

## AGENDA

**Heavy-Duty Diesel Vehicle Inspection and Maintenance Working Group  
Conference Call  
Thursday, August 30, 2018  
10:30 am (US Central Time Zone)**

**Call Information:**

**Call Number: 1-888-909-7654**

**Participant PIN: 504571#**

**Join WebEx:** <https://nctcog.webex.com/nctcog/j.php?MTID=m47131308121647deec71b30ab01ad5e6>

Meeting number: 807 631 082

1. Welcome and Introductions ..... Jason Brown, NCTCOG
2. Heavy Duty (HD) Truck On-Board Diagnostics (OBD)
  - a. Current State of HD OBD and Future Plans ..... Mark Zachos, DG Technologies
  - b. Interest in Future OBD Efforts ..... Chris Klaus, NCTCOG
3. CARTEEH Briefing ..... Joe Zietsman, Texas A&M Transportation Institute
4. On-Road Emissions Measurement Device Survey ..... Shawn Dintino, NCTCOG
5. Partner Updates:
  - a. Arizona Department of Environmental Quality
  - b. California Air Resources Board
  - c. Clark County, Nevada
  - d. Colorado Department of Public Health & Environment
  - e. Connecticut Department of Motor Vehicles
  - f. Environmental Protection Agency
  - g. Massachusetts Department of Environmental Protection
  - h. New Jersey Motor Vehicle Commission
  - i. Oak Ridge National Laboratory
  - j. Ontario Ministry of the Environment and Climate Change
  - k. Oregon Department of Environmental Quality
  - l. Rhode Island Department of Environmental Management
  - m. Southwest Research Institute
  - n. Texas A&M Transportation Institute
  - o. Texas Commission on Environmental Quality
  - p. Texas Department of Transportation
  - q. Transport Scotland
  - r. United Kingdom Department of Transport
  - s. University of California, Riverside – Center for Environmental Research & Technology
  - t. University of Leeds
  - u. University of Tennessee
  - v. Utah
  - w. Vancouver
  - x. Vermont Air Pollution Control Program
  - y. Washington State Department of Ecology
6. Next Meeting – December 2018/January 2019 (Day based on Doodle Poll)/Adjourn

More information found at [www.nctcog.org/HDDVIMWorkingGroup](http://www.nctcog.org/HDDVIMWorkingGroup).

**2018 Advanced Transportation and Congestion Management Technologies Deployment  
Vehicle Emissions Monitoring Proposal**

**DESCRIPTION**

Ten counties in the Dallas-Fort Worth (DFW) region do not meet federal air quality standards for the pollutant ozone and have been designated nonattainment for the 8-hour ozone standard. For more information about the DFW region air quality status, visit <https://www.nctcoq.org/trans/air/documents/AQHandbook2018.pdf>

Due to the DFW ozone status, gasoline-powered vehicles registered in nonattainment counties are required to pass an annual inspection to ensure compliance with safety and emissions standards. As identified in the region’s air quality State Implementation Plan, the State’s Inspection and Maintenance (IM) Program requires owners to drive their 2 to 24-year old vehicles to Department of Public Safety certified inspection stations for emissions testing. The emissions inspection is performed by attaching a computer analyzer to the vehicle’s on-board diagnostic II (OBDII) system, which has been standard in light-duty vehicles since 1996. The analyzer performs two checks of the vehicle’s emissions control system. First, the Malfunction Indicator Light is activated and checked to see if any diagnostic trouble codes are identified due to a problem that affects emissions. If so, the vehicle will fail inspection. Second, all readiness monitors that supervise the emissions components of the vehicle is examined to ensure they are operating properly. These monitors can detect when a component fails and cause emissions to exceed standards. The vehicle will fail inspection if a malfunction has been identified. Vehicles passing the emissions inspection may move toward the Texas’ vehicle registration process. Failing vehicles should be repaired and retested until passing.

Remote sensing, a secondary component of IM, is incorporated into the overall program and meant to identify high-emitting vehicles on the roadways. Remote sensing lends to vehicle owner confusion and is not adequately funded to meet its goal of identifying high-emitting vehicles. The IM program was last modified in 2002. The current inspection process is inconvenient, outdated, encourages engine idling, unnecessary vehicle trips, and has been identified to contain significant fraudulent activity due to limited regulatory enforcement. For these reasons, the State legislature has sought in recent sessions to eliminate the inspection program.

