



National Center
for Sustainable
Transportation

Program Progress Performance Report for University Transportation Centers

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Table of Contents

ACCOMPLISHMENTS	1
What are the major goals of the program?	1
What was accomplished under these goals?	1
Administrative Accomplishments	1
Research Accomplishments	2
Engagement Accomplishments.....	7
Educational Accomplishments.....	14
How have the results been disseminated?	15
What do you plan to do during the next reporting period to accomplish the goals?	15
Planned Administrative Activities	15
Planned Research Activities	16
Planned Engagement Activities	17
Planned Educational Activities.....	19
PRODUCTS	20
Tools and Instruments	Error! Bookmark not defined.
Peer-Reviewed Publications	Error! Bookmark not defined.
Other Publications	Error! Bookmark not defined.
Posters	Error! Bookmark not defined.
Website(s) or Other Internet Site(s)	21
PARTICIPANTS AND OTHER COLLABORATING ORGANIZATIONS	22
IMPACT	23
What is the impact of the program? How has it contributed to transportation education, research, and technology transfer?	24
What is the impact on the development of the principal discipline(s) of the program?	25
What is the impact on other disciplines?	25
What is the impact on transportation workforce development?	25
What is the impact on physical, institutional, and information resources at the university or other partner institutions?	26
What is the impact on technology transfer?	26
What is the impact on society beyond science and technology?	26
CHANGES AND/OR PROBLEMS	27
SPECIAL REPORTING REQUIREMENTS	27

List of Tables

Table 1: Completed White Papers	3
Table 2: Completed Research Projects	4
Table 3: White Papers in Progress	4
Table 4: Research Projects in Progress	5
Table 5: Presentations by NCST Researcher	8
Table 6: NCST Sponsored and/or Organized Events	10
Table 7: NCST Meetings	11
Table 8: Media and Online Engagement Summary	12
Table 9: Research Projects and White Papers that Will Start In Next Reporting Period.....	16
Table 10: Upcoming Presentations by NCST Researchers	17
Table 11: Upcoming NCST Sponsored and/or Organized Events	17
Table 12: Upcoming NCST Meetings.....	18
Table 13: Planned Media and Online Engagement Activities.....	18
Table 14: Current Membership of NCST Leadership Council	22

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.

Specific actions NCST is taking to achieve our goals include:

- 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 greenhouse gas (GHG) emissions and other environmental impacts; and
- delivering knowledge and tools to state departments of transportation, Metropolitan Planning Organization (MPOs), and local governments to support implementation of these real-world strategies.

What was accomplished under these goals?

During this report period (October 1, 2015 to March 31, 2016), the NCST advanced our goals by accomplishing the following administrative, research, engagement, and educational activities:

Administrative Accomplishments

- The NCST Executive Committee conducted two teleconference meetings to discuss and coordinate activities and held an in-person meeting at the Annual Meeting of the Transportation Research Board in Washington, D.C. in January.
- All of the NCST universities partners coordinated on the Call for Proposals (CFP) for Year 3 research projects. UC Riverside and UC Davis released CFPs for Year 3 research projects for both USDOT and Caltrans funding on March 1, 2016, with proposals due April 1, 2016. METRANS released CFPs for Year 3 research projects for both USDOT and Caltrans funding on March 11, 2016, with proposals due April 15, 2016. Georgia Tech is currently incorporating comments from Susan Handy into its CFP for Year 3 USDOT funded research projects and plans to release the CFP for Year 3 projects in

the coming month. Vermont is allocating Year 3 funding to on-going projects and to new white papers.

- All of UC Davis's Year 2 projects (both federally funded and Caltrans funded) were launched during this reporting period. During this reporting period, UC Davis completed 8 projects.
- During this reporting period, UC Riverside launched one Caltrans research project and completed 2 research projects.
- During this reporting period, METRANS launched six research projects, completed two projects, and submitted draft final reports for two projects.
- Georgia Tech launched Year 2 projects, including federally funded projects and projects funded by the Georgia Department of Transportation.
- Vermont coordinated its Graduate Certificate in Sustainable Systems and Planning and graduate students funded on research projects.
- The California universities are working together to pursue additional matching funds from the South Coast Air Quality Management District.

Research Accomplishments

To date, NCST has 11 completed white papers (Table 1), 10 completed research projects (Table 2), 9 white papers (Table 3) in progress, and 42 research projects (Table 4) in progress. Many research projects involve collaborations across partner institutions, and all projects incorporate technology transfer activities designed to link research to policy and practice. Highlights of NCST research activities include the following:

- **UC Davis** researchers completed a white paper on the future of passenger travel demand in the U.S. and presented their assessment at the Annual Meeting of the Transportation Research Board and other venues. The white paper is related to a Caltrans-funded project examining the travel behavior and aspirations of the Millennial generation through a state-wide survey launched in October 2015. Preliminary results suggest that Millennials are more likely to use ride-sharing services and less likely to have a driver's license or own a car than the generation that preceded them. However, differences between locations (urban, suburban, rural) tend to be larger than differences between generations. The project team is immersed in analyzing the data to answer a range of questions about the future of travel demand.
- **University of Vermont** researchers are using the detailed transportation model of the Sacramento Area Council of Governments (SACOG) for network criticality research funded by the NCST. In addition, the University of Vermont Transportation Air Quality Lab continues their work examining the composition of biodiesel emissions. University of Vermont also prepared data and drafted the report for the biannual State of Vermont Transportation Energy Profile, an on-going activity of the Vermont Agency of Transportation.
- **Georgia Tech** has launched an online version of its Fuel and Emissions Calculator (FEC)

and can be found at: fec.ce.gatech.edu. The FEC has been validated with real-world data. Georgia Tech’s MOVES-Matrix is seeking regulatory approval from U.S. Environmental Protection Agency. The project team transferred the Vermont MOVES-Matrix to University of Vermont and developed linkages between VISSIM and MOVES-Matrix for near-real time emissions estimation. Georgia Tech also completed a white paper on eco-driving applications for transit vehicles. The white paper has undergone reviews by industry leaders and have received positive comments overall. Georgia Tech incorporated reviewer comments and submitted a revised final to UC Davis for posting on the main NCST website. A webinar highlighting findings from this paper is scheduled for May 5, 2016, and will feature guest respondents from Georgia Regional Transportation Authority and the American Public Transportation Association.

