National Center for Sustainable Transportation

Project Information Form

Project Title:	The Development of Lifecycle Data for Hydrogen Fuel Production and Delivery
University:	University of California, Davis
Principal Investigator:	Marshall Miller
PI Contact Information:	Phone: 530-752-1543 Email: mmiller@ucdavis.edu
Funding Source(s) and Amounts Provided (by each agency or organization):	California Air Resources Board (CARB) - $250,000
Total Project Cost:	$250,000
Agency ID or Contract Number:	CARB Contract # 14-318 UCD-ARB-002
Start and End Dates:	November 21, 2014 – October 13, 2017
Brief Description of Research Project:	The California Air Resources Board (CARB) developed the Low Carbon Fuel Standard (LCFS) to reduce greenhouse gas (GHG) emissions in the transportation sector. The regulation identifies lifecycle pathways for each fuel and assesses a carbon intensity score. The LCFS regulation requires fuel providers to meet carbon intensity targets each year. These targets are reduced over time; therefore, overall GHG emissions from the California transport sector decrease as well. CARB has performed lifecycle assessments of many transportation fuel pathways, but important additional pathways have not yet been analyzed and currently have no carbon intensity score. While CARB has analyzed and published some hydrogen pathway carbon intensities scores, many renewable pathways have not been assessed. To assist CARB, this project collects and evaluates lifecycle data for these critical hydrogen renewable pathways. The purpose of this project is to address three distinct but related hydrogen issues – lifecycle analysis of renewable hydrogen pathways, the potential for hydrogen injection and distribution through natural gas pipeline infrastructure, and the potential demand for hydrogen from off-road transportation markets. The specific objectives of the project are: • Review the available literature to assess the most effective combinations of alternative fuels, fuel infrastructure, and vehicle powertrain technology to reduce GHG and criteria air pollutant emission in hydrogen fuel pathways. • Perform lifecycle analyses to determine pathways with the lowest GHG and criteria pollutant emissions for the production, distribution, and storage of hydrogen.

National Center for Sustainable Transportation

	• Estimate the costs of each potential hydrogen pathway to determine the most cost-effective options for reducing GHG and criteria pollutant emissions. • Assess the potential for using the current natural gas infrastructure in renewable hydrogen fuel pathways. • Identify potential hydrogen markets in the off-road transportation sector that could increase overall hydrogen demand and identify barriers to growth and strategies to overcome these barriers in these markets.
Describe Implementation of Research Outcomes (or why not implemented): Place any photos here	
Impacts/Benefits of Implementation (actual, not anticipated):	
Web Links • Reports • Project website	http://ncst.ucdavis.edu/project/development-of-lifecycle-data-for-hydrogen-fuel-production-and-delivery