

Project description/goals:

This research project focuses on understanding the critical elements of a transition to alternative-fueled medium- and heavy-duty trucks for the purposes of greenhouse gas and criteria emissions reduction. This work will focus on vehicle/technology performance and costs, and important purchase decision factors in determining the adoption of alternative fuel truck technologies in various truck segments. 700000

600000

-100000

Key research questions

factors influence the purchase of alternative fueled and advanced trucks?

Key factors we are working to quantify: Capital Cost; Operating costs (fuel use, maintenance); Environmental perception; Uncertainty (Risk); Incentives; Vehicle Range; Refueling Time; Station Availability; and Carbon Tax

- 3) How does infrastructure deployment influence the purchase of alternative fueled trucks?

The Truck Choice Model is based upon a Nested Multinomial Logit (NMNL) framework

Used in many vehicle choice approaches based on work by Greene Nests represent groupings of similar technologies that consumers consider close substitutes



UCDAVIS HD Truck Technology Transitions with a Decision Choice Model Lew Fulton, Marshall Miller, Christopher Yang, Dominique Meroux (GSR)

Institute of Transportation Studies, University of California, Davis - December 2015



4) What sorts of policy levers and incentives can help bring about these changes to a sustainable truck fleet?

sportation?	
-------------	--

Truck Segment	Long haul	Short haul	Port/drayage trucks	Heavy duty vocational	Medium-duty vocational	Medium-duty urban	Buses	Heavy-duty vans and pickup trucks			
Truck Class	Class 8	Class 7, 8	Class 7, 8	Class 6-8	Class 3-5	Class 3-5	Class 6-7	Class 2B and 3 > 8,500 lbs. GVWR			
Vehicle Examples	Tractor Trailer	Tractor Trailer	Tractor Trailer	Refuse truck	Trash compactors, bucket trucks	Delivery trucks	Transit buses, shuttles, coaches	Pickups and Vans			
Avg Annual VMT	68,805	20,237	45,594	13,416	5,170	13,150		12,042			
Avg Daily VMT	220	65	146	43	17	40		37			
Fleet size	112,319	376,946	19,528	41,366	22,274	166,553		752,938			
Avg Age	6.8	27.9	5.0	27.3	29.6	29.7		29.7			
Avg MPG	5.8	7.1	5.5	4.6	8.0	12.6		14.2			
Annual Fuel Consumption	1342.7	1077.1	163.0	120.6	14.4	174.3		637.9			
% Fuel Consumption	38%	31%	5%	3%	0%	5%		18%			
	Vehicle Technology Commercialization										
CNG/LNG	Commercial/ Early Market	Commercial/ Early Market	Commercial/ Early Market	Commercial	Commercial	Commercial	Commercial	Commercial/ Early Market			
Hydrogen			Demonstration	Demonstration	Demonstration	Demonstration	Commercial/ Early Market	Demonstration			
Electricity	-		Demonstration	Demonstration	Demonstration	Demonstration	Commercial/ Early Market	Demonstration			
Vehicle Range / Energy Storage Considerations											
CNG/LNG	Favorable	Favorable	Favorable	Favorable	Favorable	Favorable	Favorable	Favorable			
Hydrogen	Challenging	Acceptable	Acceptable	Favorable	Favorable	Favorable	Favorable	Favorable			
Electricity	Challenging	Acceptable	Acceptable	Favorable	Favorable	Favorable	Favorable	Favorable			
Infrastructure Deployment											
Refueling Considerations	Truck Stops	Truck Stops / Central location	Near Port	Central Fleet Refueling	Central Fleet Refueling	Central Fleet Refueling	Central Fleet Refueling	Conventional Fueling Stations			
CNG/LNG	Commercial/ Early Market	Commercial/ Early Market	Commercial/ Early Market	Commercial	Commercial	Commercial	Commercial	Commercial/ Early Market			
Hydrogen	-						Early Market/ Demonstration	-			
Electricity					Early Market/ Demonstration	Early Market/ Demonstration	Early Market/ Demonstration				

Contacting the Authors:

Lew Fulton (*Imfulton@ucdavis.edu*), Marshall Miller (*mmiller@ucdavis.edu*), Dominique Meroux (*dmeroux@ucdavis.edu*)

