Plug In Electric Vehicles In Smart Grids Integration Techniques Power Systems

Energy Management Strategies for Electric and Plug-In Hybrid Electric Vehicles

Electric and Hybrid Vehicles

Distribution feeders and equipment are designed to serve peak loads, and in the absence of Plug-in Electric Vehicle (PEV) loads, day-ahead dispatch of feeders is typically performed by optimizing feeder controls for forecasted load profiles. However, due to climate change concerns, the market share of PEVs is expected to increase, and consequently, utilities expect an increase in demand due to these loads charging from the grid. Uncontrolled charging of PEVs may lead to new peaks in distribution feeders, which would require expensive infrastructure and equipment upgrades. Furthermore, PEV loads will represent new sources of uncertainty, temporal and spatial, which will pose a challenge for the centralized control and optimal operation of the grid. In practice, these uncertainties arise as a result of variation in factors such as the number of PEVs connected to the grid, the load at the point of common coupling, and the initial battery state-of-charge (SoC). Hence, the integration of PEVs into the existing distribution system, without significant infrastructure upgrades, will be possible only through smart charging of these loads, while properly accounting for these uncertainties. The elasticity of PEVs provides a level of flexibility that can be used by utilities or Local Distribution Companies (LDC) to ensure efficient feeder operation, while providing fair and efficient charging to PEV customers. This thesis presents a novel two-step approach for the fair charging of PEVs in a primary distribution feeder, accounting for the uncertainty associated with PEVs, considering the perspectives of both the LDC and the PEV customer.

Determining the Optimal Subsidy for Plug-In Electric Vehicles in the United States by County

In three transportation revolutions, transportation expert Dan Sperling and his collaborators share research-based insights on potential public benefits and impacts of the three transportation revolutions of vehicle automation, shared mobility, and vehicle electrification. They describe innovative ideas and practical implementation approaches for leveraging the new transportation paradigms.

Electric and Plug-In Hybrid Vehicles

This book addresses the practical issues for commercialization of current and future electric and plug-in hybrid electric vehicles (EV/PHEVs). The volume focuses on power electronics and motor driven based solutions for both current as well as future EV/PHEV technologies. Propulsion system requirements and motor sizing for EVs is also discussed, along with practical system sizing examples. PHEV power system architectures are discussed in detail. Key EV battery technologies are explained as well as corresponding battery management issues are summarized. Advanced power electronic converter topologies for current and future charging infrastructures will also be discussed in detail. EV/PHEV interface with renewable energy in detail, with practical examples.

The Bhutan Electric Vehicle Initiative

Plug-In Electric Vehicle Grid Integration

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 public policies are needed to ensure their development.

Transitions to Alternative Transportation Technologies—a Plug-in Hybrid Electric Vehicles

This book focuses on the state of the art in worldwide research on applying optimization approaches to intelligently control charging and discharging of batteries of Plug-in Electric Vehicles (PEVs) in smart grids. Network constraints, cost considerations, the number and penetration level of PEVs, utilization of PEVs by their owners, ancillary services, load forecasting, risk analysis, etc. are all different criteria considered by the researchers in developing mathematical based equations which represent the presence of PEVs in electric networks. Different objective functions can be defined and different optimization methods can be utilized to coordinate the performance of PEVs in smart grids. This book will be an excellent resource for anyone interested in grasping the current state of applying different optimization techniques and approaches that can manage the presence of PEVs in smart grids.

Technologies and Applications for Smart Charging of Electric and Plug-In Hybrid Vehicles

Climate change, urban air quality, and dependency on crude oil are important societal challenges. In the transportation sector especially, clean and efficient energy technologies must be developed. Electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs) have gained a growing interest in the vehicle industry. Nowadays, the commercialization of EVs and PHEVs has been possible in different applications (i.e., light duty, medium-duty, and heavy-duty vehicle applications) thanks to the advances in energy storage systems, power electronics converters (including DC/DC converters, DC/AC inverters, and battery charging systems), electric machines, and efficient power flow control strategies. This book is based on the Special Issue of the journal Applied Sciences on “Plug-In Hybrid Electric Vehicles (PHEVs).” This collection of research articles includes topics such as novel propulsion systems, emerging power electronics and their control algorithms, emerging electric machines and control techniques, energy storage systems, including BMS, and efficient energy management strategies for hybrid propulsion, vehicle-to-grid (V2G), vehicle-to-home (V2H), grid-to-vehicle (G2V) technologies, and wireless power transfer (WPT) systems.

