The Electric Car Development And Future Of Battery Hybrid And Fuel Cell Cars
Iee Power Energy Series 38

The volume is dedicated to the electric car. It examines the extent to which the electric car can contribute to sustainable transport development as part of a new mobility culture. The technical, cultural, political, social and aesthetic dimensions are considered. It will be shown how the general social framework has to change in order to make the electric car a success. This book is a translation of the original German edition "Das Elektroauto“ by "Marcus Keichel", published by Springer Fachmedien Wiesbaden in 2013. The translation was done with the help of artificial intelligence (machine translation by the service DeepL.com). A subsequent human revision was done primarily in terms of content, so that the book will read stylistically differently from a conventional translation. Springer Nature works continuously to further the development of tools for the production of books and on the related technologies to support the authors.

This book covers the development of electric cars -- from their early days to new hybrid models in production -- together with the very latest technological issues faced by automotive engineers working on electric cars, as well as the key business factors vital for the successful transfer of electric cars into the mass market. Considerable work has gone into electric car and battery development in the last ten years with the prospect of substantial improvements in range and performance in battery cars as well as in hybrids and those using fuel cells. This book comprehensively covers this important subject and will be of particular interest to engineers and managers working in the automotive and transport industries.

A Step-by-Step Guide to Building a Plug-In Hybrid Electric Vehicle from the Ground Up Written by clean energy guru and electric vehicle expert Seth Leitman, this hands-on guide gives you the latest technical information and easy-to-follow instructions for building a plug-in hybrid electric vehicle (PHEV). "Written by Seth Leitman, longtime green vehicle/sustainability expert and author of "Build Your Own Electric Vehicle," this 275-page book provides an overview of the technology and the issues in doing a conversion, and it works well as a different way in to the open source material that can be found at http://www.eaa-phev.org or the easier-to-remember http://www.priusplus.org." -- CalCars.org Build Your Own Plug-In Hybrid Electric Vehicle puts you in the driver's seat when it comes to hitting the road in a reliable, economical, and environmentally friendly ride. Inside, you'll find complete details on the hybrid powertrain and all the required components, including the motor, battery, and chassis. The book covers the plug-in hybrids currently on the market as well as hybrid conversion companies, conversion kits, and related resources. Pictures, diagrams, charts, and graphs illustrate each step along the way. With this how-to guide on hand, you'll be behind the wheel of your own plug-in hybrid electric automobile in no time! Build Your Own Plug-In Hybrid Electric Vehicle covers: Energy savings and environmental benefits PHEV background Drivetrain components and design Chassis selection DC and AC motor types Batteries and chargers The conversion process Licensing and insurance Safety, maintenance, troubleshooting, and warranties Clubs and associations Additional resources

A timely comprehensive reference consolidates the research and development of electric vehicle machines and drives for electric and hybrid propulsion • Focuses on electric vehicle machines and drives • Covers the major technologies in the area including fundamental concepts and applications • Emphasis the design criteria, performance analyses and application examples or potentials of various motor drives and machine systems • Accompanying website includes the simulation models and outcomes as supplementary material

The Electric Car Development and Future of Battery, Hybrid and Fuel-cell Cars
IET

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 worlds leading industry and research experts Executive summaries of specific case studies Information on basic research and application approaches

The book deals with the fundamentals, theoretical bases, and design methodologies of conventional internal combustion engine (ICE) vehicles, electric vehicles (EVs), hybrid electric vehicles (HEVs), and fuel cell vehicles (FCVs). The design methodology is described in mathematical terms, step-by-step, and the topics are approached from the overall drive train system, not just individual components. Furthermore, in explaining the design methodology of each drive train, design examples are presented with simulation results.

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.

The author explains why he believes the electric vehicle is going to rise to the top of the personal automobile market,
discusses the benefits of electric cars, and considers the possible role of the electric vehicle in the transformation of the United States from an oil-based to an electric-powered economy.

