information on our research, education, and engagement activities. Other NCST partners have also created NCST pages on their websites. Of particular note are the sites hosted by METTRANS at <http://www.mettrans.org/uc-davis-national-center-sustainable-transportation> and UVM <http://www.uvm.edu/trc/collaborative-research/>.

Additional information about websites and other internet sites is covered in sections above.

### **PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS**

Our key partners are the members of our consortium from the University of California Riverside, University of Southern California, California State University Long Beach, Georgia Institute of Technology, and the University of Vermont.

The following entities are providing funding for selected projects and activities:

- United States Department of Transportation
- California Department of Transportation (Caltrans)
- California Air Resources Board
- California Energy Commission
- Volvo Research and Educational Foundation
- Georgia Department of Transportation for selected research projects
- University support from all partner universities

The NCST’s Leadership Council provides ongoing guidance on the research needs and policy challenges of public agencies as they aim to address sustainability. A few changes have been made to the Leadership Council in this reporting period. Both Commissioner Keith Golden (GDOT) and Secretary Brian Searles (VTrans) retired. Sue Minter was appointed Secretary of VTrans in November 2014 and agreed to replace Secretary Searles on the National Center’s Leadership Council. Joan McDonald stepped down as the Commissioner of New York State DOT and is now serving on the National Infrastructure Advisory Council as an Appointee of President Obama.

<b>LEADERSHIP COUNCIL</b>	
John Horsley	American Association of State Highway and Transportation Officials
Hasan Ikhmeta	Southern California Association of Governments
Brian Kelly	California State Transportation Agency
Joan McDonald	National Infrastructure Advisory Council
Michael Melaniphy	American Public Transportation Association
Lynn Peterson	Washington State Department of Transportation

Sue Minter	Vermont Agency of Transportation
Kirk Steudle	Michigan Department of Transportation
Barry Wallerstein	South Coast Air Quality Management District
Janea Scott	California Energy Commission
Kevin Desmond	King County Metro Transit

UC Davis collaborates with researchers at the Institute of Transportation Studies, the Plug-In Hybrid & Electric Vehicle Research Center, the Sustainable Transportation Energy Pathways program, the Urban Land Use and Transportation Center, the China Center, and the Policy Institute for Energy, Environment, and the Economy. This collaboration is both interdepartmental and interdisciplinary.

Work under the \$1.1 million award from the California Energy Commission will be completed in a collaborative effort between UC Davis, UC Riverside and the University of Southern California. Two projects funded by the California Air Resources Board will be collaborative efforts by UC Davis and UC Riverside researchers.

All partners are collaborating on the development of the model sustainable transportation curriculum. University of Virginia’s regional UTC, focusing on environmental sustainability, is also collaborating on this work.

## IMPACT

### *What is the impact of the program? How has it contributed to transportation education, research, and technology transfer?*

Researchers and staff have met and engaged with key decision makers and practitioners at all levels of government to discuss NCST research and explore opportunities for research to impact policy discussions in a timely way (see Tables 4 and 9). The NCST has also identified and met with many organizations interested in featuring NCST researchers and research at their conferences, events, and workshops.

NCST researchers have been referenced on several occasions in the media, focusing the attention of a potentially unlimited audience on the importance of working toward sustainable transportation systems. Some examples of media coverage include the following:

October 14, 2014

#### **With Program Problems In California and Elsewhere, Can a Low-Carbon Fuels Standard Work in Washington?**

By Peter Jensen • Washington State Wire

What would a low-carbon fuels standard in Washington look like? Providing that low-carbon fuels standards can be successful is largely an academic exercise presently, with research

showing it could happen if given enough time, money for research and the right market conditions, said **Anthony Eggert**, executive director of the Policy Institute for Energy, the Environment and the Economy at the University of California, Davis.

October 20, 2014

### **A World Without OPEC?**

By Joe Nocera • New York Times

[Authors] **Amy Jaffe** and Ed Morse are both global policy experts –she is the executive director of Energy and Sustainability at the University of California, Davis, and he is the global head of commodities research at Citigroup –who say that if America plays its cards right, OPEC’s dominance over the oil market could be over. I think that day may have already arrived.

October 22, 2014

### **Bring Back the Earmark**

By Jacob Anbinder • U.S. News

Research from **Gian-Claudia Sciara**, an expert on earmarks at the **University of California-Davis**, has shown that earmarking tends to shift funds away from local transportation priorities rather than adding new money to the infrastructure pot.