Plug-In Electric Vehicles

This book is designed as an interdisciplinary platform for working in electric and plug-in hybrid electric vehicles powertrain design and development, and electric and hybrid vehicles manufacturing and management, and for scientists who want to get access to information related to electric and hybrid vehicle energy management, efficiency and control. The book presents the development simulation that allows the specialist to evaluate electric and hybrid vehicle powertrain performance, energy flow, efficiency, range and consumption. The mathematics behind each electric and hybrid vehicle component is explained and for each specific vehicle the powertrain is analyzed and output results presented through the use of specific automotive industrial software (AVL Cruise, JPS CarMaker, AVL Concerts). This methodology of electric and hybrid powertrain design serves to broaden understanding of how the energy flow, efficiency, range and consumption of these vehicles can be adjusted, updated and predicted via development processes.

Electric Vehicles

This book highlights the latest advancements in the planning and operation of plug-in electric vehicles (PEV). In-depth, the book presents essential planning and operation techniques to manage the PEV fleet and handle the related uncertainties associated with the drivers’ behavior. Several viewpoints are presented in the book, ranging from the local distribution companies to generation companies to the aggregators. Problems such as parking lot allocation and charging management are investigated, taking into consideration the technical, geographical, and social aspects in a smart grid infrastructure.

Intelligent Control of Connected Plug-In Hybrid Electric Vehicles

Page 1/4
Electric power systems are experiencing significant changes at the worldwide scale in order to become cleaner, smarter, and more reliable. This edited book examines a wide range of topics related to these changes, which are primarily caused by the introduction of information technologies, renewable energy penetration, digitized equipment, new operational strategies, and so forth. The emphasis will be put on the modeling and control of smart grid systems. The book addresses research topics such as high-efficiency transformers, wind turbines and generators, fuel cells, or high-speed turbines and generators.

Planning and Operation of Plug-in Electric Vehicles

This book covers the recent research advancements in the area of charging strategies that can be employed to accommodate the anticipated high deployment of Plug-in Electric Vehicles (PEVs) in smart grids. Recent literature has focused on various potential issues of uncoordinated charging of PEVs and methods of overcoming such challenges. After an introduction to charging coordination paradigms of PEVs, this book will present various ways the coordinated control can be accomplished. These innovative approaches include hierarchical coordinated control, model predictive control, optimal control strategies to minimize load variance, smart PEV load management based on load forecasting, integrating renewable energy sources such as photovoltaic arrays to supplement grid power, using wireless communication networks to coordinate the charging load of a smart grid and using market price of electricity to coordinate the charging load. Hence, this book proposes many new strategies proposed recently by the researchers around the world to address the issues related to coordination of charging load of PEVs in a future smart grid.

Electric Vehicle Primer

What are smart cities? What are their purposes? What are the impacts resulting from their implementations? With these questions in mind, this book is compiled with the primary concern of answering readers with different profiles; from those interested in acquiring basic knowledge about the various topics surrounding the subject related to smart cities, to those who are more motivated by knowing the technical elements and the technological apparatus involving this theme. This book audience is multidisciplinary, as it will be confirmed by the various chapters addressed here. It explores different knowledge areas, such as electric power systems, signal processing, telecommunications, electronics, systems optimization, computational intelligence, real-time systems, renewable energy systems, and information systems.

San Diego Regional Plug-in Electric Vehicle (PEV) Readiness Plan

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 hybrid batteries and Li-ion batteries. Throughout this book, especially in the first chapters, alternative vehicles with different power trains are compared in terms of cost, 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 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 worlds leading industry and research experts Executive summaries of specific case studies Information on basic research and application approaches

Hybrid Electric Vehicles

This authoritative new resource provides a comprehensive introduction to plug-in electric vehicles (PEVs), including critical discussions on energy storage and converter technology. The architecture and models for sustainable charging infrastructures and capacity planning of small scale fast charging stations are presented. This book considers PEVs as mobile storage units and explores how PEVs can provide services to the grid. Enabling technologies are explored, including energy storage, converter, and charger technologies for home and park charging. The adoption of EVs is discussed and examples are given from the individual battery level to the city level. This book provides guidance on how to build and design sustainable transportation systems. Optimal arrival rates, optimal service rates, facility location problems, load balancing, and demand forecasts are covered in this book. Time-saving MATLAB code and background tables are included in this resource to help engineers with their projects in the field.