Electric Vehicle Battery Systems provides operational theory and design guidance for engineers and technicians working to design and develop efficient electric vehicle (EV) power sources. As Zero Emission Vehicles become a requirement in more areas of the world, the technology required to design and maintain their complex battery systems is needed not only by the vehicle designers, but by those who will provide recharging and maintenance services, as well as utility infrastructure providers. Includes fuel cell and hybrid vehicle applications. Written with cost and efficiency foremost in mind, Electric Vehicle Battery Systems offers essential details on failure mode analysis of VRLA, NiMH battery systems, the fast-charging of electric vehicle battery systems based on Pb-acid, NiMH, Li-ion technologies, and much more. Key coverage includes issues that can affect electric vehicle performance, such as total battery capacity, battery charging and discharging, and battery temperature constraints. The author also explores electric vehicle performance, battery testing (15 core performance tests provided), lithium-ion batteries, fuel cells and hybrid vehicles. In order to make a practical electric vehicle, a thorough understanding of the operation of a set of batteries in a pack is necessary. Expertly written and researched, Electric Vehicle Battery Systems will prove invaluable to automotive engineers, electronics and integrated circuit design engineers, and anyone whose interests involve electric vehicles and battery systems. * Addresses cost and efficiency as key elements in the design process * Provides comprehensive coverage of the theory, operation, and configuration of complex battery systems, including Pb-acid, NiMH, and Li-ion technologies * Provides comprehensive coverage of the theory, operation, and configuration of complex battery systems, including Pb-acid, NiMH, and Li-ion technologies

Advances in Battery Technologies for Electric Vehicles provides an in-depth look into the research being conducted on the development of more efficient batteries capable of long distance travel. The text contains an introductory section on the market for battery and hybrid electric vehicles, then thoroughly presents the latest on lithium-ion battery technology. Readers will find sections on battery pack design and management, a discussion of the infrastructure required for the creation of a battery powered transport network, and coverage of the issues involved with end-of-life management for these types of batteries. Provides an in-depth look into new research on the development of more efficient, long distance travel batteries. Contains an introductory section on the market for battery and hybrid electric vehicles. Discusses battery pack design and management and the issues involved with end-of-life management for these types of batteries. 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 other types 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 78,301 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-set EVs apart from internal combustion engine vehicles (ICEVs). The battery pack provides power to the motor that drives the vehicle. At times, the motor acts as a generator, sending electricity back 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 primarily powers the wheels. The battery pack and electric motor 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 currently the most widely accessible with standardized vehicle connectors and charge ports that can be set up for at-home charging. Level 3 (also called DC fast charging) offers the fastest charging rates on the market but is not available for at-home 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 PHEVs and AEVs are a major factor in determining EV greenhouse gas emissions relative to ICEVs. Per-mile EV emissions vary geographically and 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 management for batteries that are no longer suitable for use in vehicles. Support for EV deployment stems from, among other things, federal and state policies 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 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, which leaves the nation vulnerable to price shocks, supply disruptions, environmental degradation, and national security threats including terrorism. What does the future hold for this critical technology, and what should the U.S. government do to promote it? Hybrid vehicles now number more than one million on America's roads, and they are in high demand from consumers. The next major technological step is the plug-in electric vehicle. It combines an internal combustion engine and electric motor, just as hybrids do. But unlike their precursors, PEVs can be recharged from standard electric outlets, meaning the vehicles would no longer be dependent on oil. Widespread growth in the use of PEVs would dramatically reduce oil dependence, cut driving costs and reduce pollution from vehicles. National security would be enhanced, as reduced oil dependence decreases the leverage and resources of petroleum exporters. Brookings fellow David Sandalow heads up an authoritative team of experts including former government officials, private-sector analysts, academic experts, and nongovernmental advocates. Together they explain the current landscape for PEVs: the technology, the economics, and the implications for national security and the environment. They examine how the national interest could be served by federal promotion and investment in PEVs. For example, can tax or procurement policy advance the cause of PEVs? Should the public sector contribute to greater research and development? Should the government insist on PEVs to replenish its huge fleet of official vehicles? Plug-in electric vehicles are coming. But how soon, in what numbers, and to what effect? Federal policies in the years ahead will go a long way toward answering those questions. David Sandalow and his colleagues examine what could be done in that regard, as well as what should be done.

