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KEY=ENVIRONMENTAL - GLOVER KARSYN

ALTERNATIVE FUELS AND ADVANCED VEHICLE TECHNOLOGIES FOR IMPROVED ENVIRONMENTAL PERFORMANCE

TOWARDS ZERO CARBON TRANSPORTATION

Woodhead Publishing **Alternative Fuels and Advanced Vehicle Technologies for Improved Environmental Performance: Towards Zero Carbon Transportation, Second Edition provides a comprehensive view of key developments in advanced fuels and vehicle technologies to improve the energy efficiency and environmental impact of the automotive sector. Sections consider the role of alternative fuels such as electricity, alcohol and hydrogen fuel cells, as well as advanced additives and oils in environmentally sustainable transport. Other topics explored include methods of revising engine and vehicle design to improve environmental performance and fuel economy and developments in electric and hybrid vehicle technologies. This reference will provide professionals, engineers and researchers of alternative fuels with an understanding of the latest clean technologies which will help them to advance the field. Those working in environmental and mechanical engineering will benefit from the detailed analysis of the technologies covered, as will fuel suppliers and energy producers seeking to improve the efficiency, sustainability and accessibility of their work. Provides a fully updated reference with significant technological advances and developments in the sector Presents analyses on the latest advances in electronic systems for emissions control, autonomous systems, artificial intelligence and legislative requirements Includes a strong focus on updated climate change predictions and consequences, helping the reader work towards ambitious 2050 climate change goals for the automotive industry**

ALTERNATIVE FUELS AND ADVANCED VEHICLE TECHNOLOGIES

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ALTERNATIVE FUELS AND ADVANCED VEHICLE TECHNOLOGIES

PHI Learning Pvt. Ltd. **Primarily intended for the undergraduate students of Automobile, Mechanical, Electrical, Aerospace engineering, and postgraduate students of Thermal Engineering and Energy Systems, the book presents the topics as per the outcome-based education system. In addition to the coverage of various alternative fuels considered for IC engines, special focus is emphasized on research findings in the field of alternative fuels and fuel additives including nano-additives. The stress is also given towards the exclusive coverage of advanced engine technologies such as CRDI engines, MPFI engines, GDI, HCCI and advanced energy technologies such as Hybrid Electric Vehicles (HEVs), Plug-in Hybrid Electric Vehicles (PHEVs), Battery Electric Vehicles (BEVs), Fuel Cell Vehicles (FCVs), Solar Powered Vehicles. KEY FEATURES • A detailed discussion of the research findings in alternatives fuels for IC engines • 150+ Review questions • 200+ Multiple choice questions • PowerPoint slides for the instructors Target Audience • Undergraduate students of Automobile, Mechanical, Electrical, Aerospace engineering • Postgraduate students of Thermal engineering and Energy systems**

ALTERNATIVE FUELS AND ADVANCED TECHNOLOGY VEHICLES

INCENTIVES AND CONSIDERATIONS

Nova Science Pub Incorporated **A wide array of federal incentives support the development and deployment of alternatives to conventional fuels and engines in transportation. These incentives include tax deductions and credits for vehicle purchases and the installation of refuelling systems, federal grants for conversion of older vehicles to new technologies, mandates for the use of biofuels, and incentives for manufacturers to produce alternative vehicles. Many of the policy choices presented for alternative fuel and advanced vehicle technologies originated as a response to the nation's interest in reducing petroleum imports. This book examines the current array of incentives, which do not reflect a single, comprehensive strategy, but rather an aggregative approach to a range of discreet public policy issues, including improving environmental quality, expanding domestic manufacturing, and promoting agriculture and rural developments.**

ALTERNATIVE FUELS AND ADVANCED VEHICLE TECHNOLOGIES.