Implementation Approach for Plug-in Electric Vehicles at Joint Base Lewis McChord. Task 4

This book offers a comprehensive yet accessible snapshot of the latest consumer research on the adoption and use of electric vehicles. It discusses the importance of developing a better understanding of consumer behavior in relation to electric vehicles, and the advantages that can be gained from the growing number of electric vehicle users, who can now be studied directly. In turn, it systematically analyses the leading markets for electric vehicles in North America, Europe, and Asia. Bringing together the experience and expertise of authoritative researchers and practicing professionals, the book shares a wide range of empirical data obtained at the national level and summarizes the general lessons learned. The last part of the book discusses policy-relevant insights, forecasts the future evolution of the field in terms of methods and data availability, and addresses several key questions that policymakers and other stakeholders are currently facing.

Plug-in Hybrid Electric Vehicle (PHEV)

In the past few years, interest in plug-in electric vehicles (PEVs) has grown. Advances in battery and other technologies, new federal standards for carbon-dioxide emissions and fuel economy, state zero-emission-vehicle requirements, and the current administration's goal of putting millions of alternative-fuel vehicles on the road have all highlighted PEVs as a transportation alternative. Consumers are also beginning to recognize the advantages of PEVs over conventional vehicles, such as lower operating costs, smoother operation, and better acceleration; the ability to fuel up at home; and zero tailpipe emissions when the vehicle operates solely on its battery. There are, however, barriers to PEV deployment, including the vehicle cost, the short all-electric-driving range, the long battery charging time, uncertainties about battery life, the few choices of vehicle models, and the need for a charging infrastructure to support PEVs. What should industry do to improve the performance of PEVs and make them more attractive to consumers? At the request of Congress, Overturning Barriers to Deployment of Plug-in Electric Vehicles identifies barriers to the introduction of electric vehicles and recommends ways to mitigate these barriers. This report examines the characteristics and capabilities of electric vehicle technologies, such as cost, performance, range, safety, and durability, and assesses how these factors might create barriers to widespread PEV adoption. Barriers to widespread PEV adoption present an opportunity for Plug-in Electric Vehicles to provide an overview of the current status of PEV adoption in the US and present the latest research relevant to the advancement of this promising technology for consumers. Through consideration of consumer behaviors, tax incentives, business models, incentive programs, and infrastructure needs, this book studies the state of the industry and makes recommendations to further its development and acceptance.

Plug In Electric Vehicles in Smart Grids

This book explores the behavior of networks of electric and hybrid vehicles. The topics that are covered include: energy management issues for aggregates of plug-in vehicles; the design of sharing systems to support electric-mobility; context awareness in the operation of electric and hybrid vehicles, and the role that this plays in a Smart City context; and tools to test and design massively large-scale networks of such vehicles. The book also introduces new and interesting control problems that are becoming prevalent in the EV-PHEV's context, as well as identifying some open questions. A particular focus of the book is on the opportunities afforded by networked actuation possibilities in electric and hybrid vehicles, and the role that such actuation may play in air-quality and energy management.

Environmental Impacts of Road Vehicles

The latest developments in the field of hybrid electric vehicles Hybrid Electric Vehicles provide an introduction to hybrid vehicles, which include pure electric, hybrid electric, hybrid hydraulic, fuel cell vehicles, plug-in hybrid electric, and off-road hybrid vehicular systems. It focuses on the power and energy management, new vehicle 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 utility industrial 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. Interesting control problems that are becoming prevalent in the EV-PHEV's context, as well as identifying some open questions. A particular focus of the book is on the opportunities afforded by networked actuation possibilities in electric and hybrid vehicles, and the role that such actuation may play in air-quality and energy management.

