



Analysis Report BAV 10-683-001_4

**P2 Hybrid Electrification System Cost Reduction Potential
Constructed on Original Cost Assessment**

Prepared for:

International Council on Clean Transportation
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February 10, 2014

P2 Hybrid Electrification System Cost Reduction Potential

Kieran Humphries



P2 Hybrid Electrification System Cost Reduction Potential:

CTI SYMPOSIUM 2019 Euroforum Deutschland GmbH,2021-04-13 Every year the international transmission and drive community meets up at the International CTI SYMPOSIA automotive drivetrains intelligent electrified in Germany China and USA to discuss the best strategies and technologies for tomorrow s cars busses and trucks From efficiency comfort or costs to electrification energy storage and connectivity these premier industry meetings cover all the key issues in depth

Transitions to Alternative Vehicles and Fuels National Research Council,Division on Engineering and Physical Sciences,Board on Energy and Environmental Systems,Committee on Transitions to Alternative Vehicles and Fuels,2013-04-14 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 **Federal Register** ,2012-10 *Energy Research Abstracts* ,1978 Semiannual with semiannual and annual indexes References to all scientific and technical literature coming from DOE its laboratories energy centers and contractors Includes all works deriving from DOE other related government sponsored information and foreign nonnuclear information Arranged under 39 categories e g Biomedical sciences basic studies Biomedical sciences applied studies Health and safety and Fusion energy Entry gives bibliographical information and abstract Corporate author subject report number indexes *ERDA Energy Research Abstracts* United States. Energy Research and Development Administration,1977-03

Advances in Communication, Devices and Networking Rabindranath Bera,Prashant Chandra Pradhan,Chuan-Ming Liu,Sourav Dhar,Samarendra Nath Sur,2020-07-27 This book covers recent trends in the field of devices wireless communication and networking It gathers selected papers presented at the International Conference on Communication Devices and Networking ICCDN 2019 which was organized by the Department of Electronics and Communication Engineering Sikkim Manipal Institute of Technology Sikkim India on 9 10 December 2019 Gathering cutting edge research papers prepared by researchers engineers and industry professionals it will help young and experienced scientists and developers alike to explore new perspectives and offer them inspirations on how to address real world problems in the areas of electronics communication devices and networking **Transportation... Weekly Government Abstracts** ,1978

ERDA Energy Research Abstracts United States. Energy Research and Development Administration,1977-03

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Electric Vehicles Chris Mi,M. Abul Masrur,2017-09-11 The latest developments in the field of hybrid electric vehicles Hybrid Electric Vehicles provides an introduction to hybrid vehicles which include purely electric hybrid electric hybrid hydraulic fuel cell vehicles plug in hybrid electric and off road hybrid vehicular systems It focuses on the power and propulsion systems for these vehicles including issues related to power and energy management Other topics covered include hybrid vs pure electric HEV system architecture including plug in charging control and hydraulic off road and other industrial utility vehicles safety and EMC storage technologies vehicular power and energy management diagnostics and prognostics and electromechanical vibration issues Hybrid Electric Vehicles Second Edition is a comprehensively updated new edition with four new chapters covering recent advances in hybrid vehicle technology New areas covered include battery modelling charger design and wireless charging Substantial details have also been included on the architecture of hybrid excavators in the chapter related to special hybrid vehicles Also included is a chapter providing an overview of hybrid vehicle technology which offers a perspective on the current debate on sustainability and the environmental impact of hybrid and electric vehicle technology Completely updated with new chapters Covers recent developments breakthroughs and technologies including new drive topologies Explains HEV fundamentals and applications Offers a holistic perspective on vehicle electrification Hybrid Electric Vehicles Principles and Applications with Practical Perspectives Second Edition is a great resource for researchers and practitioners in the automotive industry as well as for graduate students in automotive engineering *Technology Improvement Pathways to Cost-Effective Vehicle Electrification* Aaron Brooker,2010 This paper evaluates several approaches aimed at making plug in electric vehicles EV and plug in hybrid electric vehicles PHEVs cost effective including opportunity charging replacing the battery over the vehicle life improving battery life reducing battery cost and providing electric power directly to the vehicle during a portion of its travel Many combinations of PHEV electric range and battery power are included For each case the model accounts for battery cycle life and the national distribution of driving distances to size the battery optimally Using the current estimates of battery life and cost only the dynamically plugged in pathway was cost effective to the consumer Significant improvements in battery life and battery cost also made PHEVs more cost effective than today s hybrid electric vehicles HEVs and conventional internal combustion engine vehicles CVs **Electric and Hybrid Vehicles** Gianfranco Pistoia,2010-07-27 Electric and Hybrid Vehicles Power Sources Models Sustainability Infrastructure and the Market reviews the performance cost safety and sustainability of battery systems for hybrid electric vehicles HEVs and electric vehicles EVs including nickel metal hydride batteries and Li ion batteries Throughout this book especially in the first chapters alternative vehicles with different power trains are compared in terms of lifetime cost fuel consumption and environmental impact The emissions of greenhouse gases are particularly dealt with The

improvement of the battery or fuel cell performance and governmental incentives will play a fundamental role in determining how far and how substantial alternative vehicles will penetrate into the market. An adequate recharging infrastructure is of paramount importance for the diffusion of vehicles powered by batteries and fuel cells as it may contribute to overcome the so called range anxiety. Thus proposed battery charging techniques are summarized and hydrogen refueling stations are described. The final chapter reviews the state of the art of the current models of hybrid and electric vehicles along with the powertrain solutions adopted by the major automakers. Contributions from the world's leading industry and research experts. Executive summaries of specific case studies. Information on basic research and application approaches.