ALTERNATIVE FUEL AND ADVANCED VEHICLE TECHNOLOGY INCENTIVES

A SUMMARY OF FEDERAL PROGRAMS

Createspace Independent Pub **A wide array of federal incentives support the development and deployment of alternatives to conventional fuels and engines in transportation. These incentives include tax deductions and credits for vehicle purchases and the installation of refueling systems, federal grants for conversion of older vehicles to newer technologies, mandates for the use of biofuels, and incentives for manufacturers to produce alternative fuel vehicles. The current array of incentives for alternative fuels and related technologies do not reflect a single, comprehensive strategy, but rather an aggregative approach to a range of discreet public policy issues, including goals of reducing petroleum consumption and import dependence, improving environmental quality, expanding domestic manufacturing, and promoting agriculture and rural development. Current federal programs are administered by five key agencies: Department of the Treasury, Department of Energy, Department of Transportation, Environmental Protection Agency, and the U.S. Department of Agriculture. The incentives and programs described in this report are organized by the responsible agency. Treasury (through the Internal Revenue Service, IRS) administers tax credits and deductions for alternative fuel and advanced technology vehicle purchases, expansion of alternative fuel refueling infrastructure, and incentives for the production and/or distribution of alternative fuels. Many of these incentives have expired in recent years and may or may not be reinstated. DOE (mainly through the Office of Energy Efficiency and Renewable Energy, EERE) administers research and development (R&D) programs for advanced fuels and transportation technology, grant programs to deploy alternative fuels and vehicles, and a loan program to promote domestic manufacturing of high efficiency vehicles. DOT (mainly through the Federal Highway Administration, FHWA, and Federal Transit Administration, FTA) administers grant programs to deploy “clean fuel” buses and other alternative fuel vehicles. DOT (through the National Highway Traffic Safety Administration, NHTSA) also administers federal Corporate Average Fuel Economy (CAFE) standards, which include incentives for production of alternative fuel vehicles. EPA (mainly through the Office of Transportation and Air Quality, OTAQ) administers the Renewable Fuel Standard, which mandates the use of biofuels in transportation. EPA also administers grant programs to replace older diesel engines with newer technology. USDA (mainly through the Rural Business-Cooperative Service, RBS) administers grant, loan, and loan guarantee programs to expand agricultural production of biofuel feedstocks, conduct R&D on biofuels and bioenergy, and establish and expand facilities to produce biofuels, bioenergy, and bioproducts.**

FUEL-CYCLE GREENHOUSE GAS EMISSIONS IMPACTS OF ALTERNATIVE TRANSPORTATION FUELS AND ADVANCED VEHICLE TECHNOLOGIES

At an international conference on global warming, held in Kyoto, Japan, in December 1997, the United States committed to reduce its greenhouse gas (GHG) emissions by 7% over its 1990 level by the year 2012. To help achieve that goal, transportation GHG emissions need to be reduced. Using Argonne's fuel-cycle model, I estimated GHG emissions reduction potentials of various near- and long-term transportation technologies. The estimated per-mile GHG emissions results show that alternative transportation fuels and advanced vehicle technologies can help significantly reduce transportation GHG emissions. Of the near-term technologies evaluated in this study, electric vehicles; hybrid electric vehicles; compression-ignition, direct-injection vehicles; and E85 flexible fuel vehicles can reduce fuel-cycle GHG emissions by more than 25%, on the fuel-cycle basis. Electric vehicles powered by electricity generated primarily from nuclear and renewable sources can reduce GHG emissions by 80%. Other alternative fuels, such as compressed natural gas and liquefied petroleum gas, offer limited, but positive, GHG emission reduction benefits. Among the long-term technologies evaluated in this study, conventional spark ignition and compression ignition engines powered by alternative fuels and gasoline- and diesel-powered advanced vehicles can reduce GHG emissions by 10% to 30%. Ethanol dedicated vehicles, electric vehicles, hybrid electric vehicles, and fuel-cell vehicles can reduce GHG emissions by over 40%. Spark ignition engines and fuel-cell vehicles powered by cellulosic ethanol and solar hydrogen (for fuel-cell vehicles only) can reduce GHG emissions by over 80%. In conclusion, both near- and long-term alternative fuels and advanced transportation technologies can play a role in reducing the United States GHG emissions.