Transportation Energy Data Book

This book covers the recent research advancements in the area of charging strategies that can be employed to accommodate the anticipated high deployment of Plug-in Electric Vehicles (PEVs) in smart grids. Recent literature has focused on various potential issues of uncoordinated charging of PEVs and methods of overcoming such challenges. After an introduction to charging coordination paradigms of PEVs, this book will present various ways the coordinated control can be accomplished. These innovative approaches include hierarchical coordinated control, model predictive control, optimal control strategies to minimize load variance, smart PEV load management based on load forecasting, integrating renewable energy sources such as photovoltaic arrays to supplement grid power, using wireless communication networks to coordinate the charging load of a smart grid and using market price of electricity to coordinate the charging load. Hence, this book proposes many new strategies proposed by the researchers around the world to address the issues related to coordination of charging load of PEVs in a future smart grid.
Plug In Electric Vehicles in Smart Grids

The market for electrified light-duty vehicles (also called passenger vehicles, including passenger cars, pickup trucks, SUVs, and minivans) has grown since the 1990s. During this decade, the first contemporary hybrid-electric vehicle debuted on the global market, followed by the introduction of electric vehicles (EVs). By 2018, electric vehicles made up 4.2% of the 16.9 million new light-duty vehicles sold in the United States that year. Meanwhile, charging infrastructure grew in response to rising electric vehicle ownership, increasing from 3,394 charging stations in 2011 to 75,301 in 2019. However, many locations have sparse or no public charging infrastructure. Electric motors and traction battery packs most commonly made up of lithium-ion battery cells make EVs apart from internal combustion engine vehicles (ICEVs). The battery pack provides power to the electric motor, sending electricity to the wheels. At times, the motive power is electrical energy to the battery. The broad categories of EVs can be identified by whether they have an internal combustion engine (i.e., hybrid vehicles) and whether the battery pack can be charged by external electricity (i.e., plug-in electric vehicles). The numerous vehicle technologies further determine characteristics such as fuel economy rating, driving range, and greenhouse gas emissions. EVs can be separated into three broad categories: * Hybrid Electric vehicles (HEVs): The internal combustion engine powers the wheels, while the electric motor can provide supplemental power. * Plug-In Hybrid Electric Vehicles (PHEVs): The battery pack can be charged by an external source of electricity. Depending on the model, primary power to the wheels may be supplied by the battery pack and electric motor, the internal combustion engine, or a combination. * All-electric vehicles (AEVs; also called battery-electric vehicles or BEVs): The battery pack must be charged via an external source of electricity. The battery pack and electric motor power the wheels. Current technology offers three levels of charging for plug-in EVs. Level 1 and Level 2 are the most widely available with standardized vehicle connectors and charge ports that can be set up at:home charging. Level 3 (also called DC fast charging) offers the fastest charging rates on the market but is not available for home-only installation due to high voltage. Vehicle connectors and corresponding charge ports for Level 3 are also not standardized, with three different systems currently in use by different vehicle manufacturers. Some research has raised concerns regarding the potential impact of fast charging on battery performance, resulting in technology development aimed at addressing potential capacity loss and decreased charging cycles. As an emergent technology area, EVs present a number of issues for consideration. The fuel sources used to generate the electricity to charge PEVs and AEVs are a major factor in determining GHG emissions relative to ICEVs. Per-mile EV emissions vary geographically with the time of day and year that charging takes place. Growing demand for lithium-ion batteries also shifts the material requirements of the vehicle market from fuels for combustion to minerals and other materials for battery production. A growing EV market may encourage new strategies around the supply and refining of raw materials, ability to manufacture batteries, and end-of-life battery management and recycling. Support for EV deployment stems from, among others, federal and state government establishing manufacturing rebates, tax credits for purchases, funding for research and development, and standards for fuel economy and emissions. These policies include the Plug-In Electric Vehicle Tax Credit, and the coordinated Corporate Average Fuel Economy (CAFE) standards and emissions standards for vehicles.