- **METRANS** submitted a final research report for a subtask within a larger collaborative project with UC Riverside entitled “Eco-Friendly Intelligent Transportation System Technology (ECO-ITS) for Freight Vehicles”. This project funded by the California Energy Commission (CEC). The project is examining new ECO-ITS techniques specifically designed for heavy-duty vehicles and freight traffic, such as connected eco-driving and eco-routing; truck platooning; eco-freight signal priority; and integrated ramp metering and variable speed limits. These truck-based ECO-ITS technologies will take advantage of real-time traffic sensing and telematics, allowing for a traffic management systems to better monitor truck traffic speed, density, and flow and then communicate information in real-time back to the vehicles. Dr. Matt Barth at UC Riverside will continue work on this project and submit a final report to the CEC in September 2016.

Table 1: Completed White Papers

University	Title of White Paper	Funder
GT	Eco-Driving for Transit	USDOT
UCD	Strategies for Transitioning to Low-Carbon Emission Trucks in the United States	USDOT
UCD	A Funding Compromise Can Set Transportation on Path Towards Sustainability	USDOT
UCD	Actual Results May Vary: A Behavioral Review of Eco-Driving for Policy Makers	USDOT
UCD	The Effect of Land Use Policies and Infrastructure Investments on How Much We Drive: A Practitioner’s Guide to the Literature	USDOT
UCD & GT	Future of Passenger Travel Demand in the United States	USDOT
UCD	Measuring Land Use Performance: Policy, Plan, and Outcome	USDOT
UCD	The Role of Life Cycle Assessment in Reducing Greenhouse Gas Emissions from Road Construction and Maintenance	Caltrans
UCR	Reducing Carbon Footprint of Freight Movement through Eco-Driving Programs for Heavy-Duty Trucks	USDOT
UCR	Intelligent Transportation Systems for Improving Traffic Energy Efficiency and Reducing GHG Emissions from Roadways	USDOT

UVM	Challenges and Opportunities for Integrating Climate Adaptation Efforts across State, Regional and Local Transportation Agencies	USDOT
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Table 2: Completed Research Projects

University	Title of Research Project	Funder
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
UCD	Understanding Factors that Lead to Electric Bicycles for Bay Area Users with Children	USDOT
UCD	Mandating Green: On the Design of Renewable Fuel Policies and Containment Mechanisms	USDOT
UCD	Do California Highways Act as Barriers to Gene Flow for Ground-Dwelling Mammals?	Caltrans
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
UCD	Exploring Unintended Environmental and Social-Equity Consequences of Transit Oriented Development Using a Spatial Economic Land Use and Activity-Based Microsimulation Model	Caltrans
UCD	Program for Vehicle Regulatory Reform: Assessing Life Cycle-Based Greenhouse Gas Standards	USDOT
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	Caltrans
UCR	Environmentally Friendly Driving Feedback Systems Research and Development for Heavy Duty Trucks	Caltrans
USC	Spatial Dynamics of the Logistics Industry and Implications for Freight Flows	Caltrans

Table 3: White Papers in Progress

University	Title of White Paper	Funder
UCD & GT	You Can Get There From Here: New Perspectives on Transportation Equity	USDOT
UCD & UCR	Environmental Impacts of Autonomous Vehicles	USDOT
UCD	Supporting Sustainable Transportation: Redefining State Practices for Allocating Transportation Funding in California	USDOT
UCD	Strategies for Transitioning to Zero-Emission Passenger Vehicles	USDOT
UCD	Freight Efficiency: Maximizing Assets, Off Peak Strategies	Caltrans

UCD	Freight Efficiency: Collaborative Logistics	Caltrans
USC	Freight Efficiency: Information Technology	Caltrans
USC	Freight Efficiency: Hub Modernization	Caltrans
USC	Freight Efficiency: Planning and Policy Harmonization	Caltrans

Table 4: Research Projects in Progress

University	Title of Research Project	Funder
CSULB	Impact of Legislative Mandates on Transportation Workforce Capacity	USDOT
CSULB	Analysis and Optimization Methods for Centralized Processing of Chassis	USDOT
CSULB	Introducing the Resilience into the State Transportation Network	Caltrans
CSULB	Sustainable Mitigation of Stormwater Runoff Through Fully Permeable Pavement	Caltrans
GT	Improved Emissions Models for Project Evaluation	USDOT
GT	Strategies for Reducing Emissions from Heavy Duty Vehicles – Online GHG Calculator for Heavy-Duty Vehicles	USDOT
GT	Using Technology to Expand Mobility Options – Innovative Data Collection to Improve Transit Service Assessment	USDOT
GT	Year 2 Eco-driving for Transit Vehicles	USDOT
UCD	Accelerating Commercialization of Alternative and Renewable Fuels and Vehicles	CEC
UCD	Assessment of Critical Barriers to Alternative and Renewable Fuel and Vehicle Deployment	CEC
UCD	Bicyclist Behavior in San Francisco: A Before-and-After Study of the Impact of Infrastructure Investments	Caltrans
UCD	Equity Impacts of Vehicle Fees to Support Zero Emission Vehicle Sales in California	USDOT
UCD	Electric Vehicle Consumers in China	USDOT
UCD	Accelerating Commercialization of Alternative and Renewable Fuels and Vehicles	CEC
UCD	Deployment of Sustainable Fueling/Charging Systems at California Highway Safety Rest Areas	Caltrans
UCD	Dynamic Ridesharing: Simulation of System-Level Travel Effects Using Agent-Based Demand and Supply Models in the Sacramento Region (Caltrans)	Caltrans
UCD	High Impact Prioritization of Bike Share Program Investment to Improve Underserved Communities' Access to Jobs and Services	USDOT
UCD	Highway and Ecosystem Monitoring and Adaptation to Sea Level Rise	USDOT

