

Indian Electric Vehicle Hybrid Vehicle Market In India

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 references make 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

Urban areas are integral to India's growth and development, accounting for around two-thirds of the country's GDP. Analysing India's rapidly expanding process of urbanisation, the book identifies the key challenges and opportunities and proposes suitable managerial and policy reforms. It addresses critical issues and puts forth suggestions for better planning financing alternatives and, most importantly, better governance for improved service delivery and affordable housing. Divided thematically into three sections, the volume takes into account the important facets of urbanisation, including the state of urban infrastructure and planning in India with due attention to sustainability, the role of finance in urban development and its dependence on governance, and methods to generate good governance in public institutions, and the impact on housing and climate change. The 11 essays included in this book have been written by leading analysts and practitioners, who propose critical reforms and policy interventions. The volume will be indispensable to students and scholars of urban economics, development studies, urban planning, business practitioners, policymakers as well as the informed general reader.

This book presents the ways in which three key issues of the modern world – transformation, digitalisation and sustainability – may be combined for the greater good and highlights which activities may be designed to integrate these three directly linked paths. It is an experience-derived and evidence-based analysis of how sustainable development impacts the transformation of the economy and how the business environment influences economic transformation in the light of the sustainable development principles. The book addresses the current challenges and shows how the economy can be transformed further in an organic way that meets the needs of society and the environment, through the use of digital technologies. The multidisciplinary approach to sustainability transformation is one of the core strengths of the book, as it emphasises the need for a holistic approach to the functioning of sustainable development ideas at the micro- and macro-levels. The authors present a fresh perspective, particularly around the regulations stimulating the sustainable development of enterprises, tax systems, and the allocation of capital. Moreover, the book brings together and makes available the results of the latest research on the subject, using a vast amount of primary evidence and both quantitative and qualitative methodology. The authors' insights go beyond the obvious effects of economic transformation and call attention to ways in which smart technology and digitalisation may help to achieve the Sustainable Development Goals. The book is directed first and foremost towards academics, researchers and students, but also professionals, who would like to expand their knowledge of sustainable development from a scientific perspective.

This book focuses on the latest emerging technologies in electric vehicles (EV), and their economic and environmental impact. The topics covered include different types of EV such as hybrid electrical vehicle (HEV), battery electrical vehicle (BEV), fuel cell electrical vehicle (FCEV), plug-in hybrid electrical vehicle (PHEV). Theoretical background and practical examples of conventional electrical machines, advanced electrical machines, battery energy sources, on-board charging and off-board charging techniques, and optimization methods are presented here. This book can be useful for students, researchers and practitioners interested in different problems and challenges associated with electric vehicles.

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.

Applications of solar energy have been expanding in recent years across the world. This monograph details such far-reaching and important applications which have the potential for large impact on various segments of the society. It focuses solar energy technologies for various applications such as generation of electric power, heating, energy storage, etc. This volume will be a useful guide for researchers, academics and scientists.

Heavy-Duty Electric Vehicles: From Concept to Reality presents a step-by-step design and development guide for heavy-duty electric vehicles. It also offers practical insights based on the commercial application of an electric city bus. Heavy-duty electric vehicle design is challenging due to a lack of clear understanding of the government policies, R&D directions and uncertainty around the performance of various subsystems in an electric powertrain. Therefore, this book discusses key technical aspects of motors, power electronics, batteries and vehicle control systems, and outlines the system integration strategies necessary for design and safe operation of electric vehicles in practice. This comprehensive book serves as a guide to engineers and decision makers involved in electric vehicle development programs and assists them in finding the suitable electric powertrain solution for a given heavy-duty vehicle application. Offers an overview of various standards and regulations that guide the electric vehicle design process and a comprehensive discussion on various government policies and incentive schemes propelling the growth of heavy electric vehicle markets across the world; Provides a comparative evaluation of different electric drivetrain concepts and a step-by-step power calculation guide for heavy-duty electric powertrain; Explains material selection and manufacturing methods for next generation batteries; Discusses key elements and design rules for creating a robust high voltage energy storage system, appropriate packaging and its support systems including charging network; Includes a concise description of torque mapping, power management and fault handling strategies for inverter drive and control systems; Features case studies to better understand complex topics like charging system requirements and vehicle control system diagnostics.