CRS REPORT FOR CONGRESS

ALTERNATIVE FUEL AND ADVANCED VEHICLE TECHNOLOGY INCENTIVES: A SUMMARY OF FEDERAL PROGRAMS

BiblioGov **A wide array of federal incentives support the development and deployment of alternatives to conventional fuels and engines in transportation. These incentives include tax deductions and credits for vehicle purchases and the installation of refueling systems, federal grants for conversion of older vehicles to newer technologies, mandates for the use of biofuels, and incentives for manufacturers to produce alternative fuel vehicles. The current array of incentives for alternative fuels and related technologies do not reflect a single, comprehensive strategy, but rather an aggregative approach to a range of discreet public policy issues, including goals of reducing petroleum consumption and import dependence, improving environmental quality, expanding domestic manufacturing, and promoting agriculture and rural development.**

ALTERNATIVE FUELS AND ADVANCED TECHNOLOGY VEHICLES: ISSUES IN CONGRESS

DIANE Publishing

TRANSITIONS TO ALTERNATIVE VEHICLES AND FUELS

National Academies Press **For a century, almost all light-duty vehicles (LDVs) have been powered by internal combustion engines operating on petroleum fuels. Energy security concerns about petroleum imports and the effect of greenhouse gas (GHG) emissions on global climate are driving interest in alternatives. Transitions to Alternative Vehicles and Fuels assesses the potential for reducing petroleum consumption and GHG emissions by 80 percent across the U.S. LDV fleet by 2050, relative to 2005. This report examines the current capability and estimated future performance and costs for each vehicle type and non-petroleum-based fuel technology as options that could significantly contribute to these goals. By analyzing scenarios that combine various fuel and vehicle pathways, the report also identifies barriers to implementation of these technologies and suggests policies to achieve the desired reductions. Several scenarios are promising, but strong, and effective policies such as research and development, subsidies, energy taxes, or regulations will be necessary to overcome barriers, such as cost and consumer choice.**

ADVANCED VEHICLE TECHNOLOGIES

HEARING BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES, UNITED STATES SENATE, ONE HUNDRED TWELFTH CONGRESS, FIRST SESSION, TO RECEIVE TESTIMONY ON POLICIES TO REDUCE OIL CONSUMPTION THROUGH THE PROMOTION OF ADVANCED VEHICLE TECHNOLOGIES AND ACCELERATED DEPLOYMENT OF ELECTRIC-DRIVE VEHICLES, AS PROPOSED IN S. 734 AND S. 948, MAY 19, 2011

DETERMINING ENVIRONMENTAL SENSITIVITIES AND UNCERTAINTIES OF ALTERNATIVE FUELLED, ADVANCED TECHNOLOGY AND CONVENTIONAL ROAD VEHICLES USING LIFE CYCLE ASSESSMENT