UCD	Stochastic Multi-agent Optimization Model for Addressing Risk and Equity Issues in Sustainable Transportation Energy System Planning	USDOT
UCD	The Effect that State and Federal Housing Policies on Vehicle Miles of Travel	Caltrans
UCD	The Impact of Residential Location, Lifestyles and Emerging Technologies on the Travel Behavior and Vehicle Ownership of Young Adults (“Millennials”) in California	Caltrans
UCD	Tracking Land Use Changes that Support Sustainable Mobility	Caltrans
UCD	Using Noninvasive Genetics to Compare How a California Freeway Affects Gene Flow in a Disturbance Averse Versus a Disturbance-Tolerant Species	Caltrans
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
UCD	The Dynamics of Plug-In Electric Vehicles in the Secondary Market and Their Implications for Vehicle Demand, Durability, and Emissions	CARB
UCD & UCR	Potential to Build Current Natural Gas Infrastructure to Accommodate the Future Conversion to Near-Zero Transportation Technology	CARB
UCD & UCR	The Development of Lifecycle Data for Hydrogen Fuel Production and Delivery	CARB
UCR	Using Connected Vehicle Technology for Advanced Signal Control Strategies	USDOT
UCR	Biking in Fresh Air: Consideration of Exposure to Traffic-Related Air Pollution in Bicycle Route Planning	Caltrans
UCR	Cloud Forming Potential of Aerosol from Light-Duty Gasoline Direct Injection Vehicles	USDOT
UCR	Evaluating the Viability of Dimethyl Carbonate as an Alternative Fuel for the Transportation Sector	USDOT
UCR, USC, & UCD	Eco-Friendly Intelligent Transportation System Technology for Freight Vehicles	CEC
USC	Integrating Management of Truck and Rail Systems in Los Angeles	Volvo
USC	Modeling for Local Impact Analysis	Volvo
USC	Reducing Truck Emissions and Improving Truck Fuel Economy via ITS Technologies	USDOT
USC	Routing Strategies for Efficient Deployment of Alternative Fuel Vehicles for Freight Delivery	USDOT
USC	Urban Spatial Structure and the Potential for VMT Reduction	Caltrans

USC	Congestion Reduction through Efficient Empty Container Movement	Caltrans
USC	Sustainability and Displacement: Assessing the Spatial Pattern of residential Moves near Rail Transit	USDOT
UVM	Intercity Travel in Northeastern Non-Metropolitan Regions: What Roles do Information Access and Technology Services Play in Public and Shared Transport Modes?	USDOT
UVM	Assessing Network Criticality for Climate Adaptation Planning	USDOT
UVM	Advancing Models of Intercity Travel: Overnight Models and Mobile Device Data	USDOT

Engagement Accomplishments

In this reporting period, NCST researchers provided 12 presentations on their NCST research, while NCST organized and/or sponsored 38 tech transfer events (including conferences, briefings, and seminars) and held 15 meetings. Engagement highlights during this reporting period are featured below:

UC Riverside organized a major conference on portable emissions measurement systems on March 17-18, 2016, in Riverside, CA. This conference was co-sponsored by NCST and included over 200 attendees from around the world. There were excellent keynote talks from U.S. EPA and U.S. DOE and an interesting forum on the future of vehicle testing in light of the recent VW emissions scandal. From an NCST perspective, new emissions and fuel economy measures will be able to inform regulatory models, as well as the Georgia Tech Fuel and Emissions Calculator.

METRANS hosted the 6th International Urban Freight Conference in Long Beach, CA, over the course of three days in October 2015. The biennial conference was established in 2006 and is recognized as the premier venue for urban freight research. The purpose of this conference is to provide a forum for multidisciplinary research on all aspects of urban freight and raise the visibility of urban freight research. It draws participants from around the world and from not only the research community but from the private sector and government as well. Guest speakers included Greg Winfree, Assistant Secretary, Office of the Assistant Secretary for Research and Technology, USDOT; a panel including Brett Parker of Cargomatic; Randell Iwasaki of Contra Costa Transportation Authority and Chair of the National Freight Advisory Committee; Laetitia Dablanc from The French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR), Mathieu Gardrat from Laboratoire d'Economie des Transports (LET-Lyon), and Benjamin Conwell, Cushman & Wakefield of Washington.



Figure 1: From left to right – Dahlia Garas (NCST Program Manager), Laura Podolsky (NCST Policy Director, Congressman Ami Bera, and Susan Handy (NCST Director).

UC Davis organized a congressional briefing in Washington D.C. on January 12, 2016, on key challenges and trends shaping the future of freight in the United States and opportunities for increasing the efficiency, environmental sustainability, and economic competitiveness of the nation’s freight system. The briefing featured presentations from NCST researchers from University of California, Davis and the University of California, Riverside. Congresswoman Doris Matsui provided opening remarks. There were 73 participants representing local, regional, state, and federal transportation agencies; legislative staff; academia; private

sector consultants; industry; and non-governmental organizations. NCST staff and researchers also organized five briefings with members of congress and/or their staff, including Congressman Ami Bera (Figure 1).

University of Vermont hosted Matt Barth (UC Riverside) who was selected as a featured speaker for the Dan and Carole Burack President’s Distinguished Lecture Series. Dr. Barth discussed the role of Intelligent Transportation Systems (ITS) in advancing sustainable transportation. His seminar was held in a full ballroom with many state stakeholders and community partners in addition to undergraduate and graduate students.

The following tables highlight the range of engagement activities completed during this reporting period, including presentations by NCST researchers (Table 5), events sponsored and/or organized by NCST (Table 6), NCST meetings (Table 7), and NCST social media and online engagement activities (Table 8).

Table 5: Presentations by NCST Researchers on NCST-funded Projects

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>Technology for Sustainable Cities</i>	Caroline Rodier, UC Davis	California 2030: Local Actions for a Global Impact Forum	UC Los Angeles campus

Date	Title	Speaker(s)	Event	Location
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 (Georiga Tech / 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
11/4/15	<i>Innovative Mobility in the Era of Automation</i>	Caroline Rodier, UC Davis	Podcar City 9 Conference	Silicon Valley, 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
11/18/15	<i>Warehouse Locations and Community Impacts</i>	Sanggyun Kang and Quan Yuan, USC	FHWA Talking Freight Webinar Series	online
12/2/15	<i>Financing Affordable Housing in Amenity-Rich, Walkable Locations</i>	Deb Niemeier, UC Davis	Governor’s Office of Planning and Research Brown Bag Speaker 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.
1/26/16	<i>Measuring Land Use Performance: Policy, Plan, and Outcome</i>	Gian-Claudia Sciara, UC Davis	Planning Horizons - Caltrans Seminar Series	Sacramento, CA
3/13/16 - 3/16/16	<i>Measurement Methods: Improvements and New Techniques</i>	Tom Durbin, UC Riverside	2016 CRC Real World Emissions Conference	Newport Beach, CA
3/30/16	<i>What’s Transportation’s Future?</i>	Dan Sperling, UC Davis	<i>CA Association of Council of Governments Regional Leadership Forum</i>	Monterey, CA