There is regional (in addition to national and international) interest to incorporate vehicle emissions monitoring into a central information hub. Integration of emissions monitoring and mobile data collection will modernize the IM program and make it more convenient to the vehicle owner. Vehicle owners and various stakeholders will have emissions data to stay better informed about the status of their vehicle’s emission components. Acquiring and utilizing real-time data will assist with regional planning. For instance, the real-time data can be used to verify the accuracy of transportation system modeling data. Advancing the state of practice of vehicle emissions monitoring will improve transportation systems so real-time information will be gathered and shared between both public and private sectors in order to make sound decisions.

**TECHNOLOGY NEED**

The proposed project is divided into three phases. The table below represents the benefits of each phase.

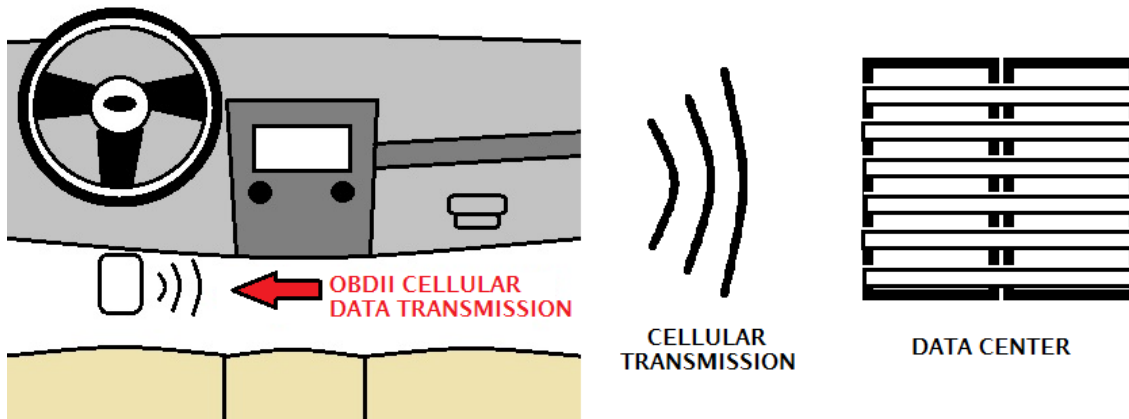
Benefit	Current System	Phase 1	Phase 2	Phase 3
		OBDII	OBDII	OBDIII
Integrate with Vehicle	X	✓	✓	✓
Convenience	X	✓	✓	✓
Minimize Fraud	X	✓	✓	✓
Actual Emissions Data	X	X	✓	✓

Heavy-Duty Diesel Data	x	x	✓	✓
Automated Process	x	x	x	✓

### Phase 1 Automatic Collection of Existing Vehicle OBDII Information

Pilot program allowing remote transfer of current OBDII data to a centralized information hub. Wireless data transfer will occur through commercially available technology, a dongle, connected to the vehicle's OBDII port. Pulling from other systems already in place elsewhere in the US, software will be written for data transfer. Incentives will be considered in order to attract voluntary participation along ATCMTD test corridors. Efforts will include both gasoline and diesel applications. Approximate three-year pilot study.

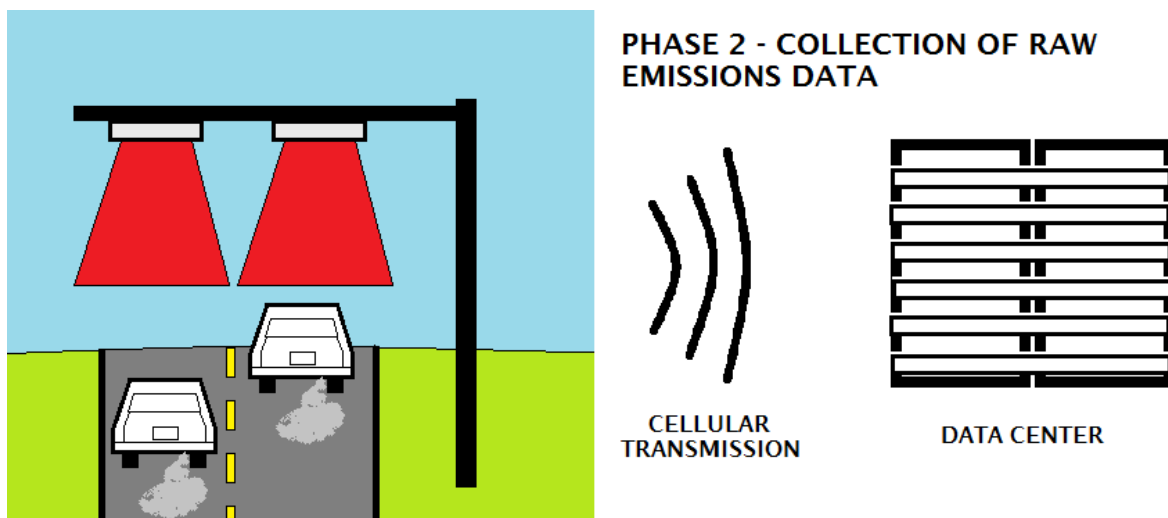
#### PHASE 1 - OBDII DATA COLLECTION/TRANSMISSION VIA "DONGLE"