A thoroughly revised 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.

Asian transportation systems and services, as well as their usage, are fraught with challenges. This handbook therefore seeks to examine the possible solutions to the problems faced by the region. It illustrates the history of transportation development in Asia and provides a comprehensive overview of research on urban and intercity transport.

Presenting an extensive literature review and detailed summaries of the major findings and methodologies, this book also offers suggestions for future research activities from top-level international researchers. Written from an interdisciplinary perspective, the topics covered include: Transportation systems across Asia; Traffic accidents; Air pollution; Land use and logistics; Transport governance. Considering the population and economic development scale, as well as the diverse cultures of Asia, the Routledge Handbook of Transport in Asia will be a valuable resource for students and scholars of transportation, Asian development and Asian Studies in general.

The aim of this new book series (Diatoms: Biology and Applications) is to provide a comprehensive and reliable source of information on diatom biology and applications. The first book of the series, Diatoms Fundamentals & Applications, is wide ranging, starting with the contributions of amateurs and the beauty of diatoms, to details of how their shells are made, how they bend light to their advantage and ours, and major aspects of their biochemistry (photosynthesis and iron metabolism). The book then delves into the ecology of diatoms living in a wide range of habitats, and look at those few that can kill or harm us. The book concludes with a wide range of applications of diatoms, in forensics, manufacturing, medicine, biofuel and agriculture. The contributors are leading international experts on diatoms. This book is for a wide audience researchers, academics, students, and teachers of biology and related disciplines, written to both act as an introduction to diatoms and to present some of the most advanced research on them.

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.

This book constitutes the proceedings of the First International Conference on Emerging Trends in Engineering (ICETE), held at University College of Engineering and organised by the Alumni Association, University College of Engineering, Osmania University, in Hyderabad, India on 22–23 March 2019. The proceedings of the ICETE are published in three volumes, covering seven areas: Biomedical, Civil, Computer Science, Electrical & Electronics, Electronics & Communication, Mechanical, and Mining Engineering. The 215 peer-reviewed papers from around the globe present the latest state-of-the-art research, and are useful to postgraduate students, researchers, academics and industry engineers working in the respective fields. Volume 2 presents papers on the theme "Advances in Decision Sciences, Image Processing, Security and Computer Vision – International Conference on Emerging Trends in Engineering (ICETE)". It includes state-of-the-art technical contributions in the areas of electronics and communication engineering and electrical and electronics engineering, discussing the latest sustainable developments in fields such as signal processing and communications; GNSS and VLSI; microwaves and antennas; signal, speech and image processing; power systems; and power electronics.

This book is one of the first fully-fledged studies to examine the next world-class industrial leaders emerging from China and India; exploring the domestic and international factors that have led to their rise, and comparing their experiences with other East Asian late-comers such as Japan.

This is a monograph presented at United Service Institution of India

The IEEE ICECCT 2019 aims to offer a great opportunity to bring together professors, researchers and scholars around the globe a great platform to deliver the latest innovative research results and the most recent developments and trends in Electrical, Electronics and Computer Engineering and Technology fields The conference will feature invited talks from eminent personalities all around the world, pre conference tutorial workshops and referred paper presentations The vision of IEEE ICECCT 2019 is to promote foster communication among researchers and practitioners working in a wide variety of the above areas in Engineering and Technology

Electric vehicles/hybrid electric vehicles (EV/HEV) commercialization is still a challenge in industries in terms of performance and cost. The performance along with cost reduction are two tradeoffs which need to be researched to arrive at an optimal solution. This book focuses on the convergence of various technologies involved in EV/HEV. The book brings together the research that is being carried out in the field of EV/HEV whose leading role is by optimization techniques with artificial intelligence (AI). Other featured research includes green drive schemes which involve the possible renewable energy sources integration to develop eco-friendly green vehicles, as well as Internet of Things (IoT)-based techniques for EV/HEVs. Electric vehicle research involves multi-disciplinary expertise from electrical, electronics, mechanical engineering and computer science. Consequently, this book serves as a point of convergence wherein all these domains are addressed and merged and will serve as a potential resource for industrialists and

researchers working in the domain of electric vehicles.