October 22, 2014

### **Report: Electric Car Buyers Hate Dealerships**

By Steven Symes • InsiderCarNews

Cited by the publication is a study from the Institute of Transportation Studies at the University of California, Davis. The conclusion of the study was that electric car shoppers were even less satisfied with the process of purchasing their car than the average car shopper.

November 4, 2014

### **With gas prices down, we’re buying more SUVs**

By Dan Weissmann • NPR's Marketplace

People often do not do the math on fuel economy. Tom Turrentine, from the University of California at Davis Energy Efficiency Center, interviewed people from 60 households about this very question.

December 1, 2014

### **Route 66 is charging into the future with a very 21st century update**

By Lewis Lazare • Chicago Business Journal

Gov. Pat Quinn said today that the state of Illinois is investing \$1 million to establish a network of charging stations for electric vehicles along the famous Route. The University of California Davis, a leading center for the study of sustainable transportation, provided technical assistance in planning the Route 66 electric vehicle charging station network.

December 17, 2014

**What's New in the West: January 2015**

By AAA's Via Magazine

The online tool **UC Davis EV Explorer** helps users compare the annual energy cost of gas, electric, and hybrid vehicles. The website is designed to help people compare up to 4 different vehicles, including gasoline and plug-in electric vehicles, side by side on an energy cost basis.

January 13, 2015

**The Bloomberg Advantage: Retail Show, Oil and Electric Cars**

By Bloomberg Radio

The Bloomberg Advantage with Kathleen Hays and Vonnie Quinn. GUESTS: **Daniel Sperling** "Dan" Director/Professor: Civil UC Davis Inst of Transportation Studies

January 16, 2015

UC Davis Professor Leading U.S. Transportation Research in 2015

By News Staff • Techwire

February 3, 2015

**President Obama's budget to boost funding for California transportation projects**

By Alex Cohen • NPR KPCC Take Two

The proposed budget has about \$1 billion for transportation and construction projects in the state, but some experts say more innovation is needed. **Dan Sperling**, Director of the UC Davis Institute of Transportation Studies speaks with Alex Cohen to give his insights.

February 20, 2015

**Study: natural gas heavy-duty trucking fleet could benefit economy, but has mixed environmental effects**

By Green Car Congress

Switching from diesel fuel to natural gas may hold advantages for the US heavy-duty trucking fleet, but more needs to be done to reach the full environmental benefits, according to a new white paper released by the Institute of Transportation Studies at the University of California, Davis, and Rice University.

March 11, 2015

**California wins by collaborating with China on electric vehicle market**

By Yunshi Wang, Dan Sperling, Alberto Ayala • Sacramento Bee

What happens in China is important to our state. For plug-in electric vehicles to succeed in California, they also need to succeed elsewhere – and China heads the list.

March 13, 2015

**The Complete Business Case for Converting Street Parking Into Bike Lanes**

By Eric Jaffe • The Atlantic - CityLab

A very recent study, from UC-Davis scholars **Natalie Popovich** and **Susan Handy**, analyzed



nearly 1,900 shopping trips to downtown Davis made after the opening of a new Target store. Cyclists not only took slightly more trips than drivers did, but spent more per trip.

March 30, 2015

### **California considers a plea for plug-in hybrids**

By Gabe Nelson • Automotive News

Ford, General Motors, Honda and Toyota, worried that they'll need to offer large incentives to sell their share of ZEVs, and are pushing California to rewrite its formula to offer more credit for plug-in hybrids such as the Volt. **Daniel Sperling**, a CARB member and director of the Institute of Transportation Studies at the University of California-Davis, said during the hearing that he's sympathetic to the e-miles argument.

March 31, 2015

### **Guest post: A driving force behind the Low Carbon Fuel Standard sees credit prices rising**

By John Kingston • Platts

The price of Low Carbon Fuel Standard credits is going to rise. It's just a question of when. That's the view of Professor Daniel Sperling, member of the California Air Resources Board, director of the Institute of Transportation Studies at the University of California, Davis, but more importantly, the intellectual father of the California Low Carbon Fuel Standard. Sperling noted that the required cut in the carbon intensity of California transportation fuels this year — and last year — was a mere 1% from a 2010 baseline.