Do you want to switch to an electric vehicle? Did you know that electric cars were first developed in the 1830s? Do you want to save money and help protect the environment too? Have you heard about the incentives offered by the government to electric car buyers? This book provides an overview of electric vehicles (EVs) beginning with their invention and early development in the early 19th century and reasons why their production was put on hold until modern times. Next you will learn about the many current advances in electric vehicles and how their batteries and technology function, the best reasons to choose EVs, EV charging stations with the best apps, what smart charging is, types of EV batteries, autonomous governments, government incentives for EVs, cost of charging EVs, social impact of EV, circular economy of EV, overall comparison between EV and internal combustion engine cars, understand the innovative technologies available for charging EVs, solar charging stations, battery swapping stations, and the future of EV. This helpful guide presents everything potential buyers need to know to make the best choice, considering important factors such as the cost of maintaining and operating an electric vehicle, and the potential challenges including the importance of checking the location of charging stations in your neighborhood and near your workplace. Get excited about taking advantage of the current incentives to make purchasing an electric vehicle even more economical. Lastly, get a sneak peek into the future of electric vehicles from Tesla Model S, Tesla Model 3, Tesla Model X, Kia e-Niro, Hyundai Kona Electric, Hyundai Ioniq Electric, Audi e-tron, Mercedes-Benz EQC, Jaguar I-Pace, Porsche Taycan, Nissan Leaf E+, Renault Zoe, BMW i3, and others. Dr. Taiwo Ayodele is a Lecturer, an Entrepreneur and an IT Consultant by profession. He is also an expert in Artificial Intelligence & Machine Learning, and Intelligent Systems. He is a consultant in Future Transportation and Sustainable Development (Advisor), as well as author of many books, academic journal articles and conference papers and proceedings.

This fundamental guide teaches readers the basics of battery design for electric vehicles. Working through this book, you will understand how to optimise battery performance and functionality, whilst minimising costs and maximising durability. Beginning with the basic concepts of electrochemistry, the book moves on to describe implementation, control and management of batteries in real vehicles, with respect to the battery materials. It describes how to select cells and batteries with explanations of the advantages and disadvantages of different battery chemistries, enabling readers to put their knowledge into practice and make informed and successful design decisions, with a thorough understanding of the trade-offs involved. The first of its kind, and written by an industry expert with experience in academia, this is an ideal resource for both students and researchers in the fields of battery research and development as well as for professionals in the automotive industry extending their interest towards electric vehicles.

A complete guide to electric vehicle design, operation, and adoption This hands-on resource thoroughly explains the technologies and techniques involved in the design and operation of today's electric vehicles. Originally written for use in a course co-taught by the authors at Stanford University, Electric Vehicle Engineering discusses the physics of vehicle motion; the electrical principles on which motors rely; the chemistry, operation, and charging of lithium-ion batteries; the design and operation of motor controllers; the energy efficiency and environmental impact of electric vehicles; and the policy and economics affecting their adoption. After teaching you the theory, the authors will guide you through a hands-on project in which you will build a model electric car from the ground up with a hand-wound electric motor of your own design. Coverage includes: Introduction to electric vehicles Electric vehicle history Vehicle dynamics Electric motors Lithium-ion batteries Controllers Well-to-wheels energy and emissions analysis Electric vehicle policies and economics Future prospects Fully updated throughout, Electric Vehicle Technology, Second Edition, is a complete guide to the principles, design and applications of electric vehicle technology. Including all the latest advances, it presents clear and comprehensive coverage of the major aspects of electric vehicle development and offers an engineering-based evaluation of electric motor scooters, cars, buses and trains. This new edition includes: important new chapters on types of electric vehicles, including pickup and linear motors, overall efficiencies and energy consumption, and power generation, particularly for zero carbon emissions expanded chapters updating the latest types of EV, types of batteries, battery technology and other rechargeable devices, fuel cells, hydrogen supply, controllers, EV modeling, ancillary systems design, and EV and the environment brand new practical examples and case studies illustrating how electric vehicles can be used to substantially reduce carbon emissions and cut down reliance on fossil fuels futuristic concept models, electric and high-speed trains and development in magnetic levitation and linear motors an examination of EV efficiencies, energy consumption and sustainable power generation. MATLAB® examples
can be found on the companion website at http://www.wiley.com/go/electricvehicle2e.www.wiley.com/go/electricvehicle2e/a Explaining the underpinning science and technology, this book is essential for practicing electrical, automotive, power, control and instrumentation engineers working in EV research and development. It is also a valuable reference for academics and students in automotive, mechanical, power and electrical engineering.