Table 6: NCST Sponsored and/or Organized Events

Date	Event Name	Description	Organizer	Location
10/6/15	Emerging Leaders in Public Policy and Service Fellowship Forum	This event brought together students, faculty, and staff from UC Davis; NGOs, and state agencies to discuss how to better connect research to policy development.	UC Davis	UC Davis Campus
10/21/16	Dan and Carole Burack President's Distinguished Lecture Series	Matt Barth (UC Riverside) served as a featured speaker to discuss his research on the role of ITS in advancing sustainable transportation.	UVM	Burlington, VT
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	This event engaged 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
12/9/15	Environmental Assessment of a Full Electric Transportation Portfolio	Special presentation by the Electric Power Research Institute on their latest research on electric vehicles.	UC Davis	UC Davis Campus
1/12/16	Capitol Hill Briefing: Increasing the Efficiency and Economic Competitiveness of the Nation's Freight System	This briefing engaged federal legislative staff and featured presentations by Matt Barth, UC Riverside; Miguel Jaller, UC Davis; and Lew Fulton, UC Davis.	UC Davis	Washington, D.C.
1/22/16	The Role of Pavement in Reducing GHG Emissions	This briefing was organized for CA legislative staff and featured a presentation by John Harvey (UC Davis).	UC Davis	Sacramento, CA

Date	Event Name	Description	Organizer	Location
3/17/16 – 3/18/16	6th International Portable Measurement Emissions Measurement Systems (PEMS) Conference & Workshop	Over 200 people representing companies, agencies, and institutions from across the country and world. Presentations covered regulatory development and trends; approaches for measuring in-use PM; current and future research developments; and development of new instrumentation for in-use testing.	UC Riverside	Riverside, CA
3/30/16	Next Generation Incentives and Policies for Growing the Zero-Emission Light-Duty Vehicle Market	This briefing provided NCST funders an update on NCST research activities, highlighted completed research, and provided a venue for NCST to engage with funders regarding implication of research on policy and practice.	UC Davis	Sacramento, CA
3/30/16	Center for International Trade and Transportation Town Hall	This event engaged leaders from government, industry, and academia to discuss how new supply chain partnerships are changing the way goods are moved.	CSU Long Beach	Long Beach, CA

Table 7: NCST Meetings

Date	Purpose and Description	Location
10/20/15	NCST Executive Committee conference call	N/A
10/27/15	UC Davis met with transportation research departments from CEC, ARB, and Caltrans	Sacramento, CA
10/30/15	UC Davis met with local government engineers, Caltrans, and local government associations to discuss the creation of a research and outreach center at UC Davis focused on local government pavement issues	Davis, CA
12/16/15	UC Davis met with CA Senate Transportation and Housing Committee staff to discuss current research efforts and research needs	Davis, CA
1/11/16	Networking meeting with all environmental UTCs	Washington, D.C.
1/12/16	Meeting among all five directors of National UTCs	Washington, D.C.
1/12/16	NCST Executive Committee meeting	Washington, D.C.
1/12/16 and 1/13/16	UC Davis researchers and staff provided individual briefings to five federal legislators and/or their staff. UC Davis staff also met with AASHTO Center for Environmental Excellence,	Washington, D.C.

Date	Purpose and Description	Location
	National League of Cities, FHWA, National Association of Counties, Smart Growth America, and Transportation for America to provide updates on research and discuss partnerships for engaging policy makers and practitioners.	
2/3/16	UC Davis met with transportation research departments from CEC, ARB, and Caltrans	Sacramento, CA
3/11/16	NCST Executive Committee conference call	N/A

Table 8: Media and Online Engagement Summary

Media Platform	Activity
YouTube	CSULB produced a video featuring interviews with transportation leaders discussing some of the most pressing issues, challenges, and opportunities for creating a more sustainable transportation system. https://youtu.be/cDLU9W45H40
Web Page	The main NCST website (ncst.ucdavis.edu) had 5,812 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 17,436 page views.
Online Engagement	NCST manages two social media accounts (Twitter and LinkedIn) to disseminate research results, news, events, and other updates; and to engage with policymakers and practitioners. In addition, UVM manages Twitter and Facebook accounts; METTRANS manages Twitter, Facebook, and LinkedIn accounts; and UC Davis manages separate Facebook and Twitter 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. UC Davis faculty, staff, and researchers also attend the seminars, as do state and local agency staff and community members. The following are seminars that occurred during the reporting period:

- **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
- **From Trend Spotting to Trend Setting: Behavioral Analysis to Guide Transformative Mobility** - Joan Walker, Associate Professor, Department of Civil and Environmental Engineering; Co-Director, Center for Global Metropolitan Studies, UC Berkeley
- **Why Is It So Difficult To Implement Sound Freight Policies?** - Jolanda Prozzi, Program Manager, Research Scientist, Environment and Planning, Texas A&M Transportation Institute
- **What is Complete Trip and How Do We Achieve It?** - Ron Kilcoyne, General Manager, Lane Transit District
- **High-Speed Rail: Connecting and Transforming California** - Dan Richard, Chair, Board of Directors, California High-Speed Rail Authority
- **Social Networks and Travel Behavior: An Investigation into the Role of Social Influence in the Transportation Mode Choices of Students** - Susie Pike, Postdoctoral Researcher, ITS-Davis and Center for Environmental Policy and Behavior, UC Davis
- **What Does a 'Sustainable' Neighborhood Development Pattern Look Like: Past, Present, Future Fused Grids and Beyond** - Gord Lovegrove, Associate Professor, School of Engineering, Sustainable Transport Safety Research Laboratory, The University of British Columbia
- **Household and Firm Responses to Gasoline Prices and Energy Policy** - William Chi Chiao Leung, Postdoctoral Researcher, Economics Department, UC Davis and Economics Fellow, California Air Resources Board
- **Making Geosense of Transportation, Trade, Environment, and Energy: Indicators, Impacts, and Opportunities for International Shipping** - James Corbett, Professor, School of Marine Science and Policy, University of Delaware
- **The Sustainable Urban Mobility Plans (SUMP) in Europe: Planning Walking and Sojourning in Streets and Public Spaces** - Thanos Vlastos, Professor of Urban & Transport Planning at National Technical University of Athens (NTUA), School of Surveying Engineering, Department of Geography and Regional Planning
- **Incentivize It and They Will Come: How Local Governments Are Leveraging Airline Incentive Programs to Grow Air Service** - Megan S. Ryerson, Assistant Professor, Department of City and Regional Planning, Department of Electrical and Systems Engineering, University of Pennsylvania

