



Technology Advancement Office Advisory Group Meeting

STEPS Program

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STEPS Background

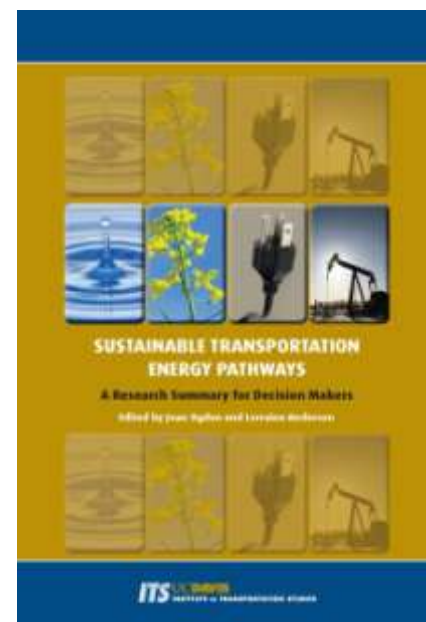


- UC Davis Institute of Transportation Studies initiated a multi-year research and outreach multidisciplinary program
- Develop the theory, tools, and methods that allow for self-consistent and transparent comparisons of promising alternative energy and vehicle pathways
- Four general pathways – hydrogen, biofuels, electricity and fossil fuels baseline



Project Completed

- UC Davis Institute of Transportation Studies (ITS) Sustainable Transportation Energy Pathways (STEPS)
- Approximately \$2 million provided by 2 dozen organizations;
- \$120,000 AQMD Clean Fuels support for four subjects



Key Subjects:

- **Hydrogen Infrastructure Transition Analysis – LA area study**
- **Electric Vehicle Energy Loads on the Grid – LA area study**
- **Plug-In Hybrid Electric and Alternative Fuel Vehicle Surveys**
- **Cross-Comparison of Vehicle-Fuel Pathways**



STEPs Key Projects

Hydrogen infrastructure analysis – Station Build-out in LA Basin



- Analyzed transition scenarios considering station placement, convenience, type of hydrogen supply, & cost (capital/operating)
- Clustering vehicles and stations improves convenience and reduces total network costs considering time/distance from home and along major driving routes
- 16 – 40 stations could serve 10,000 – 20,000 fcvs



STEPS Key Projects

Electric Vehicle Energy Loads – LA Basin case study

- Near-term, natural gas fired power plants will supply “marginal” electricity for vehicle recharging.
- Longer term, adding vehicle recharging shifts capacity from poorly utilized peaking power plants to baseload plants
- To achieve longer term GHG reductions, need to add renewable resources, nuclear generation, and reduce demand.



STEPS Key Projects

Plug-In Hybrid Electric Vehicle Consumer survey research

- Surveyed driving behavior changes and charging behavior
- Tested enhanced energy use feedback to analyze influence on drivers
- Tested social network influence on new car buying household values
- Effect of cost, innovation, and consumer behavior on market for alternative fueled vehicles



STEPS Key Projects

Cross-comparison of Vehicle-Fuel Pathways

- CA goal of 80% GHG reduction below 1990 level by 2050 is very challenging
- No silver bullet; UC Davis LEVERS model shows that portfolio approach is best
- Uncertainty in the supply of low-carbon biofuels





Results

- A portfolio approach combining efficiency, alternative fuels and Vehicle Miles Traveled (VMT) reduction provides the best chance to meet goals.
- Given the uncertainties, and the long timelines, it is critical to nurture a portfolio of key technologies toward commercialization and to start now.
- Over 75 research publications and reports produced by STEPS researchers including the STEP's book are currently available to the public at www.steps.its.ucdavis.edu.



Near-Term Transformations*

- Technology revolutions
 - Automotive
 - Large efficiency improvements
 - Electric-drive
 - Oil Supply
 - Rapid expansion of shale oil production (1M b/d in 2012 in US)
- Policy revolutions
 - Lifecycle measurement
 - Performance-based approaches (vs. prescriptive regulation and market instruments)

Policy can accelerate (or inhibit) transformations ... to PEVs, FCVs, biofuels.

- ***Complex interplay of technology, politics, innovations***

*Daniel Sperling, UC Davis Next STEPs Symposium, June 2012



UC Davis Next STEPs Key Projects

- Transition Scenarios for Alternative Fuels and Vehicles in California
- Consumer Behavior and Vehicle Choice: Longitudinal Tracking Study
- Best Policy and Incentive Strategies
- Low Carbon Options for Non-Light Duty Vehicle (LDV) Subsectors



Next STEPS 2013-2014 Members

- Energy Sector -
Aramco, BP, Chevron, Center for High Technology-India, Shell, Sempra
- Automotive Manufacturers -
BMW, Chrysler, Daimler, Ford, General Motors, Honda, Nissan, Renault, Toyota, Volkswagen
- Government Sector – SCAQMD plus
US EPA, US DOT, US DOE, CARB, Caltrans, CEC



For More Information....



South Coast
Air Quality Management District

Cleaning the air that we breathe...

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