



## **UC Davis STEPS PROGRAM: H2/FC BREAKOUT DISCUSSION**

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# STEPS 2015-2018 (STEPS3): Understanding Critical Transition Dynamics for Sustainable Transportation

## Key Research Themes

### 1. Initiating Transitions 2015-2030

*What is required for early alternative fuel/vehicle transitions to succeed?*

### 2. The Future of Fuels and the Oil and Gas Industry

*How will changing geopolitical landscapes and disruptive technology in the oil and gas and clean technology industries impact future business models and the competition of fuels?*

### 3. The Future of Global Urban Sustainable Transport (GUSTO)

*How will a rapidly urbanizing world affect transport and energy demand?*

### 4. Modeling Analysis, Verification, Regulatory and International Comparisons (MAVRIC)

*What do improved and cross-compared energy/economic/environmental/transportation models tell us about the future of transportation?*

# Projects

**Analysis of near term transitions to alternative fueled vehicles, using spatial regional consumer choice & fuel infrastructure model**

**Leveraging in-use vehicle data to estimate hydrogen vehicle and infrastructure cost-benefits to the consumer**

**Assess role of natural gas as a bridge to H2 in transportation.**

**Deep Decarbonization Scenarios for CA: role of H2 (CA-TIMES)**

**Analysis of hydrogen energy storage via electrolysis from curtailed renewables: a California case study**

**Transport sector transition scenarios to meet climate goals for California and US. Transition cost, breakeven year, vehicle and infra investments, energy use, emissions, for H2, Biofuels, electricity across all transportation sectors.**

**Understanding the transition to alternative-fueled medium- and heavy-duty freight trucks: Model emissions, costs, fuel infrastructure, and decision-making for future truck scenarios, Assess use of hydrogen in medium and heavy duty trucks.**

# Early Results

- Infrastructure and consumers:
  - Spatial consumer choice model for H2 FCVs and electric vehicles
  - Fuel cells for medium duty urban delivery vehicles have potential for central fleet refueling
- Policy and infrastructure
  - Deep decarbonization scenarios have significant levels of H2 vehicle investment for LD and HD vehicles
  - Low-carbon H2 production via hydrogen energy storage can help balance grid in high renewable electricity system

# Discussion Questions

- Consumers/Adoption:
  - Consumer prospects for H2 vehicles?
  - Prospects for H2 in non-LDV sectors (medium duty, heavy-duty)?
- Infrastructure:
  - Prospects for H2 as energy storage?
  - Is NG a bridge to H2 in vehicles?
  - “Other” infrastructure models? (fleets, tri-gen)
  - Making the 101<sup>st</sup> station profitable?
- Policy:
  - How soon do we need to decarbonize hydrogen for vehicles?
  - How important are hydrogen FCVs for decarbonizing transportation to meet climate goals?