May 1, 2015

### **Can the U.S. trucking sector cut emissions 80% by midcentury?**

By Benjamin Hulac • ClimateWire

**Law Fulton** and **Marshall Miller**, researchers at the Sustainable Transportation Energy Pathways Program (STEPS) at the University of California, Davis, have been trying to figure out what it would take for the trucking sectors in California and nationwide to meet that target. The authors' report, to be released next month, is a "high level" view of the technology and fuels available within the sector and the challenges and barriers to achieving "low-carbon trucking" by 2050.

May 13, 2015

### **RIVERSIDE: Forum examines how freight, warehouses affect Inland communities**

By Fielding Buck • The Press Enterprise

Experts spent Tuesday grappling with how Inland Southern California can reap the financial benefits of logistics yet maintain quality of life. The event was a daylong forum on "Freight and Sustainable Communities Policy," on the campus of electronics manufacturer Bourns Inc., which is also home to UC Riverside's Center for Environmental Research and Technology, which with CSSD was among several partners hosting the event. They included the **National Center for Sustainable Transportation**; Southern California Association of Governments; CalTrans, and the **UC Davis Institute of Transportation Studies**.

May 19, 2015

### **State nears carpool lane decal limit for Volt, other plug-in hybrids**

By Jerry Hirsch • LA Times

The state should consider ways to differentiate the plug-in hybrids based on range, said **Gil Tal** of the UC Davis Institute of Transportation Studies.

May 19, 2015

### **Gov. Brown makes an effort to reduce climate change**

By Mike Luery • KCRA 3

Gov. Jerry Brown is pushing to get states and governments to reduce carbon emissions to fight climate change. **Lewis Fulton** of UC Davis' Institute of Transportation Studies says the Governor's goals are very ambitious, but doable. "We need big changes in technology, some changes in the way we travel, how often we drive, and the types of cars that we drive," said Fulton.

May 21, 2015

### **Cash on the Hood of an Electric Car**

By Gina Coplon-Newfield • Huffington Post

You've probably heard of that [psychology study](#) that found that children are more likely to go for one marshmallow now than the promise of two marshmallows later. **Researchers at UC Davis** have [found](#) that car buyers are no different and are more likely to buy the car that comes with an offer of an immediate discount -- like a rebate accessible within several weeks -- than one that comes with a tax credit available several months later, even if the longer-term reward is of higher value.

May 30, 2015

### **California bends but doesn't yield on ZEVs**

By Gabe Nelson • Automotive News

**Daniel Sperling**, a University of California-Davis professor and a member of the Air Resources Board, is pushing hard for a bigger emphasis on plug-in hybrids, though some of his colleagues on the board think any solution that involves using gasoline is inadequate.

June 3, 2015

### **Can We Have Sustainable Transportation without Making People Drive Less or Giving up Suburban Living?**

By Mark Delucchi and Kenneth Kurani • Access Magazine

We ask if it is possible to retain automobility and low-density living alongside safe, convenient, economical, and environmentally sound transportation. We have designed an ambitious vehicle, roadway, and land-use scheme to make transportation more sustainable while preserving the personal automobile use and suburban living that many people desire.

June 3, 2015

### **The First Big-Box Store in Davis**

By Susan L. Handy, Kristin Lovejoy, Gian-Claudia Sciara, Deborah Salon and Patricia Mokhtarian

- Access Magazine

Davis is not the first community to debate the desirability of big-box retail. Around the US, communities have adopted policies to restrict stores like Target and Walmart, which are believed to threaten local businesses, offer low-wage jobs with limited benefits, and harm the environment. The opening of the Target store in Davis—the first big-box retailer in the city—gave a perfect opportunity to test these assumptions. **UC Davis** researchers focused on the two questions most debated in Davis. First, how did Target change residents’ total vehicle travel and greenhouse gas emissions? And second, how did Target affect downtown businesses?

July 7, 2015

### **California’s Special Session On Transportation**

By Beth Ruyak • Capital Public Radio

On today’s edition of Capital Public Radio’s Insight program, ITS-Davis Director **Dan Sperling** speaks with Beth Ruyak about short-term and long-term solutions for California transportation funding—to be addressed in a special session of the State Legislature. As highway potholes get deeper the cost of fixing them is greater, says Sperling, who addresses vehicle “mileage” fees, and other proposals.