### Phase 2 Automatic Collection of Vehicle Tailpipe Emissions Data

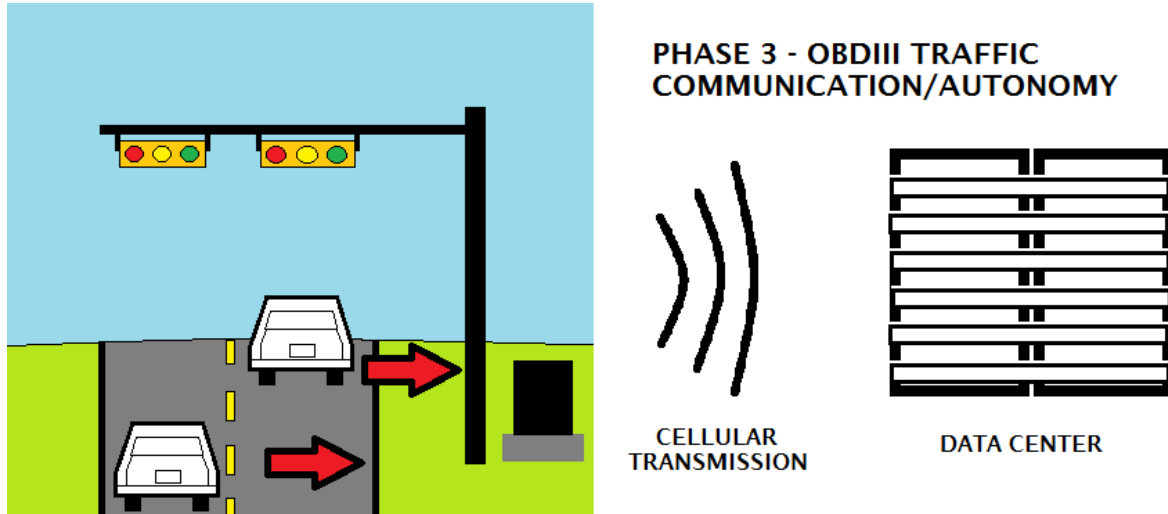
This is a pilot program to remotely collect and transmit real-time emission profiles from vehicle exhaust to a centralized information hub. Remote data collection will occur through use of external differential optical absorption spectroscopy (DOAS) equipment measuring concentrations of trace gas species contained in the exhaust plume. Software may need to be written to allow for data transfer, extrapolation, and determining a vehicle's compliance. Incentives will be considered in order to attract contractor participation along ATCMTD test corridors. Efforts will include both gasoline and diesel applications. Approximate five-year pilot study.

#### PHASE 2 - COLLECTION OF RAW EMISSIONS DATA



### Phase 3 Next Generation OBD Development and Implementation

Pilot program to develop a next generation on-board diagnostic system. Sensors will be integrated into a vehicle's emissions control system to continuously monitor real-time emission levels. "Check engine light" will register when vehicle emission levels are above national cut-point standards. Utilize data transmission technologies to send real-time emissions data to a centralized information hub. Develop technology and software to allow for vehicle compliance ability, data transfer, and processing. Efforts will include both gasoline and diesel applications. Greater than five-year effort.



### BUDGET

The vehicle emissions monitoring project totals \$5 million, with \$1 million from federal ATCMTD funds and \$4 million from the match pool of regional Congestion Mitigation and Air Quality Improvement Program Funds, Surface Transportation Block Grant Funds, Local Initiatives Projects, and partners.