This book is aimed to bring out the understanding of brand positioning of two wheelers in the minds of customers i.e., whether the customers have brand awareness, brand image, brand identity, brand knowledge about two wheelers which lead them to satisfaction. In turn, their brand preferences towards specific two wheelers among popular brands such as Hero, Honda, TVS, Suzuki, Bajaj and Yamaha were associated with brand positioning.

The automotive industry is still one of the world's largest manufacturing sectors, but it suffers from being very technology-focused as well as being relatively short-term focused. There is little emphasis within the industry and its consultancy and analyst supply network on the broader social and economic impacts of automobility and of the sector that provides it. The Global Automotive Industry addresses this need and is a first port of call for any academic, official or consultant wanting an overview of the state of the industry. An international team of specialist researchers, both from academia and business, review and analyse the key issues that make vehicle manufacturing still the world's premier manufacturing sector, closely tied in with the fortunes of both established and newly emerging economies. In doing so, it covers issues related to manufacturing, both established practices as well as new developments; issues relating to distribution, marketing and retail, vehicle technologies and regulatory trends; and, crucially, labour practices and the people who build cars. In all this it explains both how the current situation arose and also likely future trajectories both in terms of social and regulatory trends, as the technological, marketing and labour practice responses to those, leading in many cases to the development of new business models. Key features Provides a global overview of the automotive industry, covering its current state and considering future challenges Contains contributions from international specialists in the automotive sector Presents current research and sets this in an historical and broader industry context Covers threats to the industry, including globalization, economic and environmental sustainability The Global Automotive Industry is a must-have reference for researchers and practitioners in the automotive industry and is an excellent source of information for business schools, governments, and graduate and undergraduate students in automotive engineering.

The contributors explore the rapid growth of Indian multinationals and provide valuable insights into the patterns and trends of their outward investments and the factors that led to their emergence in the global FDI market. They also look at their continuously evolving strategies in the global economy.

This concise book has been designed for easy reading and to meet the critical skill requirements of students in the branches of Automobile Engineering and Mechanical Engineering and Mechanical Engineering. The contents are presented in 22 lucid chapters. The book deals with the fundamentals, electric vehicles (EVs), hybrid electric vehicles (HEVs), and fuel cell vehicles (FCVs). It comprehensively presents vehicle performance, configuration, and control strategy for different electric and hybrid electric vehicles. This course book is intended for use as a Textbook and as a primary Reference book by colleges and technical universities offering core and elective subjects like Electric and Hybrid Vehicles and New Generation Vehicles.

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.

Industrial Dynamics in China and India Firms, Clusters, and Different Growth Paths Springer

This book presents selected articles from INDIA SMART GRID WEEK (ISGW 2017), which is the third edition of the Conference cum Exhibition on Smart Grids and Smart Cities, organized by India Smart Grid Forum from 07-10 March 2017 at Manekshaw Centre, Dhaula Kuan, New Delhi, India. ISGF is a public private partnership initiative of the Ministry of Power, Govt. of India with the mandate of accelerating smart grid deployments across the country. This book gives current scenario updates of Indian power sector business. It also highlights various disruptive technologies for power sector business. Global economic growth, recently fuelled by Asia's emerging economies, has greatly accelerated the accumulation of greenhouse gases in the atmosphere and boosted demand for scarce natural resources, including energy, food and mineral raw materials. These developments are pushing the planet close to its ecological boundaries. Transforming the world economy towards sustainability, while ensuring decent levels of resource use for all global citizens, is the greatest challenge of our time. This book explores how innovation systems need to be adapted to successfully confront these challenges. The first chapter introduces the concept of sustainability-oriented innovation systems which highlights the systematic differences between systems that have developed along current resource-intensive technological trajectories and those that address the impending environmental mega-problems. The subsequent articles present case studies of sustainability-oriented innovations in a number of policy areas, including energy efficiency, electric mobility and generation of renewable energy, in China and India. These case studies confirm the specificities of innovation systems geared towards a green techno-economic

paradigm. This book was originally published as a special issue of Innovation and Development.