July 16, 2015

### **2015’s Best & Worst Cities to Be a Driver**

By Richie Bernardo • Wallethub

Traffic safety, costs and innovation are major concerns that call for attention from consumers, government leaders and industry professionals alike. For insight into these issues, we asked a panel of experts to weigh in and offer their advice. **Daniel Sperling**, Director of ITS-Davis gave his thoughts on key concerns. "Cars are parked and unused 95% of the time. Cars cost over \$8000 per year to own and operate (counting depreciation, insurance, etc.). If you have 2 or more vehicles, try downsizing your household fleet, and using car sharing and ride services such as Lyft and Uber and occasional car rental when you need them."

July 18, 2015

### **Opinion: Tipping point for electric vehicles**

By Daniel Sperling and Tom Turrentine • CALmatters

California needs to stay the course with current EV incentives, but also to enhance its EV policy. A tipping point is likely in the next decade, the inevitable result of electric vehicle costs continuing to drop, charging and hydrogen infrastructures being built out, consumers becoming more knowledgeable and engaged, and technologies refined. Stay tuned. By: **Daniel Sperling** and **Tom Turrentine**

September 3, 2015

### **All roads lead to California**

By Gustavo Collantes and F. Noel Perry • Davis Enterprise

A new analysis commissioned by Next 10 and authored by the Policy Institute for Energy, Environment and the Economy at **UC Davis** finds that these and other landmark transportation

policies are technologically feasible, cost-effective and on track to help the state achieve emission-reduction goals. The study finds that the Low Carbon Fuel Standard program, which requires reductions in the carbon intensity of fuels and is up for re-adoption next month, is motivating investments in a range of new low-carbon fuels. Related emissions reductions from this policy thus far are limited, but promising.

September 24, 2015

### **Following Petroleum defeat, Jerry Brown's air board flexes muscle on climate**

By David Siders • Sacramento Bee

“Under the regulations already in effect, if you just extend them out at the same rate through to 2030...you’d be within striking difference of the 50 percent,” said **Daniel Sperling**, an Air Resources Board member and director of the Institute of Transportation Studies at the University of California, Davis.

### *What is the impact on the development of the principal discipline(s) of the program?*

The NCST is an interdisciplinary consortium involving faculty from engineering, urban planning, environmental policy, and other disciplines. The activities of the NCST are promoting increased focus in these disciplines on sustainability, greenhouse gas reduction, low-carbon infrastructure, efficient transportation system operation, low-impact travel, sustainable land use, zero-emission vehicles and fuels, and related institutional change across the United States. The NCST is producing educational materials related to these topics that can be used in graduate education in a variety of disciplines and in continuing education and workforce development programs.

### *What is the impact on other disciplines?*

Interdisciplinary collaboration is a core principle of the NCST’s research projects, educational programs, and engagement activities. Involvement of students and researchers from disciplines not traditionally linked to the transportation field will strengthen efforts to advance sustainable transportation and will strengthen these disciplines by adding to the real-world problems to which they apply their theories and methods.

### *What is the impact on transportation workforce development?*

The NCST provided support and development opportunities to many undergraduate and graduate students during the reporting period.

Workshops, training sessions, presentations, and engagement activities are being developed to engage the transportation workforce at many different levels. Georgia Tech has generated a report on model sustainable transportation curricula; the team will be developing course

materials as part of second-year NCST activity. UC Davis is working with UC Davis Extension to develop courses for Caltrans staff on sustainable transportation topics. CSULB is well connected with the Southern California Regional Transit Training Consortium (SCR TTC), a leading provider of training for the public transit industry, and will be leveraging this relationship to develop and deliver additional training opportunities to these members.

METRANS and the University of Vermont are Surface Transportation Workforce Development Centers of Excellence. The NCST will benefit from the community of workforce development practitioners in transportation, labor and education cultivated as part of these centers, helping to extend the reach of the NCST activities to a wider audience.

### *What is the impact on physical, institutional, and information resources at the university or other partner institutions?*

The NCST is generating increased awareness of and emphasis on the importance and breadth of transportation at all partner institutions, as well as other collaborating institutions in the region and nationwide.

All partners are leveraging each other's dissemination infrastructure (e.g., email lists, social media sites, etc.) to increase the awareness and availability of NCST products and reports and to enhance the flow of information. Our media approach includes multiple channels of information dissemination so as to increase the connection and impact between NCST and a wide range of audiences with different communication needs. NCST partners are also leveraging existing relationships with outside stakeholders and our funders to help share and disseminate information.