Plug-in Electric Vehicles Integrating Fluctuating Renewable Electricity

This book focuses on the state of the art in worldwide research on applying optimization approaches to intelligently control charging and discharging of batteries of Plug-in Electric Vehicles (PEVs) in smart grids. Network constraints, cost considerations, the number and penetration level of PEVs, utilization of PEVs by their owners, ancillary services, load forecasting, risk analysis, etc. are all different criteria considered by the researchers in developing mathematical based equations which represent the presence of PEVs in electric networks. Different objective functions can be defined, and several methods can be utilized to coordinate the performance of PEVs in smart grids. This book will be an excellent resource for anyone interested in grasping the state of the art as well as the latest research on optimization techniques and approaches that can manage the presence of PEVs in smart grids.

Plug In Electric Vehicles in Smart Grids

Intelligent Control of Connected Plug-in Hybrid Electric Vehicles presents the development of real-time intelligent control systems for plug-in hybrid electric vehicles, which involves control-oriented modelling, controller design, and performance evaluation. The controllers outlined in the book take advantage of advances in vehicle communications technologies, such as global positioning systems, intelligent transportation systems, geographic information systems, and other on-board sensors, in order to provide look-ahead trip data. The book contains simple and efficient models and fuel optimization algorithms for the devised controllers to address the challenge of real-time implementation in the design of complex control systems. Using the look-ahead trip information, the authors of the book propose intelligent optimal model-based control systems to minimize the total energy cost, for both grid-derived electricity and fuel. The multipurpose intelligent control system proposed consists of trip planning, an ecological cruise control, and a route-based energy management system. An algorithm that is designed to take advantage of preiewed trip information to optimize control actions is presented. The research presented in Intelligent Control of Connected Plug-in Hybrid Electric Vehicles is a useful source of information for postgraduate students and researchers in academic institutions participating in automotive research activities. Engineers and designers working in research and development for automotive companies will also find this book of interest. Advances in Intelligent Control reports and encourages the transfer of technology in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. The series offers an opportunity for researchers to present an extended exposition of new work in all aspects of industrial control.

Plug In Electric Vehicles in Smart Grids

As the country that inspires the world with 'gross national happiness' development philosophy, Bhutan is striving to pursue its economic growth while committing to its core values of inclusive and green development. Even with robust economic growth rates, Bhutan’s dependence on imports and hydropower revenues drives the country to search for self-reliant option to fuel the economy while further decarbonizing the economy. Electric vehicle is being explored as one of the key policies to introduce green mobility, reduce fossil fuel imports and put the country firmly on a green growth path. Globally, electric vehicle market and technology are still in the nascent stage but are developing rapidly. The automotive industry has adopted electrification as a pillar of future drive train technology. EV uptake is expected to increase significantly with ongoing improvements in technology and resulting cost decreases in the global market. This report aims to help Bhutan think through various technical and policy issues of introducing electric vehicles in its own context. It analyses a variety of factors that will impact adoption of electric vehicles from technical, market and social feasibility to consumer awareness and stakeholders’ capacity. It also addresses several policy questions which are at the heart of public debate such as affordability of the government to undertake the program, economic costs and benefits, distributional impact, fiscal and macroeconomic implications. Drawing from vast international experiences, the report examines in great technical details how global cutting-edge technology like electric vehicles could be pursued in the context of developing economies with different socio-economic characteristics and constraints compared to advanced economies. It will help readers better grasp the technical, financial, and social challenges as well as opportunities in initiating electric vehicles policy program and provide practical recommendations that will be useful for policy makers in designing their own policies.

Smart Cities Technologies

Overcoming Barriers to Electric-Vehicle Deployment

Electric and Plug-in Hybrid Vehicle Networks

DOE/EV.

Electric and Plug-in Hybrid Vehicle Networks

Plug-in electric vehicles are coming. Major automakers plan to commercialize their first models soon, while Israel and Denmark have ambitious plans to electrify large portions of their vehicle fleets. No technology has greater potential to end the United States’ crippling dependence on oil, yet many Americans still refuse to believe that the future is electric. By 2012, nearly 50% of the 3.7 million miles that the world’s hybrid electric vehicles travel per day were driven by fleets. In this book, the authors explore how electric vehicles can be integrated into the power system, what the technical, economic, and policy challenges are, and what kind of research is required to make this transition possible.

Transitions to Alternative Fuel Vehicles

Plug-in electric vehicles are coming. Major automakers plan to commercialize their first models soon, while Israel and Denmark have ambitious plans to electrify large portions of their vehicle fleets. No technology has greater potential to end the United States’ crippling dependence on oil, yet many Americans still refuse to believe that the future is electric. By 2012, nearly 50% of the 3.7 million miles that the world’s hybrid electric vehicles travel per day were driven by fleets. In this book, the authors explore how electric vehicles can be integrated into the power system, what the technical, economic, and policy challenges are, and what kind of research is required to make this transition possible.

Overcoming Barriers to Deployment of Plug-in Electric Vehicles

Page 3/4
This study focused on Joint Base Lewis McChord (JBLM), which is located in Washington State. Task 1 consisted of a survey of the non-tactical fleet of vehicles at JBLM to begin the review of vehicle mission assignments and the types of vehicles in service. In Task 2, daily operational characteristics of select vehicles were identified and vehicle movements were recorded in data loggers in order to characterize the vehicles’ missions. In Task 3, the results of the data analysis and observations were provided. Individual observations of the selected vehicles provided the basis for recommendations related to PEV adoption (i.e., whether a battery electric vehicle or plug-in hybrid electric vehicle (collectively referred to as PEVs) can fulfill the mission requirement), as well as the basis for recommendations related to placement of PEV charging infrastructure. This report focuses on an implementation plan for the near-term adoption of PEVs into the JBLM fleet.

The Glass Castle

The first concerns that come to mind in relation to pollution from road vehicles are direct emissions of carbon dioxide and toxic air pollutants. These are, of course, important but the impacts of road traffic are altogether more substantial. This volume of the Issues in Environmental Science and Technology Series takes a broader view of the environment and human health, excluding only injury due to road traffic accidents. By looking across the environmental media, air, water and soil, and taking account also of noise pollution, the volume addresses far more than the conventional atmospheric issues. More importantly, however, it examines present and future vehicle technologies, the implications of more extensive use of batteries in electric vehicles and the consequences of recycling vehicles at the end of use. Finally, examples of lifecycle analysis as applied to road vehicles are reviewed. This book is a comprehensive source of authoritative information for students studying pollution, and for policy-makers concerned with vehicle emissions and road traffic pollution more generally.

The Global Rise of the Modern Plug-In Electric Vehicle

Three Revolutions

The nation has compelling reasons to reduce its consumption of oil and emissions of carbon dioxide. Plug-in hybrid electric vehicles (PHEVs) promise to contribute to both goals by allowing some miles to be driven on electricity drawn from the grid, with an internal combustion engine that kicks in when the batteries are discharged. However, while battery technology has made great strides in recent years, batteries are still very expensive. Transitions to Alternative Transportation Technologies—Plug-in Hybrid Electric Vehicles builds on a 2008 National Research Council report on hydrogen fuel cell vehicles. The present volume reviews the current and projected technology status of PHEVs; considers the factors that will affect how rapidly PHEVs could enter the marketplace, including the interface with the electric transmission and distribution system; determines a maximum practical penetration rate for PHEVs consistent with the time frame and factors considered in the 2008 Hydrogen report; and incorporates PHEVs into the models used in the frame study to estimate the frame and impacts on petroleum consumption and carbon dioxide emissions.

Who’s Driving Electric Cars

The electric vehicle offers many promises—increasing U.S. energy security by reducing petroleum dependence, contributing to climate-change initiatives by decreasing greenhouse gas (GHG) emissions, stimulating long-term economic growth through the development of new technologies and industries, and improving public health by improving local air quality. There are, however, substantial technical, social, and economic barriers to widespread adoption of electric vehicles, including vehicle cost, small driving range, long charging times, and the need for a charging infrastructure. In addition, people are unfamiliar with electric vehicles, are uncertain about their costs and benefits, and have diverse needs that current electric vehicles cannot meet. Although a person might derive some personal benefits from ownership, the costs of achieving the social benefits can be very high. It is hoped that FC charging operations will attract people who purchase the vehicles. Overall research has shown that FC vehicles can be a viable alternative to vehicles using oil as the main fuel. In an concluding the National Academy of Sciences were the National Academy’s address market barriers that are slowing the purchase of electric vehicles and hindering the deployment of supporting infrastructure. As a result of the request, the National Research Council (NRC)’s part of the National Academies-appointed the Committee on Overcoming Barriers to Electric-Vehicle Deployment. This committee documented their findings in two reports: a short interim report focused on near-term options, and a full comprehensive report. Overcoming Barriers to Electric-Vehicle Deployment fulfills the request for the short interim report that addresses specifically the following issues:

- Infrastructure needs for electric vehicles, barriers to deploying the infrastructure, and possible rules of the federal government in overcoming the barriers.
- This report also includes an initial discussion of the pros and cons of the possible rules. This interim report does not address the committee’s full statement of task and does not offer any recommendations because the committee is still in the early stages of data gathering. The committee will continue to gather and review information and conduct analyses through late spring 2014 and will issue its final report in late summer 2014. Overcoming Barriers to Electric Charging Deployment focuses on the light-duty vehicle sector in the United States and restricts its discussion of electric vehicles to plug-in electric vehicles (PEVs), which include battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). The common feature of these vehicles is that their batteries are charged by being plugged into the electric grid. BEVs differ from PHEVs because they operate solely on electricity stored in a battery (that is, there is no other power source); PHEVs have internal combustion engines that can supplement the electric power train. Although this report considers PEVs generally, the committee recognizes that there are fundamental differences between PHEVs and BEVs.

The Potential Role of Plug-in Electric Vehicles in the U.S. and Their Effect on Emissions Through Mid-Century

Climate change, urban air quality, and dependency on crude oil are important societal challenges. In the transportation sector especially, clean and energy efficient technologies must be developed. Electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs) have grown a gaining interest in the next 20 years. However, the potential of PHEVs has been possible in different applications (i.e., light-duty, medium-duty, and heavy-duty vehicles) thanks to the advances in energy storage systems, power electronics converters (including DC/DC converters, DC/AC inverters, and battery charging converters), electric machines, and energy efficient power flow control strategies. This book is based on the Special Issue of the journal Applied Sciences on “Plug-In Hybrid Electric Vehicles (PHEVs)”. This collection of research articles includes topics such as novel propulsion systems, emerging power electronics and their control algorithms, emerging electric machines and control techniques, energy storage systems, including BMS, and efficient energy management strategies for hybrid propulsion, vehicle-to-grid (V2G), vehicle-to-home (V2H), grid-to-vehicle (G2V) technologies, and wireless power transfer (WPT) systems.

Smart Charging of Plug-in Electric Vehicles in Distribution Systems Considering Uncertainties

We may be standing on the precipice of a revolution in propulsion not seen since the internal combustion engine replaced the horse and buggy. The anticipated proliferation of electric cars will influence the daily lives of motorists, the economies of different countries and regions, urban air quality and global climate change. If you want to understand how quickly the transition is likely to occur, and the factors that will influence the predictions of the pace of the transition, this book will be an illuminating read.

Price-driven Charging of Plug-in Electric Vehicles in the Smart Grid

As our world’s population grows, so does our need for energy. Scientists seek the next breakthrough in new technology to power our cars, homes, and industry. The implications of a shift to electric vehicles is significant. In this title, discover what hybrid and electric vehicles are, their history, how we use them today, and how new technologies can contribute to our energy future. Learn about exciting new ways to power cars, homes, and industry. The implications of a shift to electric vehicles is significant.

Hybrid and Electric Vehicles

This book outlines issues related to massive integration of electric and plug-in hybrid electric vehicles into power grids. Electricity is becoming the preferred energy vector for the next new generation of road vehicles. It is widely acknowledged that road vehicles based on fully electric or hybrid drives can mitigate problems related to fossil fuel dependence. This book explains the emerging and understanding of storage systems for electric and plug-in hybrid vehicles. The recharging stations for these types of vehicles might represent a great advantage for the electric grid by drives can mitigate problems related to fossil fuel dependence. This book explains the emerging and understanding of storage systems for electric and plug-in hybrid vehicles. The recharging stations for these types of vehicles might represent a great advantage for the electric grid by