- Phase 1 Budget: \$500,000
- Phase 2 Budget: \$1,000,000
- Phase 3 Budget: \$3,500,000

### BENEFIT

The vehicle emissions monitoring project will benefit from technological advances already on electric and autonomous vehicles. It will provide a convenient inspection process and increase owner awareness of vehicle health. It will reduce engine idling as well as reduce high-emitting vehicles within nonattainment areas that are facing strict National Ambient Air Quality Standards. Improper/fraudulent inspections will be reduced. Accuracy and precision will be improved for modeling and attainment measures since real-time data will be available for comparison. This effort will expand beyond current application of light-duty vehicles and include both gas and diesel registered vehicles.

### **Staff Contact**

Jason Brown  
[jbrown@nctcog.org](mailto:jbrown@nctcog.org)  
(817) 704-2514



# Center for Advancing Research in Transportation Emissions, Energy and Health

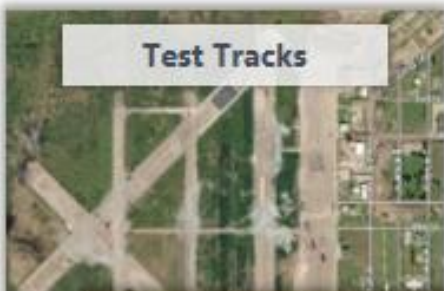
A USDOT University Transportation Center

Contact: Joe Zietsman  
[Zietsman@tamu.edu](mailto:Zietsman@tamu.edu)



## Facilities

Test Tracks



Environmental Chamber



## Emissions Testing



PEMS



Light-Duty Chassis Dyno



## Remote Sensing

OHMS/SHED



## Activity Measurement

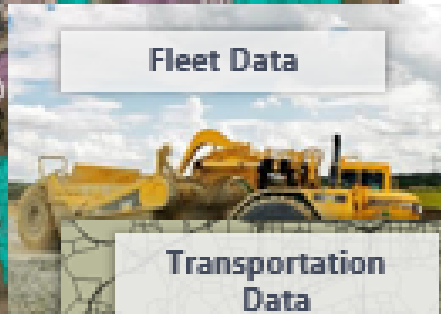
### PAMS



### Vehicle Probe Data

INRIX, ATRI, NPMRDS, etc.

### Fleet Data



### Transportation Data

FAWA, State DOTs, MPOs

## Data Processing and Analysis

### Interactive Data Analytics

- Power BI
- SSAS
- Tableau

### Data Processing & Statistical Analysis

- SAS
- R
- Python
- SQL
- ArcGIS, QGIS, PostGIS
- DAX

## Inventory Development

### More than 20 years experience

#### Developing activity inputs

VMT, speed, and fleet mix

#### - Preparing emission model inputs

#### - Running MOVES & MOBILE

SIPs (TCEQ)

Transportation Conformity

(TxDOT & Texas MPOs)

#### - Training and outreach

#### - Methodology Development

## Other Capabilities

#### - Surveys & Questionnaires

#### - Cloud Computing (AWS)

#### - Meeting and Presentation Support



# University Transportation Centers Program

- Began 1987
- Administered through Office of the Secretary of Transportation
- Transportation bill research priorities:
  - Mobility
  - Congestion
  - Safety
  - Infrastructure
  - Environment
  - Transportation Systems