METRANS also hosts regularly scheduled seminars featuring a range of speakers from partner institutions and other academic institutions. The following seminars occurred during the reporting period:

- **Noise Mapping of Container Terminals at Ports of Long Beach and Los Angeles** – I-Hung Khoo, Professor, Department of Electrical Engineering, CSU Long Beach; and Tang-Hung Nguyen, Professor, Department of Civil Engineering and Construction Engineering Management, CSU Long Beach
- **Tracking Truck Movements at the Ports of Long Beach and Los Angeles** – Burkhard Englert, Chair Department of Computer Science, CSU Long Beach
- **A Progress Report on Parking Reforms** – Donald Shoup, Professor and Chair of the Department of Urban Planning, University of California Los Angeles
- **Tracking Truck Flows with Programmable Mobile Devices for Drayage Efficiency Analysis** – Shui Lam, Professor, Computer Engineering and Computer Science Department, CSU Long Beach
- **Development of Micro Wireless Sensor Platforms for Collecting Data of Passenger-Freight Interactions** – Mohammad Mozumdar, Assistant Professor, Department of Electrical Engineering, CSU Long Beach
- **Cars that Kill? The Effect of Fuel Economy Standards on Vehicle Weight Dispersion and Safety** – Antonio M. Bento, Professor, Sol Price School of Public Policy, University of Southern California
- **Analysis and Prediction of Spatiotemporal Impact** – Cyrus Shahabi, Director, Integrated Media Systems Center, USC Viterbi School of Engineering; and Ugur Demiryurek, Associate Director, IMSC, USC Viterbi School of Engineering
- **Urban Design and Street Typology: Do They Matter?** – William Riggs, Assistant Professor of City & Regional Planning, College of Architecture and Environmental Design, Cal Poly San Luis Obispo
- **Is Los Angeles Becoming Transit Oriented?** – Genevieve Giuliano, Director, METRANS Transportation Center, USC Sol Price School of Public Policy
- **Regional Governance of a Port in China** – Paige Zhuang, Visiting Scholar, California State University Long Beach; Professor, Maritime College, Ningbo University, China

METRANS also organizes an informal “Lunch with a Practitioner” series, which provides a forum for students to meet and learn from practitioners throughout the transportation industry, from recent graduates through senior professionals, from planning and engineering, and from both the public and private sectors. METRANS hosted the following practitioners in this reporting period:

- Steven Mateer, Transportation Planning Manager IV, Los Angeles Metropolitan Transportation Authority
- John Lower, Associate Vice President, Iteris, Inc.

Educational Accomplishments

Sustainable Curriculum Development: Georgia Tech completed the Transportation and Energy online course syllabus. The course includes five academic units. There is also a mid-semester unit in which students present transportation sector presentations and fuel system model

posters. Students in the semester version of the class will present final project in the final unit. Each academic unit is composed of a series of modules, which represent the traditional 1.5 to 2 hours of lecture material presented in class. These lectures are being broken down into 7 - 10 minute mini lectures accessed online. The Georgia Tech team starts filming the lectures the week of March 28, 2016.

Educational Courses and Conferences: In conjunction to the PEMS conference (see above), UC Riverside held a targeted educational course on secondary emissions processes. This short course was held at the end of the conference and was attended by approximately 50 people. UC Riverside also organized its annual STEP Student Conference in November 2015. The purpose of this conference is to inspire California's youth to pursue education and careers in the fields of science, engineering, mathematics, and technology through hands-on experience.

Student Travel: UC Davis provided travel funding for six students to present their transportation related research at TRB in Washington D.C. in January 2016. Vermont funded three students to travel to TRB and UC Riverside funded several travel awards to students to attend TRB this year as well.

Fellowships: UC Davis released a call for Dissertation Grants with proposals due April 29, 2016.

Summer Student Exchange Program: Last year UC Riverside and UC Davis established a student exchange summer research program for graduate students to conduct transportation research. This year, the program will expand to include all partner institutions.

How have the results been disseminated?

The engagement activities listed above are the main avenues for NCST research dissemination and engagement with stakeholders. In addition to what is listed above, NCST also produces policy briefs (Figure 2) for all research projects and white papers. The policy briefs distill key research findings into a one-page document that is targeted to a policymaker and practitioner audience. Currently, NCST has 10 policy briefs posted to our website for download.

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

Planned Administrative Activities

The Center Director and Program Manager will monitor ongoing projects via quarterly reports to ensure projects are progressing on schedule and that final deliverables and products (research reports and policy briefs)



Figure 2: Policy brief highlighting findings from UC Riverside's white paper examining the potential of Intelligent Transportation Systems applications in reducing energy use and emissions.

are completed and results disseminated effectively. All NCST partner universities will be collecting proposals for Year 3 USDOT-funded research projects and the California universities will be collecting proposals for Year 3 Caltrans-funded research projects. All proposals will be circulated for external review and prioritized for funding. The Year 3 funding cycle will support an estimated 20 - 28 projects, which will most likely include a combination of white papers and research projects.

The NCST Executive Committee will continue to have quarterly conference calls.

Planned Research Activities

Researchers at each of the consortium universities will continue work on white papers and research projects that have been initiated and are in progress (see Tables 3 and 4). We expect 20 research projects and 9 white papers to be finalized during the next reporting period. We also expect several projects to begin in the next reporting period (Table 9).

Table 9: Research Projects and White Papers that Will Start In Next Reporting Period

University	Project Description	Funder
UCR	White paper summarizing the safety, mobility and environmental sustainability co-benefits and tradeoffs of intelligent transportation systems.	Caltrans
UCD	White paper summarizing the expected environmental effects of new mobility services and critically evaluate the empirical and modeling evidence that test these effects.	Caltrans
USC	White paper will include: (1) summary of the available literature on whether and how transportation is related to local economic development, (2) discussion on theoretical and data challenges on this topic in a way that will contribute to a research agenda, and (3) suggested best practices for incorporating the evidence on transportation and local economic impacts into transportation decision-making.	Caltrans
USC	White paper examining the sustainability of building affordable housing in transit-oriented developments.	Caltrans
CSULB	Research project investigating the current state of resilience of the state transportation network system and survey of the current policy planning and research projects aiming to bring resilience to the different state transportation mode, with the purpose of recognizing uncertainties to the California transportation system and further identifying one resilient and survivable networking tool enabling the state transportation network system to provide acceptable service in the face of various challenges including unusual but legitimate traffic load and large-scale natural disasters.	Caltrans
UVM	White paper on long distance travel.	USDOT

Planned Engagement Activities

NCST will continue organizing and participating in a wide range of activities to disseminate research results and engage with relevant stakeholders and policy makers. Activities that have been planned to date are listed in Tables 11, 12, and 13.

