Vehicle Modeling & Data Analysis: Transportation Secure Data Center (TSDC), FleetDNA and the Future Automotive Systems Technology Simulator (FASTSim)

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### Objectives

- **The Drive-Cycle Analysis Tool**
- Maximizes value from limited public funds
- Accessible to lab and external researchers

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- **Maximizes value from limited public funds**: This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. This work contains irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for U.S. Government purposes.

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### RELEVANCE

- **Emphasis on validation and real-world data for credibility**
- **Emphasis on maximizing data/information accessibility within constraints**

### OBJECTIVES & MILESTONES

- Developing tools to support collection and analysis of detailed real-world travel data — focus on medium- and heavy-duty vehicles
- Creating model for representing fleet partners — develop real-world drive cycles, including for connected and automated vehicles

### SUMMARY

- TSDC, FleetDNA, and FASTSim are valuable DOE resources for vehicle modeling and performance analysis.
- Workshops on modeling and analysis of detailed real-world travel data for medium- and heavy-duty vehicles have provided opportunities to share data and ideas.
- Removing data silos to enable more efficient and effective analysis of complex travel patterns.

### TSDC

- **Data sets**
  - **TSDC**
  - **FleetDNA**
  - **FASTSim**
- **Software & Tools**
  - **TSDC**
  - **FleetDNA**
  - **FASTSim**

### FleetDNA

- **Data sets**
  - **TSDC**
  - **FleetDNA**
- **Software & Tools**
  - **TSDC**
  - **FleetDNA**

### FASTSim

- **Data sets**
  - **TSDC**
  - **FleetDNA**
- **Software & Tools**
  - **TSDC**
  - **FleetDNA**

### APPROACH

- **TSDC**
  - Analyzes data from detailed real-world travel data, including for connected and automated vehicles.
  - Provides comprehensive data on energy and travel needs.
  - Integrates data from multiple sources, including government and research data.

- **FleetDNA**
  - Analyzes data from detailed real-world travel data, including for connected and automated vehicles.
  - Provides comprehensive data on energy and travel needs.
  - Integrates data from multiple sources, including government and research data.

- **FASTSim**
  - Analyzes data from detailed real-world travel data, including for connected and automated vehicles.
  - Provides comprehensive data on energy and travel needs.
  - Integrates data from multiple sources, including government and research data.

### ACCOMPLISHMENTS: TSDC DATA SETS AND WEB ACCESS

- TSDC data sets are available for download at [tisd.nrel.gov](http://tisd.nrel.gov).
- Fleet DNA data sets are available for download at [fleetDNA.nrel.gov](http://fleetDNA.nrel.gov).
- FASTSim data sets are available for download at [fastsim.nrel.gov](http://fastsim.nrel.gov).

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### Example Application Accomplishments

- **MEDIUM-DUTY RANGE-EXTENDED ELECTRIC VEHICLES**
  - **FASTSim**
    - Analyzes data from detailed real-world travel data, including for connected and automated vehicles.
    - Provides comprehensive data on energy and travel needs.
    - Integrates data from multiple sources, including government and research data.

- **REAL-WORLD DRIVE CYCLE DEVELOPMENT AND APPLICATIONS**
  - **FASTSim**
    - Analyzes data from detailed real-world travel data, including for connected and automated vehicles.
    - Provides comprehensive data on energy and travel needs.
    - Integrates data from multiple sources, including government and research data.

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### REMAINING CHALLENGES & BARRIERS + PROPOSED FUTURE RESEARCH

- **Challenges**
  - Data silos and lack of real-world data for medium- and heavy-duty vehicles.
  - Limitations in analyzing detailed real-world travel data, including for connected and automated vehicles.

- **Proposed Future Research**
  - Develop detailed real-world travel data for medium- and heavy-duty vehicles.
  - Analyze detailed real-world travel data for connected and automated vehicles.

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### COLLABORATION AND COORDINATION WITH OTHER INSTITUTIONS

- **Collaboration**
  - Partnerships with universities and other organizations to share data and ideas.
  - Joint projects with other organizations to analyze detailed real-world travel data.

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