Prospects for Plug-In Hybrid Electric Vehicles in the United States and Japan Valerie J. Karplus, Sergey Vladimirovich Paltsev, John Matthew Reilly, Massachusetts Institute of Technology. Joint Program on the Science & Policy of Global Change, 2009. The plug in hybrid electric vehicle (PHEV) may offer a potential near term low carbon alternative to today's gasoline and diesel powered vehicles. A representative vehicle technology that runs on electricity in addition to conventional fuels was introduced into the MIT Emissions Prediction and Policy Analysis (EPPA) model as a perfect substitute for internal combustion engine (ICE) only vehicles in two likely early adopting markets: the United States and Japan. We investigate the effect of relative vehicle cost and all electric range on the timing of PHEV market entry in the presence and absence of an advanced cellulosic biofuels technology and a strong 450ppm economy wide carbon constraint. Vehicle cost could be a significant barrier to PHEV entry unless fairly aggressive goals for reducing battery costs are met. If a low cost vehicle is available we find that the PHEV has the potential to reduce CO₂ emissions, refined oil demand and under a carbon policy the required CO₂ price in both the United States and Japan. The emissions reduction potential of PHEV adoption depends on the carbon intensity of electric power generation and the size of the vehicle fleet. Thus the technology is much more effective in reducing CO₂ emissions if adoption occurs under an economy wide cap and trade system that also encourages low carbon electricity generation.

Quantifying the Fuel Use and Greenhouse Gas Reduction Potential of Electric and Hybrid Electric Vehicles, 2000

Simulation and Optimization of Electric and Hybrid Vehicles with Two-speed Transmissions Kieran Humphries, 2015

Electrification and hybridization of fleet vehicles is of interest to businesses and governments due to the potential for cost savings and reduction of harmful emissions. There are many possible configurations for such vehicles from full battery electric vehicles to series parallel and power split hybrids. Electric vehicles and series hybrid vehicles are the focus of this research. Both these types of vehicle typically use a single speed gear reduction to allow for high speed motors. However performance and efficiency gains may be possible using a two speed transmission system. Through simulation this project aims to determine optimized configurations for Class 4 delivery vehicles using a two speed transmission. An in service hybrid delivery truck, an Azure Dynamics Balance Hybrid, was tested to obtain baseline performance and fuel economy results. These results were analyzed and used to refine parameter specifications and operating maps for the simulation vehicles. Simulations of the

different architectures were created using commercial software and preliminary component sizing was completed using various methodologies Two speed transmissions were added and all systems were optimized using the DIRECT and genetic optimization algorithms with respect to both component sizing and hybrid system control leading to improved vehicle performance The advantages of a two speed or direct drive system over a single speed gearbox were significant Future cost analysis is recommended to determine which system will be best for production applications

Costs and Emissions

Associated with Plug-in Hybrid Electric Vehicle Charging in the Xcel Energy Colorado Service Territory Keith Parks, 2007 The combination of high oil costs concerns about oil security and availability and air quality issues related to vehicle emissions are driving interest in plug in hybrid electric vehicles PHEVs PHEVs are similar to conventional hybrid electric vehicles but feature a larger battery and plug in charger that allows electricity from the grid to replace a portion of the petroleum fueled drive energy PHEVs may derive a substantial fraction of their miles from grid derived electricity but without the range restrictions of pure battery electric vehicles As of early 2007 production of PHEVs is essentially limited to demonstration vehicles and prototypes However the technology has received considerable attention from the media national security interests environmental organizations and the electric power industry The use of PHEVs would represent a significant potential shift in the use of electricity and the operation of electric power systems Electrification of the transportation sector could increase generation capacity and transmission and distribution T D requirements especially if vehicles are charged during periods of high demand This study is designed to evaluate several of these PHEV charging impacts on utility system operations within the Xcel Energy Colorado service territory

Costs and Emissions Associated

with Plug-In Hybrid Electric Vehicle Charging in the Xcel Energy Colorado Service Territory, 2007 The combination of high oil costs concerns about oil security and availability and air quality issues related to vehicle emissions are driving interest in plug in hybrid electric vehicles PHEVs PHEVs are similar to conventional hybrid electric vehicles but feature a larger battery and plug in charger that allows electricity from the grid to replace a portion of the petroleum fueled drive energy PHEVs may derive a substantial fraction of their miles from grid derived electricity but without the range restrictions of pure battery electric vehicles As of early 2007 production of PHEVs is essentially limited to demonstration vehicles and prototypes However the technology has received considerable attention from the media national security interests environmental organizations and the electric power industry The use of PHEVs would represent a significant potential shift in the use of electricity and the operation of electric power systems Electrification of the transportation sector could increase generation capacity and transmission and distribution T D requirements especially if vehicles are charged during periods of high demand This study is designed to evaluate several of these PHEV charging impacts on utility system operations within the Xcel Energy Colorado service territory

