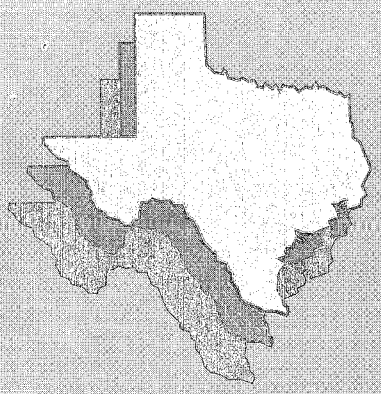

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DOCUMENTATION FOR CNG FLEET CONVERSION COST-EFFECTIVENESS MODEL

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PROBLEM STATEMENT

Environmental issues relating to air quality and energy efficiency continue to ignite state and national policy debates. Because fossil-fueled vehicles have most often been identified as contributors to these environmental problems, there has been much new legislation at the state level aimed at converting state-owned vehicles to the use of alternative fuels. Following this trend, the Texas Legislature in 1989adopted alternative fuels legislation that affects the entire state, including non-attainment areas. Specifically, Texas Senate Bill 740, which took effect September 1, 1991, requires certain state agencies to purchase new vehicles capable of operating on natural gas or on a fuel having similar emissions characteristics. The Texas Air Control Board subsequently ruled that propane and electricity also qualify as alternative fuels. The agencies affected by this legislation include all metropolitan authorities, all school districts having more than 50 buses, and all state agencies having more than 15 vehicles (excluding law enforcement and other emergency vehicles). Affected agencies can, however, receive a waiver if they demonstrate either that (1) operating a natural gas-powered fleet is more expensive than operating a gasoline or diesel fleet over its useful life, or that (2) alternative fuels are not available in sufficient supply. Because natural gas is plentiful in Texas, the determination of waiver eligibility has focused on the first condition—the economic feasibility of converting to natural gas, the fuel of choice in the new legislation. Thus, this project developed a method by which affected agencies, in their attempts to fulfill the requirements of Senate Bill 740, can document the cost of conversion to such alternative fuels.

OBJECTIVES

The Center for Transportation Research (CTR) of The University of Texas at Austin conducted a study for the Texas Department of Transportation (TxDOT) that sought to evaluate the economic feasibility of using these alternative fuels for TxDOT fleet operations. With primary focus on the waiver conditions stipulated in the new Texas legislation, this project has developed a life-cycle cost/benefit analysis model to analyze the cost-effectiveness of a compressed natural gas (CNG) operation over the life cycle of a CNG fast-fill station. Such a model, the authors believe, will assist TxDOT in fulfilling the legal requirements of Senate Bill 740, whether through implementation of an alternative fuels program or through the processing of waivers where appropriate. This report provides the model's support documentation.

FINDINGS

This report documents the various input data (constant and variable), calculations, and assumptions inherent in the CNG Net Present Value (NPV) model. Input data having constant values are those data that will not change for different TxDOT fleet

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locations, including the basic parameters for fuel tank pressures, on-board storage capacity, vehicle conversion costs, and number of tanks. Variable input data includes vehicle information relating to, among other things, number of types of vehicles and fuel consumption. Calculations, along with the assumptions inherent in such calculations, includes equations relating to vehicles, annual fuel tax, fuel prices, station design, labor time loss, and cost per vehicle per year. Finally, embedded model assumptions include those assumptions not covered by either input data or calculations.

CONCLUSIONS

The life-cycle cost/benefit analysis model developed in this project effectively provides TxDOT with a mechanism by which it can fulfill the legal conditions of Senate Bill 740, whether through implementation of an alternative-fuels program or through the processing of waivers where indicated. The model's support documentation — which includes input data, calculations, and assumptions inherent in the CNG Net Present Value Model — comprises the primary content of this brief report.

"The information described in this summary is reported in detail in Research Report 983-1F," December 1991.