# Our Vision

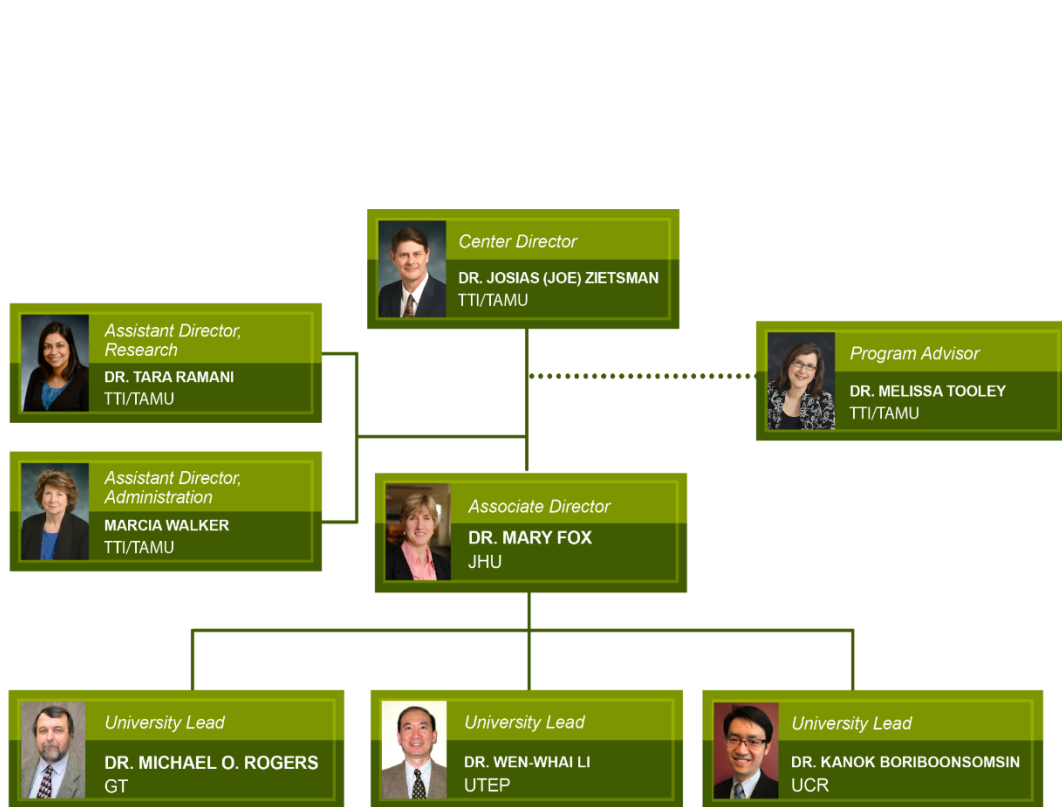
*“CARTEEH is a premier University Transportation Center where transportation and public health experts work together to address the impact of transportation emissions on human health.”*

[www.cartteeh.org](http://www.cartteeh.org)