This book is a comprehensive examination of the dynamics of India's energy security policy in the domestic and international context. Over the past decade and a half, energy security has been a constant driver of India's foreign policy. Successive Indian governments have emphasized it as a major concern, next only to food security. The long-term satisfaction of India's energy security needs calls for a fresh and multi-pronged approach. This is imperative in the light of the recent dynamics of India's foreign policy and the challenges that India is facing in its quest for energy security, mainly in the context of diversification of sources abroad and shift to alternative sources in a carbon-controlled environment. This is further intensified in the context of the complex and competitive strategic rivalry between India and China in the Indo-Pacific region, as India looks outward and expands its outreach to meet its pressing energy security challenges. The book presents an in-depth analysis of all such domestic and foreign policy challenges and measures to meet India's fast-growing energy demand in a competitive geopolitical environment.

A comprehensive text, combining all important concepts and topics of Electrical Machines and featuring exhaustive simulation models based on MATLAB/Simulink Electrical Machine Fundamentals with Numerical Simulation using MATLAB/Simulink provides readers with a basic understanding of all key concepts related to electrical machines (including working principles, equivalent circuit, and analysis). It elaborates the fundamentals and offers numerical problems for students to work through. Uniquely, this text includes simulation models of every type of machine described in the book, enabling students to design and analyse machines on their own. Unlike other books on the subject, this book meets all the needs of students in electrical machine courses. It balances analytical treatment, physical explanation, and hands-on examples and models with a range of difficulty levels. The authors present complex ideas in simple, easy-to-understand language, allowing students in all engineering disciplines to build a solid foundation in the principles of electrical machines. This book: Includes clear elaboration of fundamental concepts in the area of electrical machines, using simple language for optimal and enhanced learning Provides wide coverage of topics, aligning with the electrical machines syllabi of most international universities Contains extensive numerical problems and offers MATLAB/Simulink simulation models for the covered machine types Describes MATLAB/Simulink modelling procedure and introduces the modelling environment to novices Covers magnetic circuits, transformers, rotating machines, DC machines, electric vehicle motors, multiphase machine concept, winding design and details, finite element analysis, and more Electrical Machine Fundamentals with Numerical Simulation using MATLAB/Simulink is a well-balanced textbook perfect for undergraduate students in all engineering majors. Additionally, its comprehensive treatment of electrical machines makes it suitable as a reference for researchers in the field.

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* provides an overview of the current status of PEVs and makes recommendations to spur the industry and increase the attractiveness 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.

Lightweight Electric/Hybrid Vehicle Design, covers the particular automotive design approach required for hybrid/electrical drive vehicles. There is currently huge investment world-wide in electric vehicle propulsion, driven by concern for pollution control and depleting oil resources. The radically different design demands of these new vehicles requires a completely new approach that is covered comprehensively in this book. The book explores the rather dramatic departures in structural configuration necessary for purpose-designed electric vehicle including weight removal in the mechanical systems. It also provides a comprehensive review of the design process in the electric hybrid drive and energy storage systems. Ideal for automotive engineering students and professionals *Lightweight Electric/Hybrid Vehicle Design* provides a complete introduction to this important new sector of the industry. comprehensive coverage of all design aspects of electric/hybrid cars in a single volume packed with case studies and applications in-depth treatment written in a text book style (rather than a theoretical specialist text style)

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.

The International Conference on ICT for Digital, Smart, and Sustainable Development (ICIDSSD'20) aims to provide an annual platform for the researchers, academicians, and professionals from across the world. ICIDSSD'20, held at Jamia Hamdard, New Delhi, India, is the second international conference of this series of conferences to be held annually. The conference majorly focuses on the recent developments in the areas relating to Information and Communication Technologies and contributing to Sustainable Development. ICIDSSD'20 has attracted research

papers pertaining to an array of exciting research areas. The selected papers cover a wide range of topics including but not limited to Sustainable Development, Green Computing, Smart City, Artificial Intelligence, Big Data, Machine Learning, Cloud Computing, IoT, ANN, Cyber Security, and Data Science. Papers have primarily been judged on originality, presentation, relevance, and quality of work. Papers that clearly demonstrate results have been preferred. We thank our esteemed authors for having shown confidence in us and entrusting us with the publication of their research papers. The success of the conference would not have been possible without the submission of their quality research works. We thank the members of the International Scientific Advisory Committee, Technical Program Committee and members of all the other committees for their advice, guidance, and efforts. Also, we are grateful to our technical partners and sponsors, viz. HNF, EAI, ISTE, AICTE, IIC, CSI, IETE, Department of Higher Education, MHRD and DST for sponsorship and assistance.