Describes General Motors's decision to become the world's first mass producer of an electric car, discussing the development of the impact and the ramifications of this new type of vehicle for the American automotive industry. 30,000 first printing. Tour.

Electric Vehicles: Prospects and Challenges looks at recent design methodologies and technological advancements in electric vehicles and the integration of electric vehicles in the smart grid environment, comprehensively covering the fundamentals, theory and design, recent developments and technical issues involved with electric vehicles. Considering the prospects, challenges and policy status of specific regions and vehicle deployment, the global case study research makes this book useful for academics and researchers in all engineering and sustainable transport areas. Presents a systematic and integrated reference on the essentials of theory and design of electric vehicle technologies Provides a comprehensive look at the research and development involved in the use of electric vehicle technologies Includes global case studies from leading EV regions, including Nordic and European countries China and India

Go Green-Go Electric! Faster, Cheaper, More Reliable While Saving Energy and the Environment “Empowering people with the tools to convert their own vehicles provides an immediate path away from petroleum dependence and should be part of the solutions portfolio.”

Chelsea Sexton, Co-founder, Plug In America and featured in Who Killed the Electric Car? “Create a superior driving experience, strengthen America, and restore the planet’s ecosystems...that’s the promise of this book and it’s well worth a read!” – Josh Dorfman, Founder & CEO – Vivavi, Modern Green Furniture Store; Author, The Lazy Environmentalist: Your Guide to Easy, Stylish, Green Living. This new, updated edition of Build Your Own Electric Vehicle contains everything that made the first edition so popular while adding all the technological advances and new parts that are readily available on the market today. Build Your Own Electric Vehicle gets on the expressway to a green, ecologically sound, cost-effective way that even can look cool, too! This comprehensive how-to goes through the process of transforming an internal combustion engine vehicle to electric or even building an EV from scratch for as much or even cheaper than purchasing a traditional car. The book describes each component in detail---motor, battery, controller, charger, and chassis---and provides step-by-step instructions on how to put them all together. Build Your Own Electric Vehicle, Second Edition, covers: EV vs. Combustible Engine Overview Environmental and Energy Savings EV Evolution since the First Electric Car Current Purchase and Conversion Costs Chassis and Design Today's Best MotorsBattery Discharging/Charging Styles Electrical Systems Licensing and Insurance Issues Driving Maintenance Related Clubs and Associations Additional Resources

The electrical vehicle and plug-in hybrid electric vehicle play a fundamental role in the forthcoming new paradigms of mobility and energy models. The electrification of the transport sector would lead to advantages in terms of energy efficiency and reduction of greenhouse gas emissions, but would also be a great opportunity for the introduction of renewable sources in the electricity sector. The chapters in this book show the vision of the automobile was quietly in the past. A century later, electric cars are making a comeback. Fears over pollution and global warming have forced manufacturers to reconsider the electric concept. A History of Electric Cars presents for the first time the full story of electric cars and their hybrid cousins. It examines how and why electric cars failed the first time - and why today's car manufacturers must learn the lessons of the past if they are to avoid repeating previous mistakes all over again. The book examines in detail: Early vehicles such as the Lohner-Porsche petrol-electric hybrid of 1901; Key figures in the history of the electric car development such as Henry Ford; Sir Clive Sinclair's plans to build a number of electric vehicles, designed to sit alongside the Sinclair C5; The return of the electric technology to vehicles as diverse as the NASA Lunar Rover, commuting vehicles and superscars; Future developments in electric cars. For the first time the full story of electric cars and their hybrids are examined. The hidden past of the electric automobile is uncovered and its future developments are discussed. Superbly illustrated with 300 colour photographs, many of which are rare and original sketch designs. Nigel Burton has written and lectured on cars and automotive history for more than twenty years.