### *What is the impact on technology transfer?*

NCST is connecting research to policymakers and practitioners through in-person events, training sessions, briefings, seminars, and forums as described in earlier sections. NCST is also creating online opportunities to engage with our research, such as: regularly updating our website; managing several social media accounts where we share research and engage with our followers; and organizing webinars highlighting our research that also feature guest respondents from industry, the public sector, and policymakers. NCST is also making research more accessible to busy policymakers and practitioners by distilling key findings and policy implications of our work into 2-page policy briefs.

In addition, the NCST has helped each university partner reach new, expanded audiences. For example, UC Riverside and UC Davis partnered on organizing a policy forum in Riverside, CA, in May 2015 on Freight and Sustainable Communities. This forum brought together over 125 participants representing policymakers, practitioners, industry, and NGOs to discuss key issues facing the Inland Empire and California regarding how to create livable, healthy communities in the context of a growing need for moving goods within and across the region and state. By working together, UC Davis and UC Riverside are leveraging each other's contacts and connections and thus expanding the impact and reach of the event.

### *What is the impact on society beyond science and technology?*

The NCST is fostering greater collaboration between academic institutions, industry, government, and NGOs, which is helping to expedite solutions to some of today's greatest transportation environmental challenges. As an example, the NCST facilitates discussions throughout the year between researchers and those on the frontlines making policy and practice-related decisions. These meetings provide two significant benefits to society: 1) those in decision making positions are aware of and can use the latest data and information when formulating policies that will in turn impact society; and 2) researchers are more aware

of the most pressing issues and decisions facing policy leaders and practitioners and can shape their future and current research to ensure it is timely, relevant, and producing information and/or tools that can be readily applied by policymakers and practitioners.

## **CHANGES/PROBLEMS**

There is nothing of significance to report in terms of changes or problems.

## **SPECIAL REPORTING REQUIREMENTS**

Website: NCST website: <http://ncst.ucdavis.edu/>

Directory of Key Personnel: Information available on the program website: <http://ncst.ucdavis.edu/about/executive-committee/>

Financial and Annual Share Reports: The SF425 requirements will be met by separate report.

Annual Recipient Cost Share Report: Will be met by separate report.

FFATA Sub award and Executive Compensation Report: Will be met by separate submission.

Research Project Descriptions: Available on program website: <http://ncst.ucdavis.edu/research/white-papers/> and <http://ncst.ucdavis.edu/research/current-projects/>

## Oct. 1, 2014 – Sept. 30, 2015 Performance Indicators

University Transportation Centers Program Performance Indicators						
UTC Name:		National Center for Sustainable Transportation				
University:		University of California, Davis and Consortium				
Grant #:		DTRT13-G-UTC29				
Reporting Period:		October 1, 2014 to September 30, 2015				
Performance Indicators	Consortium	Consortium Member 1	Consortium Member 2	Consortium Member 3	Consortium Member 4	Consortium Member 5
	Total	UC Davis	USC/CSULB	GT	UVM	UCR
<b>1. Number of transportation-related courses offered during the reporting period that were taught by faculty and/or teaching assistants who are associated with the UTC</b>						
Undergraduate courses	14	6	1	5	1	1
Graduate courses	28	18	3	7	0	0
<b>2. Number of students participating in transportation research projects during the reporting period funded by this grant</b>						
Undergraduate students in research	11	2	0	5	2	2
Graduate students in research	51	23	12	7	5	4
<b>3. Number of transportation-related advanced degree programs that utilize grant funds during the reporting period to support graduate students</b>						
Masters level programs	17	5	2	2	3	5
Doctoral level programs	11	5	3	2	1	0
<b>4. Number of students supported by this grant during the reporting period</b>						
Undergraduate students	13	4	0	7	0	2
Masters students	13	3	2	4	4	0
Doctoral students	33	13	6	5	1	8
<b>5. Number of students supported by this grant who received degrees during the reporting period</b>						
Undergraduate degrees	2	0	0	0	0	2
Masters degrees	2	0	1	1	0	0
Doctoral degrees	5	0	1	2	0	2
<b>6. Number and total dollar value of research projects selected for funding during the reporting period using UTC grant funds (Federal and/or Recipient Share) that you consider to be applied research and advanced research</b>						
Number of applied research projects	12	8	1	NA	1	2
Dollar value of applied research projects	\$ 589,117.00	\$321,744.00	\$95,000	\$ -	\$122,373.00	\$ 50,000.00
Number of advanced research projects	24	14	7	NA	1	2
Dollar value of advanced research projects	\$ 1,719,179.00	\$895,496.00	\$ 585,806.00	\$ -	\$122,877.00	\$115,000.00