The Australian road vehicles, including conventional internal combustion engine running on petrol or diesel, is considered one of the main sources of greenhouse gas (GHG) emissions and environmental air pollution globally. Any methods that could be developed to improve environmental performance, thereby reducing GHG emissions, energy demand, particulate matter and human toxicity from vehicle emissions, can greatly benefit society globally. With the advent of alternative fuels and vehicles, new methods to evaluate their environmental benefits need to be developed. Life cycle assessment (LCA) has gone a long way to ensure that environmental evaluations of all types of vehicles and fuels are performed on a consistent, whole-of-life basis. However, a rigorous analysis of the input data for these LCA evaluations, plus their relatability and sensitivity to the results produced, needs to be undertaken to ensure that society, industry and government can make informed decisions based on the analysis of sound and reliable data. This thesis aims to: -- 1. examine the GHG emissions, particulate matter and human toxicity-cancer and non-cancer of transportation over a vehicle's lifetime using the life cycle assessment (LCA) method -- 2. examine the uncertainty of the input data for LCA evaluations -- 3. examine the sensitivity of the input data for LCA evaluations -- 4. apply the results from 1- 3 to a case study -- 5. make recommendations regarding how LCA can be used to evaluate conventional and alternative vehicle types to ensure a reduction of GHG and toxic emissions. -- Internal combustion engine vehicle exhaust emissions are regulated by governments worldwide, and due to this important point, the environmental impact assessment of transportation, including passenger vehicles, public transport buses and heavy-duty truck vehicles is examined over vehicles' lifetimes. Given the recent uptake of alternative vehicles and fuels, there is now a requirement for vehicles' environmental impact to be examined over its lifetime. This thesis examines the environmental impact assessment of the road transport sector in Australia. Decision-makers should heed LCA methods in order to reduce the total effect of vehicle exhaust emissions on the environment and human health. -- The LCA SimaPro software by PRe´ Consultants has been used to estimate the life cycle energy use and emissions of road transportation using the Australian National Life Cycle Inventory Database (AusLCI). Also, where possible, the case studies developed used Australian emissions sources, detailing the fuel pathway, tailpipe emissions, vehicle manufacture, vehicle maintenance and vehicle disposal over a vehicle's lifetime, as input for the LCA. -- The thesis results indicate that advanced vehicle technologies and vehicles powered by alternative fuels are reducing energy use and emissions by 80%-90% compared to conventional internal combustion engine vehicles that are running on petrol or low sulphur diesel (LSD). Also, the results show that for most vehicles the major contributor to LCA energy use (ranging from 70%-90% of total LCA emissions) occurs during the vehicle operation phase. However, the contribution of the vehicles' manufacture phase for advanced vehicle technologies is higher (up to 90% of total LCA emissions). Furthermore, although battery electric vehicles have zero tailpipe emissions, the power supply generation creates significant emissions to the environment because electricity is usually generated from non-renewable energy sources (fossil fuels) in Australia. -- Additionally, biofuel vehicle LCA results reveal that high biofuel blends, including E85 and pure biodiesel, may be worse options due to the need to change the powertrain design. Consequently, the use of low biofuel blends, including E10 and BD5, is recommended to achieve lower vehicle exhaust emissions without changing the engine design. -- In the case of vehicles' environmental rating, the results indicate that advanced vehicles or vehicles powered by alternative fuels have higher overall ratings or stars (indicating a high ranking), while conventional vehicles have lower scores (indicating a low ranking). -- Furthermore, this thesis uses the environmental impact of public buses (Department of Planning Transport and Infrastructure [DPTI] Trial Buses) in the city of Adelaide, South Australia as a case study. The results indicate that the 1905/micro hybrid bus uses significantly less energy and produces fewer GHG emissions and less air pollution compared to other bus models, including the conventional LSD bus, due to many factors, including low fuel usage, high engine efficiency, the driving cycle and driver skills/behaviour. -- In addition, in order to demonstrate the accuracy and reliability of the data and methods used to model LCA, this thesis used sensitivity and uncertainty analysis techniques to ensure that the input data was sound and thus able to produce reliable LCA results. The results show that the data used to build LCA human toxicity-cancer and non-cancer is the most unreliable. Moreover, the study used sensitivity analysis to examine how these parameters impact the outcomes. The analyses also show that many parameters, including vehicle occupancy rate, fuel consumption, distance travelled, vehicle manufacture, average load and electricity consumption, significantly impact all LCA results. -- Finally, regarding direction for future research, the life cycle of automotive technology should include fuel production, vehicle manufacture, operations and maintenance of the vehicle throughout its lifetime, in addition to scrappage and recycling. The case of an automobile using a new fuel, such as electricity, resulting in little to no air pollution per kilometre travelled but that has much higher environmental impacts when the vehicle is scrapped or recycled, demonstrates why LCA is essential. -- Hence, an important objective of this thesis is to make the LCA process transparent and usable for policy analysts. This is important thanks to the advent of new information, and as future technologies develop, LCA needs to be robust and trusted to provide reliable results.

TRANSITIONING TO A HYDROGEN FUTURE

LEARNING FROM THE ALTERNATIVE FUELS EXPERIENCE

DIANE Publishing **The challenges faced by alternative fuels during the last 20 years have much in common with those that face hydrogen (i.e., building markets simultaneously for new vehicle technologies, new fuels, and new infrastructure to support them both). The U.S. set goals in the 1980s and 1990s to derive a substantial portion of its fuel for transportation from non-petroleum alternative fuels by the early 2000s (10% in 2000, 30% in 2010). Although progress has been made through government and private efforts, these goals have not been met for a variety of reasons. To increase the chances for a timely and successful transition to hydrogen, the experiences of the alternative fuels industry must be understood and used to shape hydrogen transition strategies.**

בעד התינוקות

ADVANCED AUTOMOTIVE TECHNOLOGIES: ANNUAL REPORT TO CONGRESS, FISCAL YEAR 1996

ADVANCED VEHICLE TECHNOLOGIES

I think the case has been settled for some time that now that the economic and national security costs of our current reliance on oil are unacceptable. I don't think there's any real debate that the only way we're going to substantially affect that cost to our economy and to many of ourselves, our consumers, is to reduce the amount of oil we use in transportation. This means both increasing the efficiency of traditional combustion engines and increasing alternatives for powering vehicles. There are promising technologies today in alternative fuels, in increasing energy efficiency and in light weight materials. But because they are new and produced on smaller scales they are not yet seen as widely commercially available and viable.