Table 10: Upcoming Presentations by NCST Researchers

Date	Title	Speaker(s)	Event	Location
4/6/16	<i>Featured Goods Movement Lecture</i>	Genevieve Giuliano, USC	Harvey S. Perloff Lecture Series	Los Angeles, CA
4/8/16	<i>The Science Behind Sustainable Communities</i>	Susan Handy, UC Davis	UC Davis Capitol Speaker Series	Sacramento, CA
4/12/16 - 4/14/16	<i>Powering Possibilities</i>	Tom Durbin, UC Riverside	2016 SAE World Congress	Detroit, MI
5/25/16	<i>"Mobility of Millennials"</i>	Giovanni Circella, UC Davis	Planning Horizons-Caltrans Seminar Series	Sacramento, CA

Table 11: Upcoming NCST Sponsored and/or Organized Events

Date	Event Name	Description	Organizer	Location
4/6/16	NCST Funders' Briefing: New Solutions for Building and Operating Roadways to Achieve Greenhouse Gas Reductions	This briefing will provide an update on NCST research and engage funders regarding implication of research on policy and practice.	UC Davis	Sacramento, CA
5/5/16	NCST Webinar: Eco-Driving to Reduce Emissions for Buses	This webinar will feature a presentation by Yanzhi (Ann) Xu (Georgia Tech) and guest respondents from American Public Transportation Association and Georgia Regional Transportation Authority.	UC Davis	Online
6/13/16 – 6/15/16	International Conference on Transport & Health	This conference will bring together policymakers, practitioners, and academics to share stories of success and failure, build collaborations, and find inspiration.	Transportation Public Health Link and the Mineta Transportation Institute	San Jose, CA

Table 12: Upcoming NCST Meetings

Date	Purpose	Location
4/12/16	NCST Executive Committee conference call	N/A
6/6/16 -6/9/16	CUTC Summer Meeting (hosted by METRANS)	Los Angeles, CA
7/19/16	NCST Executive Committee conference call	N/A

Table 13: Planned Media and Online Engagement Activities

Media Platform	Activity
YouTube	All UC Davis seminars are recorded and posted on YouTube. Susan Handy's April 8 th presentation at the California Capitol Building will be posted for online viewing.
Web Page	UC Davis will continue to update the NCST main website. METRANS and UVM will maintain a NCST page on their websites. Georgia Tech will manage an outreach web page for their fuel emissions calculator for transit vehicles.
Online Engagement	UC Davis will continue manage NCST's two social media accounts. UVM will continue to manage its two social media accounts; METRANS will continue to manage its three social media accounts; and UC Davis will continue to manage its two separate social media accounts.

In addition to presentations described above, weekly UC Davis seminars will continue with support from the NCST, including the following seminars:

- **The Potential of Volunteered Geographic Information (VGI) on Future Transport Systems** - Maria Attard, Professor, University of Malta, Department of Geography, Faculty of Arts, Director, Institute for Climate Change and Sustainable Development
- **LOS to VMT: A Paradigm Shift in Transportation Planning** - Chris Ganson, Senior Planner, Governor's Office of Planning and Research
- **Efficiency Measurement and the Design of Engineered Systems for Resilience: Themes and Future Research Opportunities** - Konstantinos (Kostas) Triantis, John Lawrence Professor of Industrial Engineering and Operations Research, National Capital Region Senior Advisor, Chair, National Capital Region College of Engineering Executive Committee, Grado Department of Industrial and Systems Engineering, Adjunct Professor of Civil and Environmental Engineering, Virginia Tech
- **Road Ecology and Transformative Change in Sustainable Transportation** - Fraser Shilling, Co-Director, Road Ecology Center, Dept. of Environmental Science and Policy, UC Davis

- **Improving Air Transportation System Performance through Coordinated Speed Control** - Michael O. Ball, Robert H Smith School of Business & Institute for Systems Research University of Maryland and Civil & Environmental Engineering, UC Berkeley
- **Why Don't Teenagers Drive Anymore? Factors Associated With Delayed Driver's License Acquisition Among High School Students** - Rodney Brown, Engineer/Planner at Fehr & Peers
- **Emerging Best Practices to Accelerate Electric Vehicle Deployment** - Nic Lutsey, Program Director, The International Council on Clean Transportation (ICCT)
- **The Rise of Electric Bikes in the US: An Analysis of their Roots, their Early Adopters, and Implications on Urban Transportation** - Jonathan Weinert, Sales and Marketing Manager, Robert Bosch LLC, Automotive Electronics, Bosch eBike Systems

METRANS will also continue to organize seminars. Below are seminars currently scheduled:

- **Cities and Economic Growth** – Peter Gordon, Professor Emeritus, USC Sol Price School of Public Policy
- **Will Millennials Keep their Driving Low When they Move Back to the Suburbs?** - Xize Wang, Ph.D. Candidate in Urban Planning, USC Sol Price School of Public Policy

METRANS will also continue its popular “Luncheon with a Practitioner” series with the next one scheduled for April featuring Michael Lin (Research Analyst, Human Capital, Regional Economics, Milken).

Planned Educational Activities

The Georgia Tech team plans to finish filming of the transportation and energy course, and deliver the course content via HELIX to all partners that are interested.

UC Davis is working with UC Davis Extension on developing a one-day course for Caltrans staff examining various scenarios of how automated vehicles may impact the built environment. Two workshops are scheduled in California for Caltrans staff in May 2016 (one in Irvine and one in Sacramento). The course will draw on qualitative scenario planning methods. To ensure a common baseline of knowledge among workshop participants, the instructor will present an introduction to automated vehicles and three panelists will engage in in-depth discussions of automated vehicle related issues that California agencies are facing.

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 is to build collaborations between the schools and to give students exposure to new research methods and approaches not used at their own schools. The summer exchange in 2015 was valuable for the students and faculty involved, and provided a useful learning experience for staff supporting the exchange. NCST is working to expand the program to include all NCST partner campuses for Summer 2016.