# CARTEEH Consortium Members



# CARTEEH Structure and TTI Team



**Mohammad Askariyeh**  
Graduate Research Assistant

**Raed Alotaibi, M.D.**  
Graduate Research Assistant

**Andrew Birt, Ph.D.**  
Associate Research Scientist  
Program Manager

**Reza Farzaneh, Ph.D., P.E.**  
Associate Research Engineer  
Program Manager

**Rohit Jaikumar, Ph.D.**  
Associate Transportation  
Researcher

**Jeremy Johnson, PMP**  
Research Specialist II

**Natalie Johnson, Ph.D.**  
Assistant Professor

**Haneen Khreis, Ph.D.**  
Assistant Research Scientist

**Phil Lewis, Ph.D., P.E.**  
Associate Professor

**Tara Ramani, Ph.D., P.E.**  
Assistant Research Engineer

**Dan Seedah, Ph.D., P.E.**  
Assistant Research Scientist

**Ipek Sener, Ph.D.**  
Associate Research Scientist

**Inyang Uwak, M.D.**  
Graduate Research Assistant

**Suriya Vallamsundar, Ph.D.**  
Assistant Research Scientist

**Josias Zietsman, Ph.D., P.E.**  
Center Director  
Assistant Agency Director



## Old Paradigm

Indirect Approach

Single-Disciplinary

Nonattainment Areas

Criteria Pollutants

Network-level emissions

Conventional Vehicles

## New Paradigm

Direct Approach

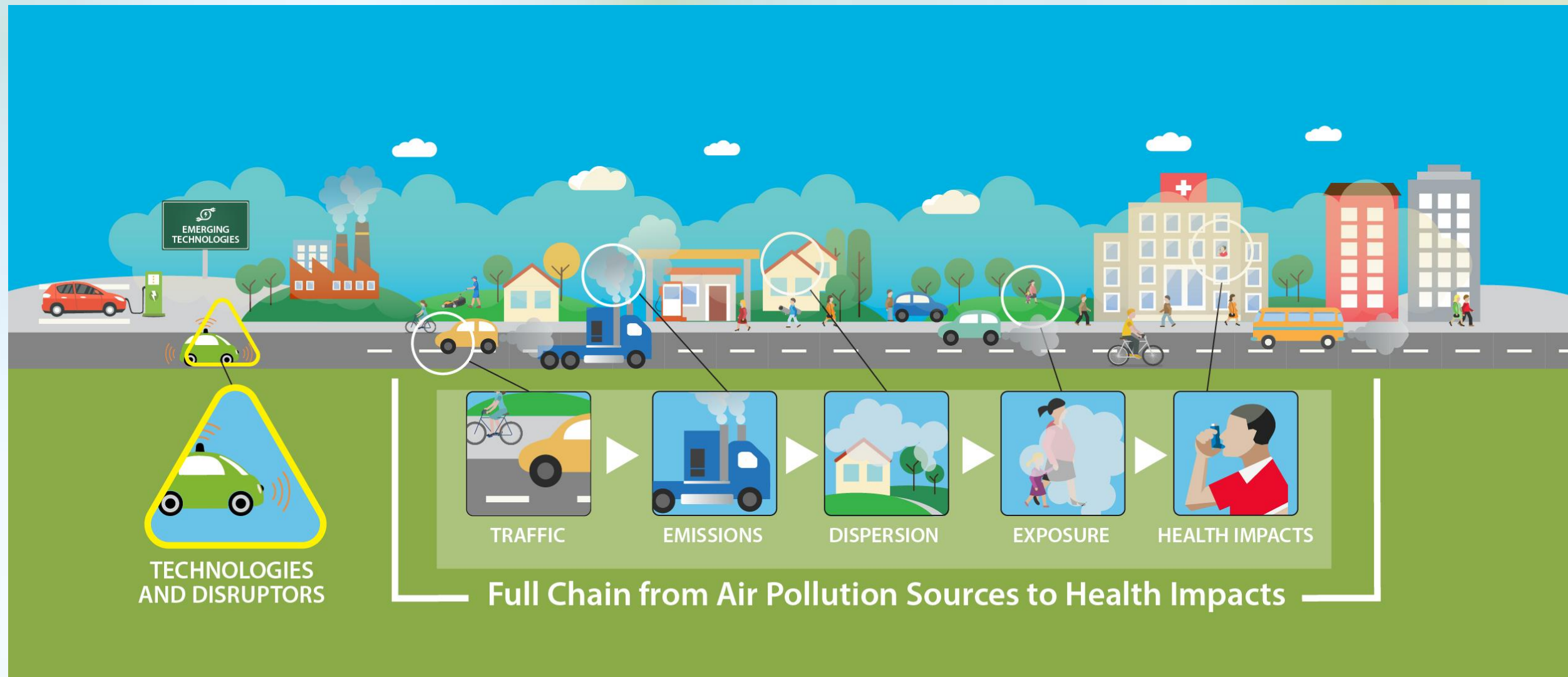
Multi-Disciplinary

All Areas

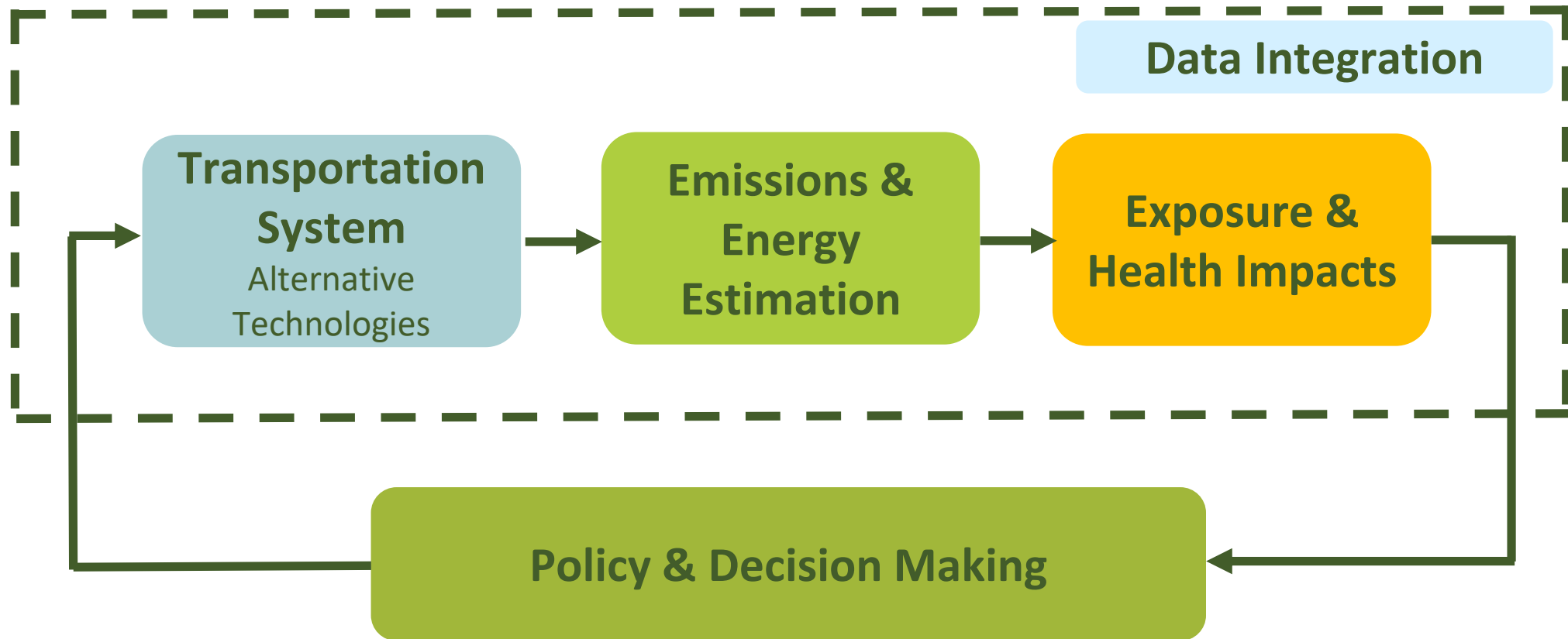
All Pollutants

Near-Source Exposures

AV/CV, Shared Use, Electrification



# Research Focus Areas



# Initial Collaborative Projects

- 1. Transportation Emissions and Health Data Hub**  
*(Lead - TTI; Partners - JHU, GT, UTEP, UCR)*
- 2. Truck Emissions-Exposure Study in Ports**  
*(Lead - GT; Partners - UCR, TTI)*
- 3. Border Crossing Emissions Impacts Study**  
*(Lead - TTI; Partners UTEP, JHU)*
- 4. Healthy Living and Traffic-Related Air Pollution in an Underserved Community**  
*(Lead - UTEP; Partners - JHU, TTI, UCR)*
- 5. Development and Evaluation of CV Application for Alternative Fuel Trucks**  
*(Lead - UCR; Partner - GT)*