The work included in this Interim Summary Report is part of the Electric Car Program, the goal of which is to develop by 1979 a totally new electric car with substantially improved performance over those electric cars available in 1976. The rationale used in designing a four-passenger electric car for use in an urban environment is presented. The approach taken was to design an electric car utilizing current technology. On the basis of technology analyses, upgrading improvements were identified which would permit the electric car to more nearly meet all of the ERDA near-term goals. The electric car design, including the chassis, drive train, major components, and the control are summarized. The Phase I electric car design will meet many of the ERDA near-term goals. Upgrading development programs are identified which, when incorporated in Phase II vehicle development, will result in upgraded performance, which essentially meets ERDA's near-term goals.

BUILD, CONVERT, OR BUY A STATE-OF-THE-ART ELECTRIC VEHICLE Thoroughly revised and expanded, Build Your Own Electric Vehicle, Third Edition, is your go-to guide for converting an internal combustion engine vehicle to electric or building an EV from the ground up. You'll also find out about the wide variety of EVs available for purchase and how they're being built. This new edition details all the latest breakthroughs, including AC propulsion and regenerative braking systems, intelligent controllers, batteries, and charging technologies. Filled with updated photos, this cutting-edge resource fully describes each component--motor, battery, controller, charger, and chassis--and provides illustrated, step-by-step instructions on how to assemble all the parts. Exclusive web content features current supplier and dealer lists. Custom-built for environmentalists, engineers, students, hobbyists, and mechanics, this hands-on guide puts you in the fast lane toward a cost-effective, reliable green machine. Build Your Own Electric Vehicle, Third Edition, covers: Environmental impact and energy savings The best EV for you--purchase trade-offs, conversion trade-offs, and conversion costs Chassis and design Different types of electric motors and controllers Lithium EV batteries Chargers and electrical systems EV builds and conversions Licensing and insuring your EV Driving and
maintenance List of manufacturers and dealers regularly updated on website

This illustrated history chronicles electric and hybrid cars from the late 19th century to today’s fuel cell and plug-in automobiles. It describes the politics, technology, marketing strategies, and environmental issues that have impacted electric and hybrid cars’ research and development. The important marketing shift from a “woman’s car” to “going green” is discussed. Milestone projects and technologies such as early batteries, hydrogen and bio-mass fuel cells, the upsurge of hybrid vehicles, and the various regulations and market forces that have shaped the industry are also covered.

The Great Race recounts the exciting story of a century-long battle among automakers for market share, profit, and technological dominance—and the thrilling race to build the car of the future. The world’s great manufacturing juggernaut—the $3 trillion automotive industry—is in the throes of a revolution. Its future will include cars Henry Ford and Karl Benz could scarcely imagine. They will drive themselves, won’t consume oil, and will come in radical shapes and sizes. But the path to that future is fraught. The top contenders are two traditional manufacturing giants, the US and Japan, and a newcomer, China. Team America has a powerful and little-known weapon in its arsenal: a small group of technology buffs and regulators from California. The story of how and why these men and women could shape the future—how you move, how you work, how you live on Earth—is an unexpected tale filled with unforgettable characters: a scorned chemistry professor, a South African visionary who went for broke, an ambitious Chinese ex-pat, a quixotic Japanese nuclear engineer, and a string of billion-dollar wagers by governments and corporations. “To explain the scramble for the next-generation auto—and the roles played in that race by governments, auto makers, venture capitalists, environmentalists, and private inventors—comes Levi Tillemann’s The Great Race…Mr. Tillemann seems ideally cast to guide us through the big ideas percolating in the world’s far-flung workshops and labs” (The Wall Street Journal). His account is incisive and riveting, explaining how America bounced back in this global contest and what it will take to command the industrial future.