India is a diverse country with consumers who are demanding and aspirational. The business environment is complex and intensely competitive. Being a successful manager today requires deep market knowledge and a sound grasp of concepts and techniques with which to develop and execute successful strategies. This book is designed to equip readers with updated knowledge and advanced tools and techniques to create effective strategies to win customers. The concepts are explained lucidly and illustrated with several live case studies and teaches a step-by-step method of the process of developing market segments and executing effective strategies.

Is it the appearance? The brand name? Performance? Or is it something much deeper? In this book, Dr. Babar Zamaan identifies the factors that influence prospective premium car buyers. A must read for marketing students, and professionals in the automobile industry.

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 quest for energy independence and rising environmental concerns are key drivers in the growing popularity of electric vehicles or EVs - electric and plug-in hybrid cars. Studies indicate that for 90% of the Americans who use their cars to get to work every day, the daily commute distance is less than 50 km - or 30 mi - and, on the average, the commuter car remains parked about 22 h per day. The EVs have in common the batteries, which provide storage capability that can be effectively harnessed when the vehicles are integrated into the grid. The entire concept of using the EVs as a distributed energy resource - load and resource - is known as the vehicle-to-grid or V2G concept. Though I have more than two decades of rendezvous with energy and diversified energy sources to quench the thirst of humanity, my specific interest in electric vehicle started in 2014 when I joined Black & Veatch and got associated with prestigious project of Tesla as strategist and adopt the success model of US market for Asia. Tesla Motors manufactures the Tesla Model S, the all-electric car that won the Motor Trend 2013 Car of the Year award. While developing the car, Tesla launched a program to aggressively deploy high-power, fast-charging stations -- "Superchargers" -- along major travel corridors throughout the United States. Tesla awarded Black & Veatch a contract to design and construct pilot sites in the Supercharger network. The Tesla Supercharger U.S. build-out is the largest project to date for the Black & Veatch team. Services include engineering, site assessment, and permitting and construction services for Tesla's charging stations. "It's one thing to build one Supercharger site, but it's a totally different thing to build 100 at a time, or have 40 or 50 in construction at any given time. Black & Veatch brought an ability to be able to expand rapidly, bring on the resources necessary and also manage the construction of a complex project like that - all concurrently." Kevin Kassekert, Director, Supercharger Deployment and Energy Efficiency, Tesla Motors, Inc. It was my absolute privilege to be part of the team of Black & Veatch, who is now a market leader in the design, construction and integration of complex electric vehicle (EV) and hydrogen/fuel cell vehicle (FCV) infrastructure. My journey started with a Big Bang when B&V Chairman Steve Edward pioneered the Chairman's Challenge for new and fresh ideas from offices across the global with the help of an online contest. Absolute delight was my feeling when my first idea on a strategic model of business capture (I call it Shark Strategy) won the most voted idea of the challenge out of hundreds of ideas submitted by most of the top brains of the 10000 odd employees of the 100 year old firm. It was just the beginning as in the next Chairman's Challenge, I collaborated with others in Kansas HQ to put forth another idea on use of Drone for Industrial Application and Project Management & Monitoring of complex nature like EPC work of intercontinental pipelines or Electric Transmission Lines across the mountains or dense forest like Amazon basin. To my absolute surprise, our team won the top award of the chairman's challenge and each team members were gifted a real Drone costing not less than 15000 INR at that time, but unfortunately it could not be shipped to Mumbai for me as Drones for private applications were banned by government of India. My all other team members sent me pictures of drones awarded to them. Great Memories of Kansas City Baseball match cheering Royals after intensive strategy meetings on future of the company and American Supercharger Infrastructures (Read Tesla, Volta and other projects). This book is my attempt to help generation next understand and support clean vehicle adoption, advance clean transportation and sustainability.

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