- 6. Health Risk Characterization for Transportation Users**  
*(Lead - JHU; Partner - UTEP)*



# Competitive Projects

1. **Health Impact Assessment of Traffic-Related Air Pollution** (*TTI*)
2. **Emissions Exposure at Schools** (*TTI*)
3. **In-cab Air Quality of Heavy Duty Diesel Construction Equipment** (*TTI*)
4. **Temporal and Spatial Exposure of Urban Cyclists** (*GT*)
5. **Air Pollution Impacts of Crude Oil by Rail Transport** (*JHU*)
6. **Mitigating Dust Impacts on Highways** (*UTEP*)
7. **Traffic Congestion and Near-Road Air Pollution Concentrations** (*UCR*)
8. **Secondary Particulate Matter from Gasoline Vehicles** (*UCR*)



# Transportation, Air Quality, and Health Symposium

February 18–20, 2019 | Austin, Texas

## SPONSORED BY

Center For Advancing Research In  
**Transportation Emissions,  
Energy, and Health**

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## SAVE THE DATE

February 18–20, 2019

Omni Austin Hotel at Southpark, Austin, Texas

**JOIN US** for a one-of-a kind symposium discussing research, policy, and emerging issues related to transportation emissions, energy, air quality, exposures, and human health. This event will bring together experts from two disciplines that have not traditionally worked together — transportation and health. The agenda includes:

- Keynote addresses.
- Interactive workshops.
- Practitioner-led roundtables.
- Lectern sessions.
- Poster sessions.
- Networking events.

[Register Now and Submit Abstract](#)

[Call For Abstracts \(Deadline, October 15, 2018\)](#)

## CONTACTS

Technical Program:  
Haneen Khreis, Ph.D.  
([h-khreis@tti.tamu.edu](mailto:h-khreis@tti.tamu.edu))

Registration:  
Mary Cearley  
([m-cearley@tti.tamu.edu](mailto:m-cearley@tti.tamu.edu))



*We welcome students, researchers and faculty, and practitioners from the public and private sectors.*

*We also invite you to submit abstracts for the lectern and poster sessions.*