UC Davis will offer research grants for incoming students for the 2016/17 academic year based

on new student applications. UC Davis will review the proposals for 2016/17 Dissertation Grants, due April 29, 2016, and will select and process those fellowships. UC Davis will continue to award travel grants to students who are presenting transportation related research at academic and professional conferences and events, such as supporting the UC Davis Institute of Transportation Engineers student team in travelling to the MidPac conference where they will compete against other engineering groups in designing a the most cost effective and efficient signalized intersection for a newly built mega mall in the Reno, Nevada, area.

During the next reporting period, METRANS (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. Efforts will also be made to extend the reach of the training by offering it throughout the NCST network of schools and transit partners (including campus bus operators). Exit interviews will be conducted with training participants to gauge the success of the program. This approach leverages METRANS's earlier FTA grant while creating a learning platform that can be used for other training modules.

PRODUCTS

Forty-two of the fifty-two research projects funded by the NCST to date are on-going, and thus final products have not yet been released. However, the 10 completed projects and many of the on-going projects have deployed and/or developed products in the past six months, including the following examples:

TOOLS/INSTRUMENTS

1. The new design of FEC website and online tool will go live by March 2016 (fec.ce.gatech.edu)

PEER-REVIEWED PUBLICATIONS

1. Aultman-Hall, Lisa and Jonathan Dowds (2016). Role and Position of Local Agencies in Climate Adaptation Planning. 95th Annual Transportation Research Board Meeting Conference, January, Washington, D.C.
2. LaMondia, Jeff, Michael Moore and Lisa Aultman-Hall. (2015) Modeling Inter-Trip Time Intervals Between Individuals' Overnight Long-Distance Trips. *Transportation Research Record* 2495. DOI: <http://dx.doi.org/10.3141/2495-03>
3. Li, H., Haobing Liu, Y. Xu, M.O. Rodgers, R. Guensler (2015). Performance of Multiple Alternatives to Reduce Carbon Emissions for Transit Fleets: A Real-world Operations Perspective (CUE2015-80). CUE2015-Applied Energy Symposium and Summit 2015. Fuzhou, Fujian, China. November 15-17, 2015. In: *Energy Procedia* (Elsevier).
4. Sullivan, James, Jeffrey LaMondia, Chester Harvey, Carter Garrison** and Lisa Aultman-Hall. An Analysis of the Long Distance and Overnight Travel Tour-Planning Process. Forthcoming *Transportation Research Record*.
5. Xu, Y., F. Gbologah, H. Liu, M.O. Rodgers, and R. Guensler (2015). "Assessment of Alternative Fuel and Powertrain Transit Bus Options using Real-world Operations Data: Life-cycle Fuel and Emissions Modelling." *Applied Energy*. Volume 154, Number 15. pp. 143-159.

6. Xu, Y., H. Li, H. Liu, M.O. Rodgers, R. Guensler (submitted). Eco-driving for Transit: An Effective Strategy to Conserve Fuel and Emissions. *Applied Energy*.
7. Xu, X., Y. Zhao, Y. Xu, M.O. Rodgers and R. Guensler (abstract submitted). "Hybrid Intercity Buses: Fuel Consumption, Emissions, and Life-cycle Cost Analysis." 22nd National Conference on Rural Public and Intercity Bus Transportation. Asheville, NC. October 2-5, 2016.
8. Zhang, Y. and P. Ioannou, ' Combined Variable Speed Limit and Lane Change Control for Highway Traffic' submitted to *IEEE Transactions on ITS*, February 2016.
9. Zhao, Y., X. Xu, R. Guensler and M.O. Rodgers (abstract submitted). "Cost-effectiveness of Alternative Fuel and Powertrain Options for Rural Public Transportation: A Life-Cycle Assessment." 22nd National Conference on Rural Public and Intercity Bus Transportation. Asheville, NC. October 2-5, 2016.

OTHER PUBLICATIONS

1. Master's Thesis from the UVM project "Intercity Travel in Northeastern Non-metropolitan Regions: What Roles Do Information Access and Technology Services Play in Public and Shared Transport Modes?"

POSTERS and PRESENTATIONS

1. Aultman-Hall, Lisa, Chester Harvey and Jim Sullivan (2016). "Framing Classes of Long-Distance Travel." Transportation Research Board Annual meeting, Washington D.C. January 2016.
2. Coen, Amanda (2016). "Do California Highways Act as a Barrier to Gene Flow for Ground-Dwelling Mammals?" The Western Section of the Wildlife Society 2016 Annual Meeting Poster Session. Pomona, CA. February 26, 2016.
3. Zhang, Yihang and P. Ioannou (2015). "Combined Variable Speed Limit and Lane Change Control for Highway Traffic." IEEE Conference on Intelligent Transportation Systems 2015. Las Palmas, Canary Islands, Spain. September 2015,
4. Zhang, Y. and P. Ioannou (2016). "Environmental Impact of Combined Variable Speed Limit and Lane Change Control: A Comparison of MOVES and CMEM Model", 2016 IFAC Symposium on Control in Transportation Systems. Istanbul, Turkey. May 2016.

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 (<http://www.mettrans.org/uc-davis-national-center-sustainable-transportation>) and UVM (<http://www.uvm.edu/trc/collaborative-research/>). Georgia Tech has created an online site for its Fuel and Emissions Calculator (<http://fec.ce.gatech.edu/>). Additional information about websites and other internet sites (such as social media accounts) is covered in sections above.

PARTICIPANTS AND OTHER COLLABORATING ORGANIZATIONS

Our key partners are the members of our consortium, which include the University of California, Davis; University of California, Riverside; University of Southern California; California State University, Long Beach; Georgia Institute of Technology; and the University of Vermont. NCST also makes an effort to stay connected with the regional environmental UTCs. We regularly post research results from the other environmental UTCs on our social media sites, and NCST schedules a meeting among all the environmental UTCs at the annual TRB conference. NCST also facilitates a meeting among all of the Directors of UTC National Centers at the annual TRB conference.

NCST has regular interactions with all of our funders at all stages of our research – selecting projects, providing guidance while research is in progress, and assisting with dissemination once a project is completed. The following entities are providing funding for NCST projects and engagement activities:

- United States Department of Transportation
- California Department of Transportation (Caltrans)
- California Air Resources Board (CARB)
- California Energy Commission (CEC)
- Volvo Research and Educational Foundation (Volvo)
- Georgia Department of Transportation
- Vermont Agency of Transportation
- University support from all partner universities

The NCST’s Leadership Council provides ongoing guidance on the research needs and policy challenges of public agencies in advancing environmental sustainability. A few changes have been made to the Leadership Council in this reporting period. Barry Wallerstein (South Coast Air Quality Management District), Lynn Peterson (Washington State Department of Transportation), and Kevin Desmond (King County Metro Transit) are no longer serving in their positions. The current membership of the NCST Leadership Council is presented in Table 14.