INVESTMENT PLAN FOR THE ALTERNATIVE AND RENEWABLE FUEL AND VEHICLE TECHNOLOGY PROGRAM

DRAFT STAFF PAPER

LOCALIZED HEALTH IMPACTS REPORT : ADDENDUM 2 FOR A SELECTED PROJECT WITH A LOCATION CHANGE AWARDED FUNDING THROUGH THE ALTERNATIVE AND RENEWABLE FUEL AND VEHICLE TECHNOLOGY PROGRAM UNDER SOLICITATION PON-13-605 : CENTERS FOR ALTERNATIVE FUELS AND ADVANCED VEHICLE TECHNOLOGIES

STAFF REPORT

ANNUAL REPORT TO CONGRESS ON THE AUTOMOTIVE TECHNOLOGY DEVELOPMENT PROGRAM. FIFTEENTH

LOCALIZED HEALTH IMPACTS REPORT : FOR A SELECTED PROJECT WITH A LOCATION CHANGE AWARDED FUNDING THROUGH THE ALTERNATIVE AND RENEWABLE FUEL AND VEHICLE TECHNOLOGY PROGRAM UNDER SOLICITATION PON-13-605 : CENTERS FOR ALTERNATIVE FUELS AND ADVANCED VEHICLE TECHNOLOGIES

STAFF REPORT

REVIEW OF THE RESEARCH AND DEVELOPMENT PLAN FOR THE OFFICE OF ADVANCED AUTOMOTIVE TECHNOLOGIES

National Academies Press

ALTERNATIVE FUELS

ALTERNATIVE FUEL VEHICLES

CreateSpace **Alternative Fuels - Alternative Fuel Vehicles - U.S. Department of Energy. An alternative fuel vehicle is a vehicle that runs on a fuel other than "traditional" petroleum fuels (petrol or diesel); and also refers to any technology of powering an engine that does not involve solely petroleum (e.g. electric car, hybrid electric vehicles, solar powered). Because of a combination of factors, such as environmental concerns, high oil prices and the potential for peak oil, development of cleaner alternative fuels and advanced power systems for vehicles has become a high priority for many governments and vehicle manufacturers around the world. Hybrid electric vehicles such as the Toyota Prius are not actually alternative fuel vehicles, but through advanced technologies in the electric battery and motor/generator, they make a more efficient use of petroleum fuel. Other research and development efforts in alternative forms of power focus on developing all-electric and fuel cell vehicles, and even the stored energy of compressed air.**

COST, EFFECTIVENESS, AND DEPLOYMENT OF FUEL ECONOMY TECHNOLOGIES FOR LIGHT-DUTY VEHICLES

National Academies Press **The light-duty vehicle fleet is expected to undergo substantial technological changes over the next several decades. New powertrain designs, alternative fuels, advanced materials and significant changes to the vehicle body are being driven by increasingly stringent fuel economy and greenhouse gas emission standards. By the end of the next decade, cars and light-duty trucks will be more fuel efficient, weigh less, emit less air pollutants, have more safety features, and will be more expensive to purchase relative to current vehicles. Though the gasoline-powered spark ignition engine will continue to be the dominant powertrain configuration even through 2030, such vehicles will be equipped with advanced technologies, materials, electronics and controls, and aerodynamics. And by 2030, the deployment of alternative methods to propel and fuel vehicles and alternative modes of transportation, including autonomous vehicles, will be well underway. What are these new technologies - how will they work, and will some technologies be more effective than others? Written to inform The United States Department of Transportation's National Highway Traffic Safety Administration (NHTSA) and Environmental Protection Agency (EPA) Corporate Average Fuel Economy (CAFE) and greenhouse gas (GHG) emission standards, this new report from the National Research Council is a technical evaluation of costs, benefits, and implementation issues of fuel reduction technologies for next-generation light-duty vehicles. Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles estimates the cost, potential efficiency improvements, and barriers to commercial deployment of technologies that might be employed from 2020 to 2030. This report describes these promising technologies and makes recommendations for their inclusion on the list of technologies applicable for the 2017-2025 CAFE standards.**

VISION MODEL

DESCRIPTION OF MODEL USED TO ESTIMATE THE IMPACT OF HIGHWAY VEHICLE TECHNOLOGIES AND FUELS ON ENERGY USE AND CARBON EMISSIONS TO 2050

The VISION model has been developed by the U.S. Department of Energy (DOE) to provide estimates of the potential energy use, oil use, and carbon emission impacts to 2050 of advanced light- and heavy-duty highway vehicle technologies and alternative fuels. DOE supports research of advanced transportation technologies (including fuels) and is frequently asked to provide estimates of the potential impacts of successful market penetration of these technologies, sometimes on a relatively quick-turnaround basis. VISION is a spreadsheet model in Microsoft Excel that can be used to respond rapidly to quick-turnaround requests, as well as for longer-term analyses. It uses vehicle survival and age-dependent usage characteristics to project total light and heavy vehicle stock, total vehicle

miles of travel (VMT), and total energy use by technology and fuel type by year, given market penetration and vehicle energy efficiency assumptions developed exogenously. Total carbon emissions for on-highway vehicles by year are also estimated because life-cycle carbon coefficients for various fuels are included in VISION. VISION is not a substitute for the transportation component of the Energy Information Administration's (EIA's) National Energy Modeling System (NEMS). NEMS incorporates a consumer choice model to project market penetration of advanced vehicles and alternative fuels. The projections are made within the context of the entire U.S. economy. However, the NEMS model is difficult to use on a quick-turnaround basis and only makes projections to 2025. VISION complements NEMS with its relative ''user-friendliness'' and by extending the time frame of potential analysis. VISION has been used for a wide variety of purposes. For illustration, we have listed some of its most recent and current uses in Table 1.1. Figures 1.1-1.3 illustrate the results of some of those runs. These graphs are not actual model output, but they are based on model results. The main body of this report describes VISION's methodology and data sources. The methodology and data sources used in the light- and heavy-vehicle portions of the model are discussed separately. Some suggestions for future improvements to the model are made. Appendix A provides instructions on how to run the VISION model. Appendix B describes the procedure for updating the model with the latest EIA Annual Energy Outlook (AEO).

REFUELING BEHAVIOR OF FLEXIBLE FUEL VEHICLE DRIVERS IN THE FEDERAL FLEET

Federal fleets are a frequent subject of legislative and executive efforts to lead a national transition to alternative fuels and advanced vehicle technologies. Section 701 of the Energy Policy Act of 2005 requires that all dual-fueled alternative fuel vehicles in the federal fleet be operated on alternative fuel 100% of the time when they have access to it. However, in Fiscal Year (FY) 2012, drivers of federal flex fuel vehicles (FFV) leased through the General Services Administration refueled with E85 24% of the time when it was available--falling well short of the mandate. The U.S. Department of Energy's National Renewable Energy Laboratory completed a 2-year Laboratory Directed Research and Development project to identify the factors that influence the refueling behavior of federal FFV drivers. The project began with two primary hypotheses. First, information scarcity increases the tendency to miss opportunities to purchase E85. Second, even with perfect information, there are limits to how far drivers will go out of their way to purchase E85. This paper discusses the results of the project, which included a June 2012 survey of federal fleet drivers and an empirical analysis of actual refueling behavior from FY 2009 to 2012. This research will aid in the design and implementation of intervention programs aimed at increasing alternative fuel use and reducing petroleum consumption.

ENVIRONMENTAL BENEFITS OF ALTERNATIVE FUELS AND ADVANCED TECHNOLOGY IN TRANSIT

This report evaluates potential reductions in pollutant emissions and fuel consumption that could be achieved through greater adoption of alternative fuels including CNG, LNG and biodiesel, and advanced vehicle technologies such as hybrid electric drive systems in the national transit bus fleet. According with the analysis results, ongoing and planned procurements by transit agencies of new technology diesel, alternative fuel and hybrid-electric buses will result in reductions in emissions of CO, NMHC, NOx and PM with modest increases in CO2 emissions and fuel consumption over the next 3 years. Increased adoption above and beyond that occurring through the transit agencies own initiatives can further capitalize emissions and fuel economy benefits of new technologies. Hypothetical scenarios in which new clean-diesel (post-2007 model year), CNG, diesel-electric hybrid, gasoline electric hybrid and biodiesel fuel use were each individually increased to 15% of the U.S. fleet were considered. Potential changes in annual emissions and fuel consumption are presented. Benefits from the different technologies are discussed. Diesel-electric hybrid buses appear to offer the best overall environmental benefits and is the only technology to result in a reduction in fossil fuel consumption. The relative emissions and efficiency impacts benefits of the various technologies are presented for comparison.

REFUELING BEHAVIOR OF FLEXIBLE FUEL VEHICLE DRIVERS IN THE FEDERAL FLEET

Federal fleets are a frequent subject of legislative and executive efforts to lead a national transition to alternative fuels and advanced vehicle technologies. Section 701 of the Energy Policy Act of 2005 requires that all dual-fueled alternative fuel vehicles in the federal fleet be operated on alternative fuel 100% of the time when they have access to it. However, in Fiscal Year (FY) 2012, drivers of federal flex fuel vehicles (FFV) leased through the General Services Administration refueled with E85 24% of the time when it was available--falling well short of the mandate. The U.S. Department of Energy's National Renewable Energy Laboratory completed a 2-year Laboratory Directed Research and Development project to identify the factors that influence the refueling behavior of federal FFV drivers. The project began with two primary hypotheses. First, information scarcity increases the tendency to miss opportunities to purchase E85. Second, even with perfect information, there are limits to how far drivers will go out of their way to purchase E85. This paper discusses the results of the project, which included a June 2012 survey of federal fleet drivers and an empirical analysis of actual refueling behavior from FY 2009 to 2012. This research will aid in the design and implementation of intervention programs aimed at increasing alternative fuel use and reducing petroleum consumption.

NORCAL ALTERNATIVE FUELS AND ADVANCED VEHICLE TECHNOLOGY CENTER

FINAL PROJECT REPORT

ADVANCED TECHNOLOGY AND ALTERNATIVE FUEL VEHICLES

REVIEW OF THE RESEARCH PROGRAM OF THE U.S. DRIVE PARTNERSHIP

FIFTH REPORT

National Academies Press Review of the Research Program of the U.S. DRIVE Partnership: Fifth Report follows on four previous reviews of the FreedomCAR and Fuel Partnership, which was the predecessor of the U.S. DRIVE Partnership. The U.S. DRIVE (Driving Research and Innovation for Vehicle Efficiency and Energy Sustainability) vision, according to the charter of the Partnership, is this: American consumers have a broad range of affordable personal transportation choices that reduce petroleum consumption and significantly reduce harmful emissions from the transportation sector. Its mission is as follows: accelerate the development of pre-competitive and innovative technologies to enable a full range of efficient and clean advanced light-duty vehicles (LDVs), as well as related energy infrastructure. The Partnership focuses on precompetitive research and development (R&D) that can help to accelerate the emergence of advanced technologies to be commercialization-feasible. The guidance for the work of the U.S. DRIVE Partnership as well as the priority setting and targets for needed research are provided by joint industry/government technical teams. This structure has been demonstrated to be an effective means of identifying high-priority, long-term precompetitive research needs for each technology with which the Partnership is involved. Technical areas in which research and development as well as technology validation programs have been pursued include the following: internal combustion engines (ICEs) potentially operating on conventional and various alternative fuels, automotive fuel cell power systems, hydrogen storage systems (especially onboard vehicles), batteries and other forms of electrochemical energy storage, electric propulsion systems, hydrogen production and delivery, and materials leading to vehicle weight reductions.

ALTERNATIVE FUEL AND ADVANCED VEHICLE TECHNOLOGY INCENTIVES

A SUMMARY OF FEDERAL PROGRAMS

THE EVOLUTION OF A SUPERVISORY CONTROLLER FOR A SPLIT PARALLEL PLUG-IN HYBRID ELECTRIC VEHICLE

The growing global acceptance of alternative fuels and electrified vehicles, accelerated by stricter emission rules, has accentuated the demand for more engineers who are adept in advanced vehicle technologies, particularly in the field of hybrid electric vehicles. Through the EcoCAR 3 challenge, the University of Waterloo Alternative Fuels Team (UWAFT) has the opportunity to produce a split parallel plug-in hybrid electric vehicle (PHEV) that runs on an alternative fuel that has 85% ethanol and 15% gasoline (E85). With the avant-garde design of a snowmobile engine (850cc turbocharged, two-cylinder) with pre and post transmission motors and an 8-speed automatic transmission, there is a need to build an equally innovative hybrid supervisory controller (HSC). This research focuses on

the process followed to build pragmatic controls for its HSC that aims to optimise vehicle performance while ensuring safe operation, lowering emissions, and maximising fuel economy. The question of how an HSC built in a student team environment, which transitions through various drive modes, can ensure safety coverage has not yet been sufficiently addressed. Along with documentation that has traceability between requirements and testing of the HSC code, UWAFT's HSC is intelligently structured for manageability, serviceability and ultimately safety. This investigation starts with methodologies adopted to ascertain traceability between requirements developed and testing done for validation and verification of the developed HSC code for automotive safety. UWAFT's HSC is a rule-based controller developed through model-based design. Following regression testing in various environments such as SIL and HIL, the integrated HSC code is then tested in vehicle. For the integrated code to be cohesive, the rules for code partitioning to maintain its readability and how the model is managed are discussed. The preliminary results of the HSC code prove its practicality by showing effective transitions and torque splitting. Thus, by providing an HSC with incorporated safety and intelligent structure for rapid code development, a new benchmark is set for HSC developed within student team environments.

2015 VEHICLE BUYER'S GUIDE (BROCHURE).

Drivers and fleets are increasingly turning to the hundreds of light-duty, alternative fuel, and advanced technology vehicle models that reduce petroleum use, save on fuel costs, and cut emissions. This guide provides a comprehensive list of the 2015 light-duty models that use alternative fuels or advanced fuel-saving technologies.

REGIONAL ON-ROAD MOBILE SOURCE EMISSIONS CHARACTERIZATION FOR CONVENTIONAL AND ALTERNATIVE VEHICLE TECHNOLOGIES

The development of alternative fuels and vehicle technologies could lead to reductions in emissions and reduced reliance on petroleum fuels. The objectives of this study are to evaluate the potential reductions in air pollutant emissions associated with real world operation of future vehicles that utilize advanced fuels or technologies in comparison to conventional vehicles. For light duty vehicles, the fuels or energy sources considered are gasoline, ethanol (E85), compressed natural gas, hydrogen, and electricity. The technologies considered are internal combustion engines, hybrids, fuel cell, and electric vehicles. For heavy duty vehicles, biodiesel is considered for trucks and compressed natural gas is considered for buses, in addition to conventional diesel fuels and technologies. For most of the vehicle fuel and technology combinations, modal fuel use and emissions models were developed based on available second-by-second portable emission measurement system (PEMS) or dynamometer tailpipe emissions data. Link-based average emission rates were estimated for different link-based average speeds and roadway types based upon second-by-second speed profiles measured on the road as part as previous PEMS measurements, supplemented by data from the literature in some cases. The results enable comparison of different vehicle technologies and fuels for each of several link-based average speeds and roadway facility types. The linked-based emissions factors are coupled with the outputs of a transportation demand model for emission inventory estimation and assessment of the potential changes in emissions that can accrue from technology and fuel use. The results will provide support for decision making regarding alternative fuels, adoption of new vehicle technologies, and air quality management.

ALTERNATIVE AUTOMOTIVE AND ENERGY EFFICIIENCY

DIANE Publishing

2012-2013 INVESTMENT PLAN UPDATE FOR THE ALTERNATIVE AND RENEWABLE FUEL AND VEHICLE TECHNOLOGY PROGRAM

LEAD COMMISSIONER REPORT

NREL - ADVANCED VEHICLES AND FUELS BASICS - CENTER FOR TRANSPORTATION TECHNOLOGIES AND SYSTEMS 2010

We can improve the fuel economy of our cars, trucks, and buses by designing them to use the energy in fuels more efficiently. Researchers at the National Renewable Energy Laboratory (NREL) are helping the nation achieve these goals by developing transportation technologies like: advanced vehicle systems and components; alternative fuels; as well as fuel cells, hybrid electric, and plug-in hybrid vehicles. For a text version of this video visit http://www.nrel.gov/learning/advanced_vehicles_fuels.html.

ELECTRIC VEHICLES

AN ALTERNATIVE FUELS VEHICLE, EMISSIONS, AND REFUELING INFRASTRUCTURE TECHNOLOGY ASSESSMENT

ALTERNATIVE PROPULSION

FUEL CELL, HYBRID VEHICLE, PLUG-IN HYBRID, ETHANOL FUEL, ELECTRIC CAR, ELECTRIC VEHICLE, ALTERNATIVE FUEL VEHICLE, BIODIESEL,

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