Plug-In Hybrid Electric Vehicle Value Proposition

Study, 2009 Plug in hybrid electric vehicles PHEVs offer significant improvements in fuel economy convenient low cost

recharging capabilities potential environmental benefits and decreased reliance on imported petroleum However the cost associated with new components e g advanced batteries to be introduced in these vehicles will likely result in a price premium to the consumer This study aims to overcome this market barrier by identifying and evaluating value propositions that will increase the qualitative value and or decrease the overall cost of ownership relative to the competing conventional vehicles and hybrid electric vehicles HEVs of 2030 During this initial phase of this study business scenarios were developed based on economic advantages that either increase the consumer value or reduce the consumer cost of PHEVs to assure a sustainable market that can thrive without the aid of state and Federal incentives or subsidies Once the characteristics of a thriving PHEV market have been defined for this timeframe market introduction steps such as supportive policies regulations and temporary incentives needed to reach this level of sustainability will be determined PHEVs have gained interest over the past decade for several reasons including their high fuel economy convenient low cost recharging capabilities potential environmental benefits and reduced use of imported petroleum potentially contributing to President Bush s goal of a 20% reduction in gasoline use in ten years or Twenty in Ten PHEVs and energy storage from advanced batteries have also been suggested as enabling technologies to improve the reliability and efficiency of the electric power grid However PHEVs will likely cost significantly more to purchase than conventional or other hybrid electric vehicles HEVs in large part because of the cost of batteries Despite the potential long term savings to consumers and value to stakeholders the initial cost of PHEVs presents a major market barrier to their widespread commercialization The purpose of this project is to identify and evaluate value added propositions for PHEVs that will help overcome this market barrier Candidate value propositions for the initial case study were chosen to enhance consumer acceptance of PHEVs and or compatibility with the grid Potential benefits of such grid connected vehicles include the ability to supply peak load or emergency power requirements of the grid enabling utilities to size their generation capacity and contingency resources at levels below peak Different models for vehicle battery ownership leasing financing and operation as well as the grid communications and vehicle infrastructure needed to support the proposed value added functions were explored during Phase 1 Rigorous power system vehicle financial and emissions modeling were utilized to help identify the most promising value propositions and market niches to focus PHEV deployment initiatives

This book delves into P2 Hybrid Electrification System Cost Reduction Potential. P2 Hybrid Electrification System Cost Reduction Potential is a vital topic that needs to be grasped by everyone, from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into P2 Hybrid Electrification System Cost Reduction Potential, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
 - Chapter 1: Introduction to P2 Hybrid Electrification System Cost Reduction Potential
 - Chapter 2: Essential Elements of P2 Hybrid Electrification System Cost Reduction Potential
 - Chapter 3: P2 Hybrid Electrification System Cost Reduction Potential in Everyday Life
 - Chapter 4: P2 Hybrid Electrification System Cost Reduction Potential in Specific Contexts
 - Chapter 5: Conclusion
2. In chapter 1, this book will provide an overview of P2 Hybrid Electrification System Cost Reduction Potential. The first chapter will explore what P2 Hybrid Electrification System Cost Reduction Potential is, why P2 Hybrid Electrification System Cost Reduction Potential is vital, and how to effectively learn about P2 Hybrid Electrification System Cost Reduction Potential.
3. In chapter 2, the author will delve into the foundational concepts of P2 Hybrid Electrification System Cost Reduction Potential. This chapter will elucidate the essential principles that need to be understood to grasp P2 Hybrid Electrification System Cost Reduction Potential in its entirety.
4. In chapter 3, the author will examine the practical applications of P2 Hybrid Electrification System Cost Reduction Potential in daily life. The third chapter will showcase real-world examples of how P2 Hybrid Electrification System Cost Reduction Potential can be effectively utilized in everyday scenarios.
5. In chapter 4, the author will scrutinize the relevance of P2 Hybrid Electrification System Cost Reduction Potential in specific contexts. This chapter will explore how P2 Hybrid Electrification System Cost Reduction Potential is applied in specialized fields, such as education, business, and technology.
6. In chapter 5, this book will draw a conclusion about P2 Hybrid Electrification System Cost Reduction Potential. This chapter will summarize the key points that have been discussed throughout the book.

This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of P2 Hybrid Electrification System Cost Reduction Potential.

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P2 Hybrid Electrification System Cost Reduction Potential Introduction

In this digital age, the convenience of accessing information at our fingertips has become a necessity. Whether its research papers, eBooks, or user manuals, PDF files have become the preferred format for sharing and reading documents. However,

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