Table 14: Current Membership of NCST Leadership Council

Name	Affiliation
John Horsley	American Association of State Highway and Transportation Officials
Hasan Ikhata	Southern California Association of Governments
Brian Kelly	California State Transportation Agency
Joan McDonald	National Infrastructure Advisory Council
Michael Melaniphy	American Public Transportation Association
Sue Minter	Vermont Agency of Transportation
Kirk Steudle	Michigan Department of Transportation
Janea Scott	California Energy Commission

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 for Energy and Transportation, 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.

NCST is also actively working with leaders from industry, government, professional associations, and non-governmental organizations during all stages of our research to ensure our research is addressing the most pressing policy and practice related questions, and delivering results that are timely, relevant, and valuable to policymakers and practitioners. We call upon this broader community of practitioners and professionals to provide external reviews of research proposals, serve on project panels where they provide feedback and direction on specific research projects, participate in tech transfer events (e.g., webinars, conference panels) as guest respondents, review and provide comments on draft reports and policy briefs, and identify high value opportunities for sharing research results with the broader community of practitioners and policymakers.

NCST's Research-in-Action working groups are another avenue for collaborating with state, regional, and local agencies as well as the private sector and non-governmental organizations. NCST's current working groups include Freight Efficiency Strategies Development Group, Urban Footprint Open Source Collaborative, and the Zero Emission Market Acceleration Partnerships (ZE MAP). These groups provide an open and ongoing forum for generating ideas, sharing research results, identifying future research needs, and developing best-practices and policy strategies that put research findings into action. During this reporting period, NCST researchers worked closely with industry leaders and environmental advocates participating in the Freight Efficiency Strategies development Group to develop five white papers on various strategies for improving the efficiency of California's freight operations. Caltrans and ARB are also in this working group and will consider including the strategies identified in these papers into the California Sustainable Freight Action Plan, which will be adopted this summer.

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 as described in the engagement section above. 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:

- *Following Petroleum defeat, Jerry Brown's air board flexes muscle on climate* - David Siders, Sacramento Bee
- *Volkswagen Scandal to Dampen Demand for Diesel Cars as 'Clean Diesel' Image Threatened* - International Business Times
- *Shell Shuts Down Offshore Arctic Drilling After Huge Investment* - NPR Morning Edition
- *Audit: Bus lanes won't have dire impact on El Camino traffic* - San Jose Mercury News
- *Chevron's CEO Calls for U.S. to Lift Crude Export Ban* - Houston Chronicle
- *To save money, states give up on repairing some rural roads* - Scott McFetridge, Associated Press
- *Big Data Makes its presence felt across the energy industry: Q & A, Amy Myers Jaffe* - The National
- *California's DOT Admits That More Roads Mean More Traffic* - Eric Jaffe, CITYLAB from The Atlantic
- *Experts Discuss: What Will the U.S. Energy Industry Look Like Over the Next Five Years?* - Lynn Cook, Wall Street Journal
- *UC Davis expert to take pro-cycling message to Paris climate conference* - Edward Ortiz, The Sacramento Bee
- *Despite Push for Cleaner Cars, Sheer Numbers Could Work Against Climate Benefits* - David Jolly, New York Times
- *California's political center shifts to France for a week* - David Siders, Sacramento Bee
- *Brown expected to tout California climate plan in Paris* - David Bienick, KCRA-TV
- *The Dimming of Diesel Fuel's Future in Cars* - Conrad De Aenelle, New York Times
- *Transportation Researcher Lewis Fulton Reminds Us How Bikes Can Fight Global Warming* - Robert Annis, Bicycling.com
- *Low Gas Prices Expected To Continue In 2016* - Jeff Brady, NPR
- *Buying A New Car Can Trim Your Carbon Footprint, But There's More To It* - John Ydstie, NPR
- *Mideast Crisis Deepens* - MSNBC "Squawk Box"
- *Drive on with a Moveable Feast* - Joanne Richard, Toronto Sun
- *Impacts of Fighting Congestion Through Adding Capacity* - Strong Towns Podcast

- *The market is in a panic: UC Davis director (Video)* - CNBC
- *E-Commerce: Convenience Built on a Mountain of Cardboard* - Matt Richtel, The New York Times
- *California university system drops coal, tar sands investments* - Diana Madson, Yale Climate Connections
- *Alternative Fuels Need More Than Hype to Drive Transportation Market* - Kat Kerlin, UC Davis News

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?

Workshops, training sessions, presentations, and engagement activities organized by NCST engage the transportation workforce at many different levels. Highlights of our impact on workforce development include the following:

- **Georgia Tech** has generated a report on model sustainable transportation curricula (see above); and the team will be developing course materials in the coming reporting period.
- **CSU Long Beach** 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. Tom O'Brien (CSU Long Beach) serves on the SCR TTC Board.
- **METRANS and the University of Vermont** are designated Surface Transportation Workforce Development Centers of Excellence. NCST research helps to inform activities organized by these centers. During this reporting period, the Southwest Transportation Workforce Center (led by METRANS) co-hosted a webinar titled "Innovative Transportation, Distribution, and Logistics Partnerships" with the National Association of

State Directors for Career and Technical Education. The webinar featured teachers, administrators, and industry partners who will provide insights and best practices from innovative education programs and teaching models for grades 6 to 12 students when delivering transportation-related curricula. The Northeast Transportation Workforce Center (led by University of Vermont) conducted two webinars: 1) Innovative Teaching and Transportation Industry Partnerships; and 2) Partners in Transportation Workforce Solutions. Both webinars featured teachers, administrators, and industry partners.

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. NCST partners are also leveraging existing relationships with outside stakeholders and our funders to help share and disseminate information. UC Davis provides central communication, engagement, and outreach support to all NCST partners, such as organizing webinars, developing policy briefs, identifying opportunities for NCST researchers to present at professional conferences, and much more.

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 as well as commentary from guest respondents representing industry, public sector, and/or policy perspectives. NCST is also making research more accessible to busy policymakers and practitioners by distilling key findings and policy implications of our research into 2-page policy briefs.

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 AND/OR PROBLEMS

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

SPECIAL REPORTING REQUIREMENTS

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

Directory of Key Personnel: Information available on the NCST 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/>