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, Overcoming 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 deployment. Overcoming 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 deployment. Overcoming 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 deployment.

Very Good,No Highlights or Markup,all pages are intact.

Lithium batteries may hold the key to an environmentally sustainable, oil-independent future. From electric cars to a “smart” power grid that can actually store electricity, letting us harness the powers of the sun and the wind and use them when we need them, lithium—a metal half as dense as water, found primarily in some of the most uninhabitable places on earth—has the potential to set us on a path toward a low-carbon energy economy. In Bottled Lightning, the science reporter Seth Fletcher takes us on a fascinating journey, from the salt flats of Bolivia to the labs of MIT and Stanford, from the turmoil at GM to cutting-edge lithium-ion battery start-ups, introducing us to the key players and ideas in an industry with the power to reshape the world. Lithium is the thread that ties together many key stories of our time: the environmental movement; the American auto industry, staking its revival on the electrification of cars and trucks; the struggle between first-world countries in need of natural resources and the impoverished countries where those resources are found; and the overwhelming popularity of the portable, Internet-connected gadgets that are changing the way we communicate. With nearly limitless possibilities, the promise of lithium offers new hope to a foundering American economy desperately searching for a green-tech boom to revive.

An expanded and updated third edition of this widely praised, bestselling textbook presents a comprehensive systems-level perspective of electric and hybrid vehicles with emphasis on technical aspects, mathematical relationships and basic design guidelines. The emerging technologies of electric vehicles require the dedication of current and future engineers, so the target audience for the book is the young professionals and students in engineering eager to learn about the area. The book is concise and clear, its mathematics are kept to a necessary minimum and it contains a well-balanced set of contents of the complex technology. Engineers of multiple disciplines can either get a broader overview or explore in depth a particular aspect of electric or hybrid vehicles. Additions in the third edition include simulation-based design analysis of electric and hybrid vehicles and their powertrain components, particularly that of traction inverters, electric machines and motor drives. The technology trends to incorporate wide bandgap power electronics and reduced rare-earth permanent magnet electric machines in the powertrain components have been highlighted. Charging stations are a critical component for the electric vehicle infrastructure, and hence, a chapter on vehicle interactions with the power grid has been added. Autonomous driving is another emerging technology, and a chapter is included describing the autonomous driving system architecture and the hardware and software needs for such systems. The platform has been set in this book for system-level simulations to develop models using various softwares used in academia and industry, such as MATLAB®/Simulink, PLECS, PSIM, Motor-CAD and Altair Flux. Examples and simulation results are provided in this edition using these software tools. The third edition is a timely revision and contribution to the field of electric vehicles that has reached recently notable markets in a more and more environmentally sensitive world.

The Paris Agreement on Climate Change adopted on December 12, 2015 is a voluntary effort to reduce greenhouse gas emissions. In order to reach the goals of this agreement, there is a need to generate electricity without greenhouse gas emissions and to electrify transportation. An infrastructure of SPCSs can help accomplish both of these transitions. Globally, expenditures associated with the generation, transmission, and use of electricity are more than one trillion dollars per year. Annual transportation expenditures are also more than one trillion dollars per year. Almost everyone will be impacted by these changes in transportation, solar power generation, and smart grid developments. The benefits of reducing greenhouse gas emissions will differ with location, but all will be impacted. This book is about the benefits associated with adding solar panels to parking lots to generate electricity, reduce greenhouse gas emissions, and provide shade and shelter from rain and snow. The electricity can flow into the power grid or be used to charge electric vehicles (EVs). Solar powered charging stations (SPCSs) are already in many parking lots in many countries of the world. The prices of solar panels have decreased recently, and about 30% of the new U.S. electrical generating capacity in 2015 was from solar energy. More than one million EVs are in service in 2016, and there are significant benefits associated with a convenient charging infrastructure of SPCSs to support transportation with electric vehicles. Solar Powered Charging Infrastructure for Electric Vehicles: A Sustainable Development aims to share information on pathways from our present situation to a world with a more sustainable transportation system with EVs, SPCSs, a modernized smart power grid with
energy storage, reduced greenhouse gas emissions, and better urban air quality. Covering 200 million parking spaces with solar panels can generate about 1/4 of the electricity that was generated in 2014 in the United States. Millions of EVs with 20 to 50 kWh of battery storage can help with the transition to wind and solar power generation through owners responding to time-of-use prices. Written for all audiences, high school and college teachers and students, those in industry and government, and those involved in community issues will benefit by learning more about the topics addressed in this book. Those working with electrical power and transportation, who will be in the middle of the transition, will want to learn about all of the challenges and developments that are addressed here. The book presents interesting topics from the area of modeling and simulation of electric vehicles application. The results presented by the authors of the book chapters are very interesting and inspiring. The book will familiarize the readers with the solutions and enable the readers to enlarge them by their own research. It will be useful for students of Electrical Engineering; it helps them solve practical problems.

"In Electric Vehicle, Gijs Mom challenges this view, arguing that at the beginning of the automobile age neither the internal combustion engine nor the battery-powered vehicle enjoyed a clear advantage. He explores the technology and marketing/consumer-feedback relationship over four "generations" of electric-vehicle design, with separate chapters on privately owned passenger cars and commercial vehicles. He makes abundant comparisons among European countries and between Europe and America." "The Electric Vehicle offers a long-overdue reassessment of the place of this technology in the history of street transportation."--BOOK JACKET.

The resurgence of the electric car in modern life is a tale of adventurers, men and women who bucked the complete dominance of the fossil fueled car to seek something cleaner, simpler and cheaper. Award-winning former Wall Street Journal reporter John Fialka documents the early days of the electric car, from the M.I.T./Caltech race between prototypes in the summer of 1968 to the 1987 victory of the Sunraycer in the world's first race featuring solar powered cars. Thirty years later, the electric has captured the imagination and pocketbooks of American consumers. Organizations like the U.S. Department of Energy and the state of California, along with companies from the old-guard of General Motors and Toyota as well as upstart young players like Tesla Motors and Elon Musk have embraced the once-extinct technology. The electric car has steadily gained traction in the U.S. and around the world. We are watching the start of a trillion dollar, worldwide race to see who will dominate one of the biggest commercial upheavals of the 21st century. Drawing from the last decade of his 26-year career at the Wall Street Journal, where he covered energy and environmental matters, ClimateWire founder and industry insider John Fialka brings to life this thrilling and important story about American's rejection and second obsession with the electric car.

The electric vehicle market has been gradually gaining prominence in the world due to the rise in pollution levels caused by traditional IC engine-based vehicles. The advantages of electric vehicles are multi-pronged in terms of cost, energy efficiency, and environmental impact. The running and maintenance cost are considerably less than traditional models. The harmful exhaust emissions are reduced, besides the greenhouse gas emissions, when the electric vehicle is supplied from a renewable energy source. However, apart from some Western nations, many developing and underdeveloped countries have yet to take up this initiative. This lack of enthusiasm has been primarily attributed to the capital investment required for charging infrastructure and the slow transition of energy generation from the fossil fuel to the renewable energy format. Currently, there are very few charging stations, and the construction of the same needs to be ramped up to supplement the growth of electric vehicles. Grid integration issues also crop up when the electric vehicle is used to either do supply addition to or draw power from the grid. These problems need to be fixed at all the levels to enhance the future of energy efficient transportation. Electric Vehicles and the Future of Energy Efficient Transportation explores the growth and adoption of electric vehicles for the purpose of sustainable transportation and presents a critical analysis in terms of the economics, technology, and environmental perspectives of electric vehicles. The chapters cover the benefits and limitations of electric vehicles, techno-economic feasibility of the technologies being developed, and the impact this has on society. Specific points of discussion include electric vehicle architecture, wireless power transfer, battery management, and renewable resources. This book is of interest for individuals in the automotive sector and allied industries, policymakers, practitioners, engineers, technicians, researchers, academicians, and students looking for updated information on the technology, economics, policy, and environmental aspects of